The degree of polymerization of primary wall cellulose seems to be considerably less than that of secondary walls. But it is still good α-cellulose. On the other hand, the crystallinity is astonishingly poor. Dr. Hermans has informed me that only extracellular cellulose of *Bacterium xylinum* has as low a crystallinity as these preparations. According to our model of Fig. 1, the elementary fibrils of such cellulose must have a broader cortex of paracrystalline chains. This insufficient order of the surface layers in the primary wall is probably caused by the large amount of hemicelluloses and pectins, which may hinder an orderly crystallization. The fact that only one-third of its cellulose is really crystalline rules out the possibility that the observed individuality of the microfibrils is due to a better surface delimitation. Therefore, the lack of lateral aggregation of the cellulose microfibrils in the primary wall must be caused by their considerable distance apart (Fig. 2).

References

1. FREY-WYSSLING, A., MÜHLETHALER, K., and WYCKOFF, R. W. G. *Experientia* **4**, 475 (1948).
2. PRESTON, R. D., *et al. Nature* **162**, 665 (1948).
3. WUHRMANN, K., HEUBERGER, A., and MÜHLETHALER, K. *Experientia* **2**, 105 (1946).
4. RÅNBY, B. G., and RIBI, E. *Ibid.* **6**, 12 (1950).
5. PATEL, G. M. Diss. E. T. H. Zürich, 1951, and *Makromol. Chem.* **7**, 12 (1951).
6. VOGEL, A. Diss. E. T. H. Zürich, 1953.
7. MUKHERJEE, S. M., and WOODS, H. J. *Biochim. et Biophys. Acta* **10**, 499 (1953).
8. FREY-WYSSLING, A., and MÜHLETHALER, K. *Fortschr. Chem. org. Naturstoffe* **8**, 1 (1951).
9. FREY-WYSSLING, A. *Experientia* **9**, 181 (1953).
10. ———. Holz (Berlin) **9**, 333 (1951).
11. HENGSTENBERG, J., and MARK, H. *Z. Krist.* **69**, 271 (1928).
12. HERMANS, P. H. *Physics and Chemistry of Cellulose Fibres.* New York–Amsterdam : Elsevier, 1949.
13. HERMANS, P. H., and WEIDINGER, A. *J. Polymer Sci.* **4**, 135 (1949).
14. PHILIPP, H. J., NELSON, M. L., and ZIIFLE, H. M. *Textile Research J.* **17**, 585 (1947).
15. MÜHLETHALER, K. *Exptl. Cell Research* **1**, 341 (1950).

News and Notes

Symposium on the Utilization of Solar Energy

A Symposium on the Utilization of Solar Energy was held at the University of Wisconsin Sept. 12–14. It was sponsored jointly by the National Science Foundation and the University of Wisconsin, with Professor Farrington Daniels acting as Chairman. Attendance was limited to an invited list of 40 people in order that the discussions and exchange of information could be as free as possible; no formal papers were presented.

The general purpose of the symposium was to assess the present knowledge of solar energy and to consider its future. It was hoped that to point out unexplored areas would arouse the attention of those who might be interested in conducting research.

Palmer Putnam opened the conference with a statement concerning the long-range inadequacy of the world's resources of coal, gas, oil, and uranium. At the present rate of fuel consumption, and including the projected increase over the near future, it was estimated that the supply of easily obtainable (i.e., at a cost not more than twice present prices) coal, oil, and gas would be exhausted in less than 100 years. The nuclear fuels would only last another 150 to 200 years. Therefore, it was felt that this generation would be negligent in its duty to posterity if research in the utilization of solar energy were not quickly accelerated.

The first general discussion on solar energy at the conference centered around its storage and utilization for house heating, water heating, and cooking. This discussion indicated that knowledge of absorbents of solar energy was well advanced, but that considerable improvement was still necessary before house heating with solar energy could be achieved without the use of auxiliary fossil fuels. One of the major problems is the storage of energy through the night and during long periods of overcast or stormy weather. Collection and storage are interrelated and will require much more research, but substantial progress is to be expected in the near future. Improvements in house design would make possible better use of the sun's heat in both winter and summer.

The next question considered was that of solar power. Present knowledge indicated that solar power in small units might be produced in certain parts of the world, including the southwestern part of the United States, at from two to three times the current cost of power production from coal and oil. The chief disadvantage is that the power would be intermittent because it can be produced only during the hours of sunlight. There was some discussion of the possibility of deriving power from engines with water vapor at low pressures, making use of low temperatures. This method seemed farther away than the absorption of solar energy to produce steam, and there were arguments concerning the relative merits of focusing mirrors and black collectors with multiple glass plates.

Closely allied to the power problem is the solar evaporation of sea water. Some progress in this regard has been made by putting dyes in the water in order to improve the absorption of energy. One part per million of dye may increase absorption by as much as thirty percent in the evaporation of water to yield salt.

The question of the production of conventional fuels from agricultural and algal sources was considered briefly. The consensus was that this would be an in-

efficient use of these materials, that they could be used to greater advantage in other ways, and that energy should be produced by more direct methods.

For any widespread use of solar energy, there must be a better understanding of the meteorological implications. If improved methods for protecting crops against frost could be devised, and the growing season thus lengthened, the food supply in certain areas of the world could be increased appreciably. Conversely, if absorption could be induced on snow surfaces so that melting would be speeded, the ground would be available for planting sooner in the spring. Meteorology could make an important contribution to the advancement of solar energy by developing an improved method for specifying the amount of solar radiation at any given point on the globe. Expensive shields and ditches are now being used in California to conserve solar radiation and to influence wind currents so as to minimize frost damage.

Solar energy is also being used to heat to high temperatures certain materials whose contamination must be prevented. By means of solar furnaces that reach a temperature of over 4400° C, the heat conduction and thermal shock of high-melting ceramics can be studied.

