

of Plant Pathology at Cornell University are raising a graduate student loan fund to be administered by the university. Professor Whetzel, who was always much interested in the welfare of the graduate student in science, was concerned over the inadequacy of funds for loans, and gave considerable time and thought to ways of correcting the situation. In more recent months before his death he was especially concerned with the problem of depleted ranks in both undergraduate and graduate students, as the result of the war, and saw in a graduate student loan fund the means of helping some promising students who otherwise could not finance their graduate work. He did not live to see any of his plans for obtaining money materialize, but it is believed that the Memorial Loan Fund may serve to fulfil his purpose in part. While solicitations are being restricted largely to former students and associates, and close friends, contributions from any one desiring to assist will be most welcome. Further information may be had from Professor L. M. Massey, of the Department of Plant Pathology, College of Agriculture, Cornell University, Ithaca, N. Y.

THE CLEVELAND PHYSICS SOCIETY

PHYSICISTS, meeting at the Case School of Applied Science, have formed the Cleveland Physics Society, which is intended to serve the academic and industrial physicists of Greater Cleveland in a manner similar to that in which the engineering societies serve the engineers.

Over one hundred members attended the meeting (March 22) which was addressed by Professor P. M. Morse, of the department of physics of the Massachusetts Institute of Technology. His topic was "Recent Developments in Room and Auditorium Acoustics."

Officers elected were as follows: *President*, Leonard O. Olsen, assistant professor of physics, Case School of Applied Science; *Vice-president*, Clifton G. Found, director of physical research, General Electric Company, Nela Park; *Secretary*, John T. McCarthy, assistant professor of physics, Western Reserve Univer-

sity; *Treasurer*, W. Byron Brown, physicist, N.A.C.A. Engine Laboratory. Elmer Hutchisson, dean of the faculty of the Case School, was elected a member of the executive council.

It is planned to hold regular monthly meetings which will be addressed by prominent physicists who will speak on subjects of rather general interest. In addition informal seminars will be held occasionally on more specialized subjects.

Information concerning meetings or membership in the society may be obtained from the secretary, Professor John T. McCarthy, at Western Reserve University by mail or telephone.

MEDALS OF THE FRANKLIN INSTITUTE

IN addition to the Medals of the Franklin Institute announced in *SCIENCE* last week the Franklin Medal has been awarded to Dr. Harlow Shapley, director of the Harvard College Observatory, "in consideration of his many valuable contributions to the science of astronomy, and especially of his work in the measurement of the vast distances necessary for the determination of the nature and extent of our galaxy, as well as those of other galaxies external to ours."

The Potts Gold Medal for 1945 has been awarded to Edwin A. Link in recognition of "valuable contributions in the field of training devices for aviators." The medal was established in 1906 by the bequest of Howard N. Potts to be given for distinguished work in science or the mechanic arts.

The Edward Longstreth Medal has been awarded to Sanford Lockwood Cluett, vice-president of Cluett, Peabody and Company, Troy, N. Y., "in view of the fundamental nature and mechanical ingenuity displayed in the development of the process for the pre-shrinking of woven fabrics, known as Sanforizing."

The Louis E. Levy Medal has been awarded to Dr. Rupen Eksbergian, consulting engineer for the Edward G. Budd Manufacturing Company, Philadelphia, for his paper entitled "On the Reaction of Fluids and Fluid Jets," which appeared in the issue of the *Journal* of the institute for May, 1944.

SCIENTIFIC NOTES AND NEWS

THE Washington section of the American Chemical Society presented on March 8 the Hillebrand Prize for 1944 for an outstanding contribution to the science of chemistry during the three preceding years to Raymond M. Hann, of the National Institute of Health, in recognition of his work on the chemistry, structure and synthesis of methylene and benzylidene acetals of sugar alcohols.

At the thirty-second annual meeting in Chicago of the American Social Hygiene Association, the Wil-

liam Freeman Snow Medal for distinguished service to humanity was presented to Major General Merritte W. Ireland, formerly surgeon general of the U. S. Army.

At the seventh annual Forum on Allergy, meeting at Pittsburgh, the first Marcelle award was conferred on Dr. Mary Hewitt Loveless, of the New York Hospital, and the second award was presented to Dr. Charles F. Code, of the Mayo Foundation, Rochester, Minn.