The conference gave attention to those areas that show the greatest promise of making major contributions to the utilization of solar energy as a source of power in the future, both from the short-range view in which solar energy competes with present fuel supplies, and from the long-range view of the time when fuel supplies will have been greatly depleted and the sun's energy will have to be used more directly. Chemists should be urged to search for a suitable solar compound which will absorb sunlight through photochemical reactions, store the energy, and then release it at will in a way suitable for practical use. To find such a chemical compound presents a real challenge, but basic research on the question should be encouraged. When more is known about the fundamental principles involved, there will be a better chance of finding such a compound. The use of sunlight in photochemical reactions offers theoretical advantages over its use as heat in engines. However, one of the difficulties is that the products of these photochemical reactions may immediately react and reverse the reaction.

An example of a possibly useful photochemical reaction is the production of hydrogen and oxygen from water, using cerium salts as the absorbent to transfer the energy needed to make the water dissociate. The hydrogen and oxygen could be stored and later recombined to give back the stored energy. Another possibility is the absorption of energy by one side of a photovoltaic cell or an electrical battery while the second side of the cell is kept in darkness. The side absorbing the energy from the sun would transmit that energy through an electric circuit to the side which is kept in darkness.

Still another means of utilizing solar energy was suggested by the same direct electrical method. It was felt that, in addition to studies of the kind mentioned above, considerable more work should be done on the thermo-element method, in which two different electric conductors are connected, with one junction heated by the sun and the other junction kept cold. The resulting current could be made to do work; however, it will be necessary to find metals or alloys that, when connected together in this way, will produce substantially higher voltages than any produced so far.

Nature's own method of utilizing solar energy in growing plants through photosynthesis is a remarkable phenomenon which can guide us in our approach to the collection of solar energy. We are just beginning to understand photosynthesis. Green chlorophyll absorbs light and decomposes water to give hydrogen. This reduces carbon dioxide, resulting in organic material (carbohydrates) that can be preserved. The organic fuels then recombine with the oxygen of the air to release the energy as needed. The energy-absorbing material, and the mechanisms for preventing the reverse reaction and for storing the energy, set a pattern which should be studied further. Perhaps eventually the same type of reaction may be produced artificially, without any requirement for the growing plant and good soil conditions.

Considerable attention was given to the possibilities of a "poor man's solar engine." Atomic energy requires central stations with large capital investments but, theoretically, small solar engines could be placed in out of the way places. Although such engines would be inefficient thermodynamically and economically in comparison with modern engines, they might find extensive use, particularly in countries which are not industrialized. The night interruption of power would not be a disadvantage in operations such as the pumping of water for irrigation.

No great achievements of practical value were reported in this attack on the problem of utilizing solar energy, and it was generally agreed that no new era of direct utilization of solar energy is yet in sight. However, many of the participants of the conference, including architects, engineers, chemists, and meteorologists, were pleased to find that such substantial progress is being made in the preliminary development of solar house heating, solar power production, evaporation of sea water, and in the application of meteorology. They were also interested to discover that there are many areas of physical chemistry, physics, and engineering where fundamental research may well lead to significant advances in this direction.

FARRINGTON DANIELS

Department of Chemistry
University of Wisconsin

RALPH MORGEN

Program Director for Engineering
National Science Foundation

Science News

To study the effects of mechanical vibration on man, the Navy has designed and constructed a research instrument termed a large **displacement-amplitude vibration machine.** The Naval Research Laboratory, cooperating with the Naval Medical Research Institute, has completed the first phase of the project by the construction, calibration, and testing of the instrument. The instrument, which has taken over five years to build, has now been assembled and installed at the Naval Medical Research Institute.

The two-ton instrument was designed to study low frequency vibrations. It is capable of producing smooth vibrations from two to 50 cycles per second. Constructed to handle loads up to 200 pounds, the table-top vibrating platform moves vertically through a maximum of four inches at accelerations up to 15 units of gravity. Also, special built-in features allow the investigators to vary the cycles per second and the amplitude while the instrument is in operation, or to hold one and vary the other.

After an extensive study, E. M. Brooks of St. Louis University predicts that the best spot for viewing the **eclipse of the sun** next June 30 will be Minneapolis. There the early morning sky is less often overcast and the air is relatively dry. Nevertheless, the chance that the eclipse will be visible from Minneapolis is less than 50 percent. At other spots along the total eclipse path the chances of good observing weather are even less.

Seven of the most accessible sites were investigated. Totality will be visible in the United States across an area running from northeastern Nebraska across South Dakota, Iowa, Minnesota, Wisconsin, upper Michigan, and the provinces of Ontario and Quebec in Canada before passing over the Labrador coast. The sites considered were Spencer, Iowa; Minneapolis; Park Falls, Wis.; Calumet, Mich.; and White River, Kapuskasing, and Moonsonee, Ontario. Park Falls was found to be the best for photographing the eclipse, although Minneapolis offers a better opportunity for visual observations.

Foreign scientists are now conducting much of the chemical research in large American universities that ordinarily would be done by Americans, Professor Roger Adams of the University of Illinois stated recently. Attributing this situation in great part to the operations of the American selective service system, he said:

"If the current attitude of the draft boards towards scientists continues, important research developments in our universities will be achieved almost exclusively with the help of foreigners."

It is significant, he noted, that even now "only 25 to 50 percent of the postdoctoral research assistants in institutions with large research programs, such as Harvard, the Massachusetts Institute of Technology, and the University of Illinois, are Americans."

The Council of the Federation of American Scientists has issued the following statement regarding **prospective appointments to the National Science Board.**

On May 10, 1954 the terms of office of eight members of the National Science Board, established by the National Science Foundation Act of 1950 as the policy-making group for the Foundation, will expire. Reaffirming its belief, as expressed in the past, that a strong, vigorous National Science Foundation is essential to our continued scientific progress as a nation, the Council urges that the most careful consideration be given to new appointments to the Board. Government officials and scientists and their organizations have joint responsibility to ensure that the nominations presented by the President to the Senate will be of the highest caliber and will give to the Board proper balance and the widest perspective.

The Council believes that, among others, the following principles should be observed in considering nominees:

1. Incumbents whose terms are expiring should be considered individually for renomination on the basis of their past performance and future promise. Blanket renomination of all incumbents, as seemed advisable in 1952, would now both establish bad precedent and fail to take the opportunity to bring new points of view into the Board. For best working relations between the Foundation and the scientific community, continuous exchange of personnel between them is desirable.

2. Nominees to the Board should be distinguished for their breadth of view on the relation of science and public affairs as well as for leadership in their particular specialty.

3. In considering problems of balance within the Board, attention should be given to the proportion of actual working scientists in relation to members engaged mainly in the administration of scientific or other activities. In this connection, it is worth noting that the terms of three of the small number of active working scientists on the 24-man Board expire this year.

4. In relation to problems of balance, also, attention should be given to the appointment of younger individuals, creatively active and close to the problems of training, selection and encouragement of new scientific personnel.

The current size of the **World Health Organization,** which totals 84 nations now that Yemen has signed the constitution, shows that the nations of the world put health above everything except communications. The 84-member WHO is outranked only by the 113-member International Telecommunications Union and the 93-member Universal Postal Union among the specialized agencies of the United Nations. The UN itself numbers only 60 members.

WMO (World Meteorological Organization) now counts 79 members. Next come UNESCO and FAO, each with 68 members, ILO with 66, ICAO (International Civil Aviation Organization) with 59 members, and the International Monetary Fund and International Bank for Reconstruction and Development with 54 members each.

Two other specialized UN agencies are not yet officially in existence, but each has had some nations sign-

ing its constitution. These are the International Trade Organization with 54 signers and the Intergovernmental Maritime Consultative Organization with 11 signers.

Scientists in the News

David Bass, biochemist at the Quartermaster Research and Development Command, Lawrence, Mass., and lecturer in physiology at Boston University, has received the Research Directors' Award for 1953. Dr. Bass was cited for his contributions in directing, supervising, planning, and executing several difficult studies in developing new-type survival rations for military and civilian use in time of emergency. These studies were conducted in collaboration with 1st Lt. Murray Quinn, MC, and 1st Lt. Charles R. Kleeman, MC.

The Institute of Radio Engineers has announced the following awards; presentation will be made at the Institute's annual banquet on March 24 during the national convention:

Alda V. Bedford, RCA Laboratories Division, Princeton, N.J., has been awarded the Vladimir K. Zworykin Television Prize Award for 1954 "for his contributions to the principle of mixed highs and its application to color television." The award is presented annually to engineers who have made the most important contributions to electronic television.

The Institute's Morris Liebmann Memorial Prize, one of the highest awards in the radio engineering field, was bestowed on **Robert R. Warnecke,** Technical Director of Companie Générale de Telegraphie Sans Fil, Paris, France, "for his many valuable contributions and scientific advancements in the field of electron tubes, and in particular, the magnetron class of traveling-wave tubes."

Harold A. Zahl, Director of Research, Signal Corps Engineering Laboratories, Fort Monmouth, N.J., was named the recipient of the Harry Diamond Memorial Award for 1954 "for his technical contributions, his long service, and his leadership in the U.S. Army Signal Corps research program." This award is given annually to persons in government service for outstanding contributions in the field of electronic research.

Howard R. Bierman, formerly associate clinical professor of oncology at the University of California School of Medicine, San Francisco, has assumed his duties as medical and scientific director of the Hospital for Tumors and Allied Diseases at the City of Hope Medical Center, Duarte, Calif. Dr. Bierman will head the extensive program of research, service, and postgraduate medical education in malignant diseases at the new Medical Center.

J. A. Campbell Colston, Editor of the *Journal of Urology,* has been elected president of the American Urological Association.

George L. Cunningham, industrial scientist, and a consultant for the applied science laboratory of the University of Cincinnati, has been appointed to the staff of the Southwest Research Institute in San Antonio.

Air Research and Development Headquarters, Baltimore, have announced the appointment of **Lt. Col. William O. Davis** as chief of scientific research.

Desmond D. Dolan, associate research professor and associate professor of horticulture at the Rhode Island Agricultural Experiment Station, has been named regional coordinator of the newly created Plant Introduction Station of the New York State Experiment Station, Geneva. He will work in close cooperation with the experiment stations of the twelve states that make up the Northeastern Region and with the Division of Plant Exploration and Introduction of the U.S. Bureau of Plant Industry.

Willis A. Gortner, who has been associated with the Bjorksten Research Foundation, Madison, Wis., during his sabbatical leave, has returned to his duties as head of the Department of Chemistry of the Pineapple Research Institute, Hawaii.

Herbert E. Hawkes, recently chief of the Geochemical Prospecting Section of the U.S. Geological Survey, Denver Federal Center, has joined the staff of the Department of Geology and Geophysics at the Massachusetts Institute of Technology as lecturer in geochemistry. Dr. Hawkes will conduct one course in geochemical prospecting and will carry on geochemical research at the Institute.

The Foundation for Research on Human Behavior, recently established in Ann Arbor, has announced the appointment of **Samuel P. Hayes, Jr.,** as its first director. Dr. Hayes formerly headed the Far East programs of the Foreign Operations Administration. The aim of the new foundation is to increase the scientific knowledge of industry, government, and social welfare agencies and to promote the use of this knowledge.

Martin Henze, former director of the Zoological Station of Naples and professor emeritus at the University of Innsbruck, Austria, has been awarded an honorary Doctor's degree in medicine by that university on the occasion of his 80th birthday. Dr. Henze now resides in Pasadena.

Richard Alden Howard, professor and chairman of the Department of Botany at the University of Connecticut, has been named Arnold professor of botany and professor of dendrology at Harvard University. **Reed Clark Rollins,** an authority on plant genetics and director of the Gray Herbarium, will become, in addition, Asa Gray professor of systematic botany. Both appointments are effective Feb. 1, 1954.

Hugh H. Hussey has been appointed professor and head of the Department of Preventive Medicine and Public Health at the Georgetown University School of Medicine. He also becomes a member of the Executive

Faculty of the Medical School. In addition to his new duties, Dr. Hussey will continue his lectures in medicine and clinical chemistry.

Mervin J. Kelly, president of Bell Telephone Laboratories, is to receive the Industrial Research Institute Medal for 1954. The medal is given annually for "outstanding accomplishment in leadership in or management of industrial research which contributes broadly to the development of industry or the public welfare." Formal presentation will be made in San Francisco on April 22.