THE first Sidney Powers Memorial award for outstanding contributions to petroleum geology was presented on March 27 at the recent annual meeting of the American Association of Petroleum Geologists to Wallace Pratt, a director of the Standard Oil Company of New Jersey.

THE American Association of University Women has conferred the annual achievement award of \$2,500 on Dr. Katharine B. Blodgett, of the General Electric Research Laboratory at Schenectady, N. Y.

THE Buchan Prize for 1945 of the Royal Meteorological Society, London, has been awarded to E. L. Hawke, secretary of the society.

Nature reports that on February 2, at the Royal Botanic Garden, Edinburgh, Sir William Wright Smith, King's Botanist in Scotland, regius keeper of the Royal Garden and professor of botany in the University of Edinburgh, was presented with a portrait of himself on the occasion of his seventieth birthday. Sir John Stirling-Maxwell presided, and the presentation was made by the Earl of Stair. At the same ceremony a second portrait of Sir William was presented to the Botanic Garden by Sir John Fraser. The portraits, which were painted by Stanley Cursiter, were the gift of a number of Sir William's botanical and horticultural colleagues and other friends.

A SMALL group of friends of Dr. Albert Kenrick Fisher on the evening of March 21 gave him a surprise dinner at the Cosmos Club in Washington in celebration of his eighty-ninth birthday. Until his retirement, Dr. Fisher was for forty-six years a member of the staff of the Bureau of Biological Survey, U. S. Department of Agriculture (now the Fish and Wildlife Service, Department of the Interior), where he carried on natural-history investigations for the Government and organized the Federal program of predatory-animal and rodent control. He was a member of the Death Valley Expedition in 1891, the Hariman Alaska Expedition in 1899 and the Pinchot South Seas Expedition in 1929. He was one of the founders of the American Ornithologists' Union and is the author of "Hawks and Owls of the United States," a pioneer work in economic ornithology published in 1893. On his retirement from active service in 1931, Dr. Fisher was appointed honorary collaborator in biology of the Smithsonian Institution.

DR. ANDREW C. IVY, professor of physiology at the Medical School of Northwestern University, has been elected a member of the National Advisory Cancer Council of the U. S. Public Health Service.

CAPTAIN CURTIS SAUNDERS, Sanitary Corps, Division of Parasitology, Army Medical School, Washington 12, D. C., has been elected a fellow of the Royal Entomological Society, London.

A DINNER in honor of the sixty-fifth birthday anniversary of Howard W. Blakeslee, since 1928 science editor of the Associated Press, was given recently at the Waldorf Astoria Hotel in New York City. The occasion marked the completion of forty years' service with the Associated Press. The speakers included Charles E. Honce, assistant general manager of the Associated Press; Dr. Robert C. Hockett, scientific director of the Sugar Research Foundation, and Mr. Blakeslee.

THE newly elected officers of the Wasmann Biological Society of Loyola University, Chicago, are: *President*, Charles J. Wideman, S.J.; *Vice-president*, Floyd A. Jenkins, S.J.; *Secretary-Treasurer*, J. W. Hudson, all of the university. Edward L. Kessel, of the University of San Francisco, was elected editor.

DR. RALPH PEMBERTON, professor of medicine in the Graduate School of Medicine of the University of Pennsylvania, has been elected president of the Pan-American League for the Study and Control of Rheumatic Diseases.

DR. JACOB A. BENNER, professor of mathematics at Lafayette College, has been appointed director of the summer session.

DR. W. HENRY HOLLINSHEAD, associate professor of anatomy at the School of Medicine of Duke University, will be visiting associate professor of anatomy at the School of Medicine of the University of Utah during the summer quarter.

DR. HELEN WALTER DODSON, since 1943 on leave for war work in the Radiation Laboratory of the Massachusetts Institute of Technology, has been appointed associate professor of astronomy and mathematics for 1945-46 at Goucher College.

LORIN E. HARRIS, formerly agent for the Fish and Wildlife Service, U. S. Department of the Interior, and more recently research associate of the School of Nutrition of Cornell University, has become associate professor of nutrition at the Utah State Agricultural College at Logan.

DR. C. G. C. CHESTERS has been appointed professor of botany at University College, Nottingham, in succession to Professor T. A. Bennet-Clark.

THE American Medical Association has made a grant to Iowa State College in support of research on penicillin, which is being carried out under the direction of Dr. C. H. Werkman. Associated with him in the work are Dr. L. O. Krampitz, professor of bacteriology, and graduate students.