Jack W. Keuffel, research associate who has been working in the Cosmic Ray group at Princeton University, has joined the Department of Physics, University of Utah, as an associate professor. He will continue his researches on the high energy component of cosmic rays, both at the University and at a field site in the neighboring mountains.

Marcel A. Martin has joined the staff of the Applied Physics Laboratory of The Johns Hopkins University, in Silver Spring, Md. He came to the United States in 1945 as a representative of the French government to make a study in American industries of control testing and optical equipment. Later, he was with the American Optical Company and then the Jacobs Instrument Company.

William J. Morgan, formerly with the Psychological Strategy Board, has been appointed Deputy Chief, Research Branch, Office of the Chief, Psychological Warfare, Department of the Army.

Carl Neuberg of the New York Medical College and the Polytechnic Institute of Brooklyn has been awarded honorary membership in the German Society of Physiological Chemists.

Raphael O. Patt has been named an assistant medical director of the American Heart Association. The staff of the Association's Medical Division now includes two assistant medical directors. Frederick J. Lewy has served in that position since July, 1951.

Geoffrey William Rake, an authority in the field of microbiology, has been appointed research professor of microbiology in medicine at both the School of Medicine and School of Veterinary Medicine, University of Pennsylvania.

John Francis Reintjes, associate professor of electrical engineering at the Massachusetts Institute of Technology, has been appointed director of the Servomechanisms Laboratory of the Department of Electrical Engineering. Dr. Reintjes first joined the M.I.T. staff in 1943.

Donald K. Reynolds, senior research engineer in Stanford Research Institute's Engineering Division, has been granted a three-year leave of absence to serve as professor at the Instituto Tecnologico de Aeronautica, a government-sponsored aeronautical school at San José dos Campos, São Paulo, Brazil. He will teach at the Institute and will conduct research on problems related to military and civilian aircraft.

Herbert Robbins, of the University of North Carolina, has been appointed professor of mathematical statistics at Columbia University.

Emanuel A. Salma, associate professor of mechanical engineering, has been appointed acting director of the Evening Division of New York University's College of Engineering. He succeeds **John A. Hill,** who has resigned to accept a position with the Minneapolis Honeywell Company.

Conley Hall Sanford is retiring as chief-of-staff at the John Gaston Hospital and chief of the Division of Medicine at the University of Tennessee College of Medicine, positions he has held since 1939. Dr. Sanford will continue as professor of medicine and as a private practitioner.

E. P. Vance, chairman of the Department of Mathematics at Oberlin College, is on sabbatical leave for the year 1953–54; R. R. Stoll is serving as acting chairman.

The American Association of Physics Teachers has announced the award of its Oersted Medal "for notable contributions to the teaching of physics" to **C. N. Wall,** professor of physics, University of Minnesota. Presentation will be made during the Association's annual meeting, Jan. 28–30.

Education

Marian College, Indianapolis, is constructing a three-story science building, Scotus Hall. On the first floor will be biology, with a greenhouse and an animal room adjoining; physics will be on the second floor, and chemistry on the third. The building is to be ready for use in September, 1954. At this time the college will begin admitting men students, establishing Marian as the first Catholic coeducational college in the State of Indiana.

Mount Holyoke College is starting construction of a new chemistry building that will cost approximately one million dollars. The north end of the new building will connect directly with the present physics building. Lecture rooms are to be concentrated in the one-story central area of the new structure; these have been designed for use not only by chemistry and physics, but also by the rest of the college for both classes and public lectures. The east wing, containing laboratories, offices, stock rooms, seminar rooms, and a library, will have a second story and also a basement floor. The eight laboratories in this wing will each accommodate a section of 20 to 24 students.

Purdue University's Departments of Biological Sciences and Agricultural Economics have been awarded a joint grant from the Indiana Heart Foundation

to undertake a $130,000 five-year study of the energy requirements of various types of agricultural work in relation to the incidence, causes of, and magnitude of heart disease among rural workers. The objectives of this long range study are: (1) to determine the energy requirements, cardiac output, and other physiological values for a representative sample of rural workers in Indiana and establish norms for this segment of the population by age, type of work, barometric pressure, temperature, humidity, and other environmental factors; (2) to determine energy requirements, cardiac output, and other physiological values as work methods for doing essential farm jobs; (3) to develop and evaluate easier, more effective, and more economical work methods for the cardiac worker through changes in machinery, equipment, layout, work order, and motion patterns; and (4) to formulate job classifications according to energy requirements.

To accomplish these objectives, M. X. Zarrow and associates in the Department of Biological Sciences will supervise tests of agricultural workers of one or more rural areas and make measurements of oxygen consumption, cardiac output, blood pressure, heart rate, muscle fatigue, and vital capacity. A mobile laboratory with the necessary equipment for measuring energy requirements, etc., will be assembled and sent into the field where farmers are working. L. S. Hardin of the Department of Agricultural Economics and Work Simplification will direct the development and evaluation of easier and more effective work methods for the cardiac farmers, according to the energy requirements of the various farm jobs.

Grants and Fellowships

The Hawaiian Academy of Science has awarded **AAAS Research Grants** to: John Forster, Department of Sociology, University of Hawaii, for his project on Samoan communities in Hawaii; and Shirley M. Trefz, Department of Zoology, University of Hawaii, for her study of the digestive physiology of holothurians with reference to their role in the ecology of coral reefs.

The Lederle Laboratories Division of the American Cyanamid Company has announced the establishment of the **Lederle Medical Faculty Awards.** The purpose of the program is to encourage men and women who have progressed beyond the stage of development which is now encompassed by the postdoctorate fellowships, or the so-called senior fellowships, in preclinical sciences. The program will assist promising teachers and investigators, particularly in the fields of anatomy, biochemistry, microbiology, pathology, pharmacology, and physiology, for a limited period with the expectation that the medical schools which have appointed them, or some other schools, will thereafter provide for future support. The plan is also intended to aid departments that could benefit by expansion and offer opportunities for development of promising individuals.

The awards will be administered by an independent committee composed of professors representing most of the preclinical sciences and drawn from medical schools throughout the United States. Direct requests to this committee for the support of specific individuals will be accepted from U.S. and Canadian medical schools through their administrative officers, or from heads of departments with approval of such administrative officers. The curriculum vitae of the candidate, together with information supporting his eligibility, the reasons for requesting the support, and a general outline of the program proposed by the head of the department for that individual, must accompany each request. An independent statement from the individual who is recommended should be sent directly to the committee.

Announcement of the recipients will be made not later than May 1 of each year, commencing in 1954. Candidates must hold faculty rank. Awards will be made for a term not exceeding three years. The only restriction is that the total amount, which will be dispersed at a rate to be determined by the committee, shall not exceed $10,000 in any one year to any one grantee.

The funds should be used primarily to increase or to create salaries for the designated individuals, but they may be used, in part, to support the departmental activities of the individual within the total amount granted. The funds are meant to augment, but not replace, funds already available for the department in question; they are not intended as, and will not be used for, "recapture" funds. While the Lederle Medical Faculty Awards Committee will be interested in the progress of each grantee, no formal reports will be required. Address all communications to: Lederle Medical Faculty Awards, Office of the Secretary, Pearl River, N.Y.

The **American Trudeau Society,** Medical Section of the National Tuberculosis Association, provides a limited number of fellowships to promote the training and development of investigators in the field of tuberculosis and related pulmonary diseases. The awards are open to citizens of the United States for work within this country. Preference is given to candidates not more than 30 years of age who have the degree of Doctor of Medicine or other doctor's degree. Within the broad field of research on tuberculosis, applications will be considered in the special disciplines of clinical medicine and surgery, epidemiology, chemistry, microbiology, pathology, and pulmonary physiology.

Stipends are determined by individual circumstances and may vary from $3000 to $3600 per annum. No other remunerative work will be permitted during the tenure of the fellowship. Appointments are for full-time service and may begin at any time determined by the fellowship board. They are made for one year, but they may be renewed up to a total period of three years. Applications are considered in April or May

and October; *they must be received by April 1 or Sept. 1.* For further information communicate with The Director of Medical Research, American Trudeau Society, c/o Henry Phipps Institute, Seventh and Lombard Streets, Philadelphia 47, Pa.

The **Atomic Energy Commission** awarded 69 unclassified research contracts in the fields of biology, medicine, and biophysics during the period July–September, 1953:

New Projects

University of Connecticut. A. E. Schwarting. Study of the method of ergot formations by use of isotopes.

University of Illinois. S. B. Binkley, College of Medicine. Chemistry and biological significance of nucleotides and polynucleotides.

University of Tennessee. J. D. Perkinson, Jr., School of Biological Sciences. Effect of internal radiation on cellular metabolism.

Vanderbilt University. M. T. Bush, Medical School. Metabolic fate of barbituric acid anesthetics with special reference to evipal.

Louisiana State University. H. E. Wheeler. Investigations of the toxin theory of plant disease using labeled plant pathogens.

Smithsonian Institution. R. B. Withrow. Specific biological indicators of ionizing radiation and the mechanism of its action.

New York University-Bellevue Medical Center. W. E. Smith. Investigation of factors that may modify neoplastic changes induced by irradiation.

Radio Corporation of America. Multiplier phototube development.

Contract Renewals and Extensions

Amherst College. P. T. Ives. Studies of mutations in bacteria and in *Drosophila* induced by radiation.

University of Arkansas. J. Sacks. Studies on the phosphorylation cycle in the intact animal using radioactive phosphorus.

University of Chicago. H. Gaffron. Effect of blue and dark red light upon reactivation of ultraviolet treated photosynthetic microorganisms.

Connecticut Agricultural Experiment Station. P. E. Wagoner and A. E. Dimond. Therapy of plant disease by nuclear radiations.

University of Illinois. B. C. Johnson. Nutritional biochemistry on the metabolism of vitamins and amino acids.

University of Illinois. H. H. Mitchell. Content in human tissues of eleven trace elements.

Indiana University Foundation. H. J. Muller. Influence of radiation in altering the incidence of mutations in *Drosophila.*

Johns Hopkins University. B. F. Chow. Purification of intrinsic factor in gastric juices.

Johns Hopkins University School of Medicine. T. Enns and F. Chinard. Study of relative diffusion rates of isotopes from capillaries.

University of Maryland. J. C. Shaw. Metabolism of radioactive carbon compounds in lactating ruminants.

University of Massachusetts. P. A. Swenson. Effects of ultraviolet radiations on phosphate turnover of yeast cells in the presence of galactose.

Northwestern University. G. H. Mickey. Comparison of the delayed effects produced by chemical mutagens and by x-rays.

University of Notre Dame. C. S. Bachofer. Study of the protection of virus systems against irradiation.

University of Oregon. F. J. Reithel. Investigation of lactose synthesis in mammary gland homogenates.

University of Pennsylvania. D. R. Goddard and W. Stepka. Study of sulfate reduction and the biosynthesis of organic sulfur derivatives in higher plants.

University of Pennsylvania. D. W. Wilson. Synthesis of isotopic carbon compounds used in biochemistry.

University of Pittsburgh. M. A. Lauffer. Study of correlation of radiation effects with physical and chemical changes in viruses.

Purdue Research Foundation. H. Koffler and D. M. Powelson. Physiology of hydrogen bacteria.

Roscoe B. Jackson Memorial Laboratory. E. S. Russell and W. S. Murray. Maintenance of a genetically controlled colony of mice to insure the availability of strains of known constitution to AEC institutions and contractors.

Stanford University. A. C. Giese. Studies on photoreactivation following ultraviolet irradiation injury.

Syracuse University. B. S. Strauss. Study of intermediate carbohydrate metabolism in neurospora using radioactive carbon and biochemical mutants.

Tennessee Agricultural and Industrial State College. H. B. Crouch. Radiation and tracer element studies on certain pathogenic protozoa and nematodes of rodents.

University of Wisconsin. P. H. Phillips. Long time effects of intermittent radiation on dogs.

Yale University. N. H. Giles, Jr. Investigations on the cytogenic effects of radiations.