DR. W. B. KEMP, acting director of the Maryland Agricultural Experiment Station, has been appointed

director to succeed Dr. Roger B. Corbett, who has been on leave to work with the American Farm Bureau Federation.

DR. ERWIN H. ACKERKNECHT, a former research fellow at the Institute of the History of Medicine of the Johns Hopkins University, has been appointed assistant curator of physical anthropology of the department of anthropology of the American Museum of Natural History. He will be in charge of exploring and organizing plans for an Institute of Human Morphology at the museum under the direction of Dr. Harry L. Shapiro, chairman of the department of anthropology.

DR. JAMES T. LOWE, special counsel for the Wisconsin Alumni Research Foundation, has been appointed director of nutritional research for Nestlé's Milk Products, Inc.

PROFESSOR F. Y. HENDERSON has been appointed director of Forest Products Research in the British Department of Scientific and Industrial Research on the forthcoming retirement of W. A. Robertson, who has been director since 1933. Professor Henderson is at present assistant professor in timber technology at the University of London and at the Imperial College of Science and Technology. He will take up his new work on April 1.

DR. ARTHUR W. HAUPT, associate professor of botany at the University of California at Los Angeles, has left for Chicago to assume the task of arranging for the publication of the research work of the late Dr. Charles J. Chamberlain, of the University of Chicago. Dr. Chamberlain, who had worked for some thirty years on an exhaustive treatise on the Cycads, a group of tropical plants, died before his study was finished. At the invitation of the University of Chicago, Dr. Haupt will prepare the monograph for publication.

NELSON C. BROWN, head of the Department of Forest Utilization of the New York State College of Forestry, Syracuse University, is in Italy, where he has been appointed forestry consultant with the Allied Control Commission to advise commissioners in the reorganization of Italy's forestry program and survey and make recommendations regarding the country's lumber requirements for reconstruction.

DR. JAKOB BJERKNES, professor of meteorology at the University of California at Los Angeles, has returned to the university after a trip to Guam for the Army Air Forces.

DR. KIRK BRYAN, professor of physiography at Harvard University, spent the winter term in Mexico, on a dam-site consulting project, and in Guatemala, where he carried on geological field work for the Carnegie Institution of Washington.

DR. PEYTON ROUS, of the Rockefeller Institute for Medical Research, will deliver during the period from March 30 to May 9 a series of Sigma Xi lectures on cancer at thirty colleges and universities.

DR. WILLIAM F. WINDLE, professor of neurology at the Medical School of Northwestern University, will deliver on April 19 the seventh Harvey Society Lecture of the current series at the New York Academy of Medicine. He will speak on "Respiratory Conditions in the Fetus and Effects of their Impairment."

DR. FRANZ WEIDENREICH, honorary director of the Cenozoic Research Laboratory, formerly professor of anatomy at Peking Union Medical College, will deliver at the University of California at Berkeley five Hitchcock lectures during April on "The Physical Evolution of Man."

DR. PHILIP B. ARMSTRONG, professor of anatomy at the School of Medicine of Syracuse University, gave the Alpha Omega Alpha Lecture to the faculty and students of the School of Medicine of the University of Georgia on February 21. His subject was "Cholinesterase at Peripheral Nerve Terminations."

DR. JAMES WATSON WHITE, of New York City, on April 6 inaugurates the John O. McReynolds Lectureship in Ophthalmology recently established by Colonel and Mrs. Frank W. Wozencraft, of Washington, D. C., at the Medical Branch at Galveston of the University of Texas.

DR. HARLAN T. STETSON, of the Massachusetts Institute of Technology and director of the Cosmic Research Laboratory, Needham, Mass., on March 14 addressed the students at Wilson College, Chambersburg, Pa., on "Science Tomorrow." On March 15 he lectured at Dickinson College, Carlisle, the subject there being "Our Future in the Sun."

In the interest of avoiding congestion of hotel and transportation facilities during 1945, the Council of the Institute of Food Technologists has voted unanimously not to petition the Federal Committee on Conventions and Conferences for consent to hold its 1945 conference originally scheduled for Rochester, N. Y., in May. Except for the holding of this conference, the activities of the institute will proceed as usual with the election of officers, the holding of a summer meeting of the council authorized to transact essential business, the holding of regional sections or group meetings and the publishing of its *Proceedings*.