Boston University. L. C. Wyman. Effect of irradiation on the growth and functioning of transplanted or regenerated adrenocortical tissue in the rat.

The Chicago Medical School. P. Shubik. Study of the latent tumor cells as produced by beta radiation and a comparison of the latent tumor state with that produced by chemical carcinogens.

Columbia University. A Gorbman. Biological effects of radiation from excessive amounts of radioiodine.

Johns Hopkins University School of Medicine. C. L. Conley. Studies of the absorption, utilization, and excretion of vitamin B-12, using B-12 containing radioactive cobalt (Co^{60}). Synthesis of compounds with vitamin K activity labeled with radioactive carbon (C^{14}) for use in tracer studies.

Johns Hopkins University. J. E. Howard. Investigation of the mechanism of bone deposition and related physiological studies.

Massachusetts General Hospital. O. Cope. Effects of radioactive iodine on biology of the thyroid gland.

Massachusetts General Hospital. W. H. Sweet. External localization of brain tumors employing positron-emitting isotopes.

New England Deaconess Hospital. S. P. Hicks. Effect of ionizing radiation on the developing mammalian nervous system.

New York University College of Medicine. H. W. Smith. Study of body fluid distribution in hypertensive and renal disease and collateral physiological studies.

Northwestern University. S. Freeman. Studies on radiation induced cataracts.

Northwestern University. R. W. Schayer. Studies of the metabolism and biogenesis of histamine.

Peter Bent Brigham Hospital. F. D. Moore. Intracellular changes in trauma, depletion and repair; biochemical studies in the human being with the aid of isotopes.

University of Pittsburgh. F. J. Dixon. Study of the effects of radiation on the immune response with special reference to factors that increase the radio-resistance of the immune response.

Sloan-Kettering Institute for Cancer Research. C. P. Rhoads. Biological effect of radiation, and related biochemical and physical studies.

Tufts College. D. Rapport. Study of the relation of radiation on reactions associated with growth.

Washington University. I. L. Shechmeister. Investigations of the relationship between radiation damage and the immune state.

Western Reserve University. L. A. Manson and L. O. Krampitz. Effect of incorporated radioactivity on the biological activity of bacteriophage.

University of Wisconsin. H. F. Harlow and P. H. Settlage. The effect of various forms of irradiation of the brain on behavior of monkeys and chimpanzees.

Worcester Foundation for Experimental Biology. G. Pincus. Investigation of the effects of radiation on the biosynthesis and metabolism of adrenocortical steroids.

Columbia University. V. K. LaMer. Filtration of monodisperse radioactive solid aerosols (dusts).

Allen B. DuMont Laboratories, Inc. Photomultiplier tube development.

Massachusetts Institute of Technology. R. D. Evans. Radium and mesothorium poisoning and dosimetry and instrumentation techniques in applied radioactivity.

Sloan-Kettering Institute for Cancer Research. J. S. Laughlin. Equivalence of absorbed radiation energy and cavity ionization.

University of Wisconsin. D. M. Angevine and J. J. Lalich. Development and application of historadiography in relation to the distribution of mass and localization of elements in normal and pathologic tissues.

Western Reserve University. H. G. Wood and L. O. Krampitz. Intermediary metabolism of carbohydrates by bacteria.

University of Wisconsin. R. H. Burris and P. W. Wilson. Biological nitrogen fixation with isotope tracers.

University of Wisconsin. R. H. Burris, M. J. Johnson, and

P. W. Wilson. Metabolism of organic acids in higher plants and microorganisms.

Boston University School of Medicine. I. Asimov. Radiation-induced changes in nucleic acids and their hydrolysis products.

The Children's Medical Center, Boston, Mass. S. Farber. Nature of bleeding in pancytopenia with special regard for thrombocytopenia and the vascular defect.

Emory University. H. W. Ades. Effect of radiation on learned behavior problem-solving ability and neural mechanism of Rhesus monkeys. Effect of radiation on ground substance of loose connective tissue.

Massachusetts General Hospital. J. C. Aub, I. T. Nathanson, and P. C. Zamecnik. Biochemical study of the effects of radiation on cells.

University of Michigan. F. J. Hodges and I. Lampe. Clinical evaluation of teletherapy.

New England Deaconess Hospital. S. P. Hicks *et al.* Acute and chronic radiation injury.

New York University-Bellevue Medical Center. J. M. Converse and M. Gaudino. Effect of refrigeration of human and animal skin upon its use in skin grafts in animals and man. Study of the antibodies produced by homologous skin grafts in animals and in man.

Philadelphia General Hospital. H. P. Schwarz. Effect of x-ray radiation on the infra-red spectra of neural and radiosensitive visceral tissue.

Western Reserve University. A. R. Moritz. Physiological and pathological aspects of thermal and flash burns.

University of Washington. F. I. Badgley. Atmospheric turbulence study.

The Radcliffe Graduate School of Arts and Sciences is inviting applications for the **Helen Putnam Fellowship for Advanced Research,** a postdoctoral resident fellowship for women. The recipient will be permitted to use research facilities at Harvard University. The research may be in any field related to human genetics or mental health, including psychology, child development, and other fields of social science. The stipend will be $3000 a year, with possibility of renewal. Application blanks may be obtained from the Secretary of the Graduate School, Radcliffe College, Cambridge 38, Mass. *Completed applications should be returned not later than April 1, 1954.*

The **University of Washington,** Department of Biochemistry, has announced the availability of several predoctoral fellowships for 1954–55. These offer stipends of $135 per month for the academic year, and remission of tuition and laboratory fees. Fellows are also eligible for full-time research assistantships during the summer that allow $270 monthly for three months. Applications should be addressed to the Executive Officer, Department of Biochemistry, University of Washington, Seattle 5.

In the Laboratories

The **Shell Chemical Corporation** has recently opened a $10,000,000 anhydrous ammonia plant in Ventura, Calif., that will have a productive capacity of 150 tons a day. Ammonia's most important application is as a fertilizer because it contains 82 percent nitrogen. The new plant will also produce ammonia for use in industry for refrigeration, and for the manufacture of synthetic fibres, explosives, pulp, and nitric acid.