THE forty-seventh annual meeting of the American Ceramic Society will be held at the Hotel Statler, Buffalo, N. Y., on April 16 and 17. Conforming with the Government War Committee directive limiting "out-of-district" meetings to fifty persons, the divisions of the society will forego their usual technical

sessions, and members, other than past-presidents, officers and committee chairmen, are requested not to attend the business meetings. Hotel reservations should be made direct with the Hotel Statler, Buffalo, N. Y.

THE Minnesota Chapter of the American-Soviet Medical Society held a symposium on February 15 on the "Development of the Blood Bank." Professor Maurice B. Visscher, of the department of physiology of the University of Minnesota, presided and introduced the discussion with a review of the work on the utilization of cadaver blood in the U.S.S.R. and the organization of the first blood bank in the United States. Dr. E. B. Flink discussed the problems of

transfusion reactions. Speakers included Dr. D. State, Dr. S. A. Corson, Dr. D. A. Needham, Captain J. Mehlman and Lieutenant Commander J. W. Edwards. The proceedings will be published in the next issue of the *Bulletin* of the Minnesota Medical Foundation.

It is planned to erect at the cost of \$1,500,000 a new building for the Medical and Dental Schools of Loyola University, Chicago. Science laboratories, lecture halls, student commons and faculty lounges will be arranged so that they may be used both by the medical and dental schools. It is hoped that the plan will encourage cooperation between the professors of medicine and dentistry.

DISCUSSION

ANAEROBIC RESPIRATION OR FERMENTATION

SEIFRIZ¹ has argued in *SCIENCE* for the use of the term "respiration" for all forms of energy liberation in living cells and for the retention of the term "anaerobic respiration" for energy liberation in the absence of oxygen. Our attention should be directed to the concepts involved with full recognition that terms are but useful symbols. However, confusion concerning terms may lead to confusion in ideas.

Several patterns of biological energy liberation may be recognized:

(1) Oxidation of organic compounds with the simultaneous reduction of molecular oxygen to water. The oxidation may be complete, with all the carbon converted to CO₂, or it may be incomplete with the formation of organic acids as end products. This type of oxidation is known to most cellular physiologists as respiration or cellular respiration.

(2) Oxidation of inorganic compounds and the reduction of oxygen to water, such as the oxidation of ammonia to nitrites, nitrites to nitrates, etc., in chemosynthetic bacteria. No suitable term for this "inorganic respiration" has been proposed.

(3) Degradation of an organic molecule into two or more simpler molecules by an oxidation and reduction occurring within the original molecules or its products. This is illustrated by the conversion of glycogen or glucose into lactic acid (glycolysis) or into alcohol and CO₂ (alcoholic fermentation), etc. This type of mechanism does not require molecular oxygen, and may or may not be suppressed by molecular oxygen. It is known as fermentation, intramolecular respiration or anaerobic respiration.

(4) Oxidation of organic compounds with the simul-

taneous reduction of carbon dioxide, nitrates or nitrites, or sulfates. This type of reaction has been particularly studied by Barker.² It is included by some under the name of fermentation, but probably needs a distinct term.

There are several features common to all these types of metabolism, and two or more types may occur in the same cell, even simultaneously. We may use the term respiration in a generic sense to include all metabolic processes liberating energy (occurring with a free energy decrease) and have specific names for the different types of respiration, such as aerobic respiration for types 1 and 2, and anaerobic respiration for types 3 and 4, or we may use respiration for metabolism involving oxygen consumption and use fermentation for metabolism of type 3 and perhaps 4.

The writer objects to anaerobic respiration, because it implies a type of metabolism that only occurs in the absence of molecular oxygen. However, it is well recognized that in some tumors, contracting muscles, certain yeasts and some varieties of seeds, the pathway of carbohydrate degradation is fermentative, resulting in the accumulation of lactic acid, ethyl alcohol or other products, even when the tissues are exposed to oxygen. The terms aerobic and anaerobic glycolysis are widely used and aerobic and anaerobic fermentation are in frequent use. If we follow Seifriz we will be forced to discuss anaerobic respiration occurring aerobically!

A second objection to the use of anaerobic respiration is that it has led to a confusion of ideas particularly when the plant physiologist measures metabolism only by the carbon dioxide liberated, for in some cases the rate of carbon dioxide production is the same under aerobic and anaerobic conditions. Such an

¹ William Seifriz, *SCIENCE*, 101: 88-89, 1945.

² H. Albert Barker, *Ann. Rev. Biochem.*, 10: 555-586, 1941.