All U.S. Department of the Navy studies of methods of protecting exposed surfaces of airplanes against corrosion, erosion, and ice coating are centered now at the **University of Cincinnati Applied Science Research Laboratory.** In addition to its own research in the field, the laboratory will be the official testing center for all materials considered by the Navy to have possibilities for use as plane coatings.

The **Westinghouse Electric Corporation** will build a new metals development plant at Blairsville, Pa. Scheduled for completion by late 1955, the plant, which is part of the company's $300,000,000 expansion program, will be devoted to metallurgical development and pilot production of special alloys and castings.

Construction has begun on a new $150,000 building to house the insecticide and animal laboratories of the **Wisconsin Alumni Research Foundation** (WARF) in Madison. The structure will stand immediately behind the present Foundation. It will house the insecticide testing division, which is expected to be about three times as large as the present division. The Foundation's tests for the insecticide industry involve screening numerous compounds for possible insecticidal activity and the conducting of control and development work. Projects with animals, including chick tests, warm blooded toxicity tests, and biological assays for vitamins, will be carried out. Completion of the building is planned for March, 1954.

Meetings and Elections

At the scientific award dinner of the mid-year meeting of the **American Pharmaceutical Manufacturers' Association,** the American-Korean Foundation cited the Association for its "overwhelming generosity in providing drugs, pharmaceuticals and medical supplies valued at over one million dollars to the people of Korea on the warm, voluntary 'Brother to Brother' basis that befits relationships between free peoples." The citation was signed by General James A. Van Fleet, chairman of the Foundation, and Milton S. Eisenhower, honorary chairman.

At the **23rd Annual Meeting of the American Association of Physics Teachers** to be held in New York City, Jan. 28–30, there will be sessions of contributed and invited papers and panel discussions. In the last category "The Responsibility of the Physics Teacher in Engineering Education" will be considered, with Dean L. E. Grinter of the University of Florida and Joseph H. Keenan of the Massachusetts Institute of Technology among the participants. There will also be a panel discussion of the important topic "Research Subsidies and College Teaching."

During a joint session with the **American Physical Society,** the retiring president of the Society will address the meeting; Enrico Fermi will speak on "What Can We Expect to Learn from High Energy Accelerators?"; and John A. Wheeler of Princeton University will deliver the 12th Richtmyer Memorial Lecture, "Fields and Particles."

The 4th annual meeting of the **Animal Care Panel** was held Dec. 2–3 at the University of Chicago. For the first time in its four-year history, the Panel met as an incorporated organization. Because the care of laboratory animals by specially trained professional personnel is a fairly new concept, until recently there has been little standardization in the field and an inadequate literature. As a result of the interest created by the new group, much has been accomplished both in improving specific areas of care, and in establishing higher standards for housing, nutrition, and sanitation.

The program for the meeting included reports on aspects of handling laboratory animals, such as nutrition of laboratory dogs, nutrition of small laboratory animals, and the selection of appropriate animal material for a given investigation. Other reports dealt with projects of particular timeliness. The Hormel Institute of Austin, Minn., contributed a paper on the development of miniature pigs for research purposes, pigs that weigh less than 70 pounds at maturity. Another paper discussed a colony of rats maintained germ-free, rodent-free, and parasite-free, at the Lobund Institute, Notre Dame.

Two reports of interest to research biologists were given. Orson N. Eaton, executive secretary of the newly formed Institute of Animal Resources, described the Institute's program; he also spoke on the development of the genetic concept of controlled pure animal strains. W. Lane-Petter of the Laboratory Animals Bureau outlined the conduct of animal experimentation in Great Britain. The British have long had licensing laws in effect that are of interest to American scientists in view of the current agitation in this country for adoption of similar legislation.

The Animal Care Panel publishes proceedings of each meeting and individual members of the Panel are available for consultation on problems relating to the care of laboratory animals. For further information about the Panel, or to obtain copies of the Proceedings, write to the secretary, Dr. R. J. Flynn, P.O. Box 299, Lemont, Ill.

Alfred C. Kinsey, professor of zoology at the Institute of Sex Research, Indiana University, will deliver the **29th Annual Hermann M. Biggs Memorial Lecture,** under the auspices of the Committee on Public Health Relations of The New York Academy of Medicine, on Feb. 4. His subject will be "Data on Female Sexual Behavior: Their Application in Clinical Medicine and Public Health." There will be three discussants: Sophia J. Kleegman, associate clinical professor of obstetrics and gynecology, New York University School of Medicine; Carney Landis, professor of psychology, Columbia University; and George Murdock, professor of anthropology, Yale University.

The **Association of Southeastern Biologists will hold** its 15th annual meeting April 15–17 at Louisiana State University, Baton Rouge. The Association is composed of more than 500 biologists from southern colleges, universities, and research institutions. President for 1954 is Bruce D. Reynolds of the University of Virginia. Mary E. Garlden of Oak Ridge, Tenn., is secretary. Also meeting with ASB will be the Southern Appalachian Botanical Club and the Southeastern Section, Botanical Society of America.

A special feature, a symposium on marine biology, will be held on the Thursday evening preceding the main sessions. Field trips will be arranged by the local committee at Baton Rouge. Cochairmen of this committee at Louisiana State University are George C. Kent, Department of Zoology, and H. E. Wheeler, Department of Botany.

The **3rd International Conference on Low Temperature Physics** held at The Rice Institute Dec. 17–22, 1953, was sponsored jointly by the National Science Foundation, the International Union of Pure and Applied Physics, and The Rice Institute. About 200 leading scientists in the field of low temperature physics from the United States and foreign nations met to discuss the latest research developments and theories dealing with temperatures approaching absolute zero.

Nine formal sessions were held during which papers were presented on research with liquid helium, magnetism under supercooled conditions, superconductivity, and solid state physics at low temperatures. Chairmen of the sessions were: J. F. Allen, St. Andrews University, Fife, Scotland; J. Bardeen, University of Illinois; H. Casimir, Phillips Company, Eindhoven, The Netherlands; K. Clusius, University of Zurich, Switzerland; P. Donzelot, French Science and Cultural Attaché, New York, N.Y.; A. Frolich, University of Liverpool, England; C. J. Gorter, University of Leiden, The Netherlands; L. C. Jackson, University of Bristol, England; P. Jacquinot, University of Paris, France; N. Kurti, University of Oxford, England; L. McKenzie, Interdepartmental Committee on Scientific Research and Development, Washington, D.C.; K. Mendelssohn, University of Oxford, England; W. Meissner, University of Munich, Germany; A. B. Pippard, Royal Society Mond Laboratory, Cambridge, Mass.; K. W. Taconis, University of Leiden, The Netherlands; A. van Itterbeek, University of Louvain, Belgium; L. Weil, Institut Fourier, Grenoble, France.

The conference was planned and directed by the following committee: W. V. Houston, The Rice Institute; C. T. Lane, Yale University; R. J. Seeger, National Science Foundation; J. Slater, Massachusetts Institute of Technology; C. F. Squire, The Rice Institute.

In conjunction with the annual meeting of the American Academy of Forensic Sciences, to take place in Chicago, Feb. 25–27, the Section on Pathology will hold a **Medico-Legal Slide Seminar** to be moderated by Arnold Strauss, pathologist to the Chief Medical Examiner's Office, Norfolk, Va. This seminar is designed to cover a wide range of problems frequently

encountered by forensic pathologists. The sets of slides and the protocols may be obtained by writing to Geoffrey T. Mann, Chairman, Section on Pathology, American Academy of Forensic Sciences, 404–406 N. 12 St., Richmond 19, Va. Each application must be accompanied by a check for $5 payable to Dr. Mann.

The **Professional Group on Electronic Component Parts** (PGECP) has been organized in the Institute of Radio Engineers for the purpose of promoting the continued improvement of electronic components and to provide channels for exchanging both functional and environmental test information on component parts among research, development, and production organizations. Floyd A. Paul of Northrop Aircraft, Inc. has been elected chairman of this group, whose field of interest includes the characteristics, limitations, applications, development, performance, and reliability of component parts.

This group—with the cooperation of the American Institute of Electrical Engineers, other professional groups of the IRE, the Radio-Electronics Television Manufacturers Association, and the West Coast Electronics Manufacturers Association, and with the active participation of the U.S. Department of Defense and the National Bureau of Standards—will sponsor the **Electronic Components Symposium** to be held in the Department of Interior in Washington on May 4–6. Speakers from both government and industrial organizations will take part in the symposium. Other activities planned by the group are the publication of a Transaction in the *Proceedings of the Institute of Radio Engineers* early in 1954, and the proposal of a scholarship plan to induce engineering electronic graduates to direct their activities toward the field of electronic component parts, and the creation of component part chapters in various cities throughout the country.

Membership in the PGECP is open to all IRE members, and interested engineers are urged to join. Application forms and detailed information may be obtained from Dr. Fred Haynes, Supervisor, Electronics Product Section, The Glenn L. Martin Co., Baltimore, Md., or application may be made directly to Miss Emily Sirjane, IRE, 1 East 79 St., New York 21, N.Y.

Miscellaneous

The following **chemicals** are wanted by the Registry of Rare Chemicals, Armour Research Foundation of Illinois Institute of Technology, 35 W. 33 St., Chicago 16: tellurium sulfide; bismuth telluride; ammonium cobalt thiocyanate; molybdenum oxyfluoride; ferrous oxide; butadiene monoxide; 8-hydroxy-1,2,3,4-tetrahydroquinoline; epifluorohydrin; 2,3-dihydrofuran; 1-amino-4,6,8-naphthalenetrisulfonic acid; N-methylvaline; 3,5-pyridinedicarboxylic acid; 2-pyrollecarboxylic acid; L-tropic acid; 1-decanesulfonic acid; glycolic aldehyde; sedoheptulose; L-ecgonine; D-isorhamnose; sinomenine.

A **conference on heavy water reactors**, organized by the Dutch-Norwegian Joint Establishment for Nuclear Energy Research, was held at Kjeller and Oslo on Aug. 11–13, 1953. The Proceedings of this conference, edited by J. A. Goedkoop and G. Jenssen, are now available as JENER Publication No. 7. The price per copy is 35,00 kr., postpaid. Checks should be made payable to The Joint Establishment for Nuclear Energy Research, Kjeller per Lillestrøm, Norway.

In May the University of Hawaii Press is publishing Robert W. Hiatt's ***Directory of Hydrobiological Laboratories and Personnel of North America.*** This work lists 187 laboratories, and for each is included the address, senior officer, institutional affiliation, objectives, scope of activities, season of operation, and environments stressed. For the visiting investigator the volume will indicate the accommodations available, major research facilities, capital equipment, and provisions for publication; and for the prospective student, the instructional program, teaching facilities, and scientific staff. Biographical sketches of 1300 personnel are included, listing the institutional affiliation, mailing address, field of specialization, current research project, and field experience, by geographic regions.

During last summer, a group of persons interested in the establishment of a memorial at the Marine Biological Laboratory to the late **Edwin Grant Conklin** held an informal meeting at Woods Hole. As a result of this meeting a committee headed by William R. Amberson, University of Maryland School of Medicine, was constituted to seek funds and make plans for such a memorial.

Dr. Conklin's association with Woods Hole as an active research worker covered a span of 62 years—from 1890 to 1952. He became a member of the Corporation in 1894 and was a trustee from 1897 until the time of his death. Few have had a longer or more intimate connection with the Marine Biological Laboratory than he, and no one has been more devoted to its welfare.

It is hoped to secure a sum of at least $5000. A portion of this amount will be used to place a plaque in the main foyer of the M.B.L., similar to those now there in memory of other biologists who had a prominent part in the early development of the Laboratory. The remainder of the funds might be used to secure a portrait of Dr. Conklin, painted from life by Gertrude Whiting in 1946, or to provide in his memory a scholarship in the embryology course, or to establish a special annual lecture. Contributors to the fund are asked to transmit any suggestions they may wish to make regarding the type of memorial that should be established.

Contributions should be sent immediately to the treasurer, Mr. Homer P. Smith, Marine Biological Laboratory, Woods Hole, Mass. Contributors will be notified later concerning the amount raised and its disposition.