of both grass and weeds. After collection, weeds and grasses from each plot were hand sorted and weighed separately while fresh.

Preliminary results of the November 1945 treatments, as shown by the first clippings made on 4 April 1946, are briefly as follows: The clippings from the fertilized control plots (no 2,4-D applied) contained an average fresh weight of 62.2 grams of weeds, while the weight of weeds in plots receiving 1½, 3, 6, and 9 pounds per acre of 2,4-D in the fertilizer was 7.4, 6.0, 2.4, and 1.8 grams, respectively. Weed clippings from plots receiving the two highest rates of 2,4-D consisted entirely of sheep sorrel (*Rumex acetosella*). Black medic (*Medicago lupulina*) was eliminated from all 2,4-D-treated plots, while white Dutch clover (*Trifolium repens*) appeared to be eradicated only at the rates of 6 and 9 pounds of 2,4-D per acre. No significant difference was found in the weight of grass clippings at this date. The grass in plots receiving either 6 or 9 pounds per acre were noticeably greener in spite of the fact that they had received the same kind and amount of fertilizer.

From these results it appears that once the established weeds have been killed by means of 2,4-D sprays, and young seedling weeds that subsequently germinate in the surface soil layers have been eradicated by further spraying, it is feasible to maintain a weed-free lawn by judicious use of this chemical. Repeated sprayings have not proved harmful to established grasses, and in the absence of weeds the sod has developed a uniformly dense coverage of the soil surface which in itself tends to discourage infestation by most of the common lawn weeds.

Preliminary results with dry mixtures of fertilizer and 2,4-D are promising for weed control in lawns, pastures, and other grassy areas. In the absence of spraying equipment this method provides a convenient method of application. By this means it is possible to apply an effective weed-killing and fertilizing treatment in the same operation, which saves both time and labor.

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News and Notes

House Action on Science Legislation

Before last week's issue containing an appeal from Howard A. Meyerhoff addressed to supporters of S. 1850 had reached any considerable number of readers, House action had definitely killed all National Science Foundation Bills for this session.

On 19 July the Priest Subcommittee on Public Health of the Insterstate and Foreign Commerce Committee refused to take action on the competing bills: H.R. 6672 embodying the proposals of S. 1850; H.R. 6448 reasserting the principles and structure of the original Magnuson Bill; or S. 1850 as amended and passed by the Senate.

The Subcommittee said that the issues were "too involved and too important" to be acted on in the few final days of the 79th Congress.

Legislative observers said that "by failing to present a united front scientists themselves caused the legislators to doubt the wisdom of any of the competing measures." They pointed out that only a few days before this committee had approved, and the House had passed, the solidly supported National Mental Health Act providing for the establishment of a National Psychiatric Institute and grants-in-aid for psychiatric research.

Next week *Science* will carry a final and authoritative analysis of the legislative picture as it appears in mid-summer, 1946.

About People

H. Jermain Creighton, Swarthmore College, has been awarded the Edward Goodrich Acheson gold medal and $1,000 prize by the Electrochemical Society for his "outstanding accomplishments in electrochemistry."

Charles F. Kettering, chairman of the AAAS Executive Committee, became chairman of the Board of Trustees, Ohio State University, on 1 July.

John Green, Cambridge University, has been appointed Alexander Blain Hospital fellow in anatomy, Wayne University College of Medicine, for the year 1946–47.

Eugene C. Crittenden, chief of the Electrical Division, National Bureau of Standards, has been awarded the I.E.S. medal, given by the Illuminating Engineering Society in recognition of meritorious achievement

which has conspicuously furthered the profession, art, or knowledge of illuminating engineering. The I.E.S. medal, highest honor in the field of lighting, together with a citation, will be presented at the Illuminating Engineering Society's convention to be held at the Chateau Frontenac, Quebec, 18–20 September.

Frederic C. Blake and *Edmund S. Manson,* of the Department of Physics and Astronomy, Ohio State University, will retire at the end of the summer quarter after 39 years of service at the University.

Col. Harry Plotz, MC, chief of the Division of Virus and Rickettsial Diseases, Army Medical School, Washington, D. C., has been awarded the Legion of Merit.

Robert Donald Lewis, chairman of the Department of Agronomy at Ohio State University since 1940, will become director of the Texas Agricultural Experiment Station on 1 September.

Harold E. Himwich has resigned his post as professor of physiology and pharmacology at the Albany Medical College, Union University, to assume the duties of research physician, chief of Clinical Research Branch, Edgewood Arsenal, Maryland.

R. Smoluchowski, formerly research physicist at the General Electric Laboratories, Schenectady, New York, has joined the staff of the Metals Research Laboratory and the Department of Metallurgical Engineering, Carnegie Institute of Technology, Pittsburgh, as an associate professor.

Walter B. Shelley has been made an instructor in the Department of Physiology at the University of Pennsylvania Medical School. Dr. Shelley has just been released from duty in the Army Medical Corps, in which he was awarded the commendation ribbon for his work as head of the clinical investigation section of the Armored Medical Research Laboratory, Fort Knox.

Frederick Campion Steward and *Johannes F. K. Holtfreter* have been appointed to the faculty of the Division of Biological Sciences, University of Rochester. Dr. Steward, Birkbeck College, University of London, has been named visiting professor of botany and chairman of the Department of Botany, and Dr. Holtfreter, formerly of the Kaiser Wilhelm Institute, Berlin, and the Zoological Institute, University of Munich, has been appointed associate professor of zoology. Both will begin their new duties with the opening of the fall term in September.

Fayek Nahass and *Mukhtar Wasfi,* two Syrian physicians, are taking special postgraduate work at the University of Texas Medical Branch through the cooperation of the State Department and the U. S. Public Health Service. Dr. Nahass has been given a fellowship in neuropsychiatry under the direction of Jack Ewalt, professor of neuropsychiatry and director of the State Psychopathic Hospital, while Dr. Wasfi holds a similar position in radiology under the direction of Martin Schneider, chairman of the Department of Radiology.

Peter Kellaway, of McGill University Faculty of Medicine, was awarded the William Osler medal by the American Association of the History of Medicine at its annual meeting held in Atlantic City on 27 May, for his essay, "The part played by electric fish in the early history of bioelectricity and electrotherapy." The William Osler medal was established in order to stimulate interest and research in medical history among students of the medical schools of the United States and Canada and is granted annually to the author of the best student essay submitted to the Association.

Announcements

The Division of Biology, California Institute of Technology, has announced the following appointments of its graduates or former staff members: Barbarin Arreguin, Department of Agriculture, Republic of Mexico; Walter D. Bonner, Jr., research fellow, University of California; Robert Emerson, professor, University of Illinois; Klaus Mampell, instructor in zoology, University of Pennsylvania; D. D. Miller, instructor in zoology, University of Nebraska; E. Novitsky, Guggenheim fellow, Biological Laboratories, University of Rochester; and G. T. Rudkin, research fellow, Lankenau Hospital, Philadelphia.

A bureau of industrial psychology has been established in the Extension Division, University of Wisconsin, according to an announcement by L. H. Adolfson, director of the Division. Karl U. Smith, formerly assistant professor, University of Rochester, will head the unit.

Appointments in the enlarged Department of Physics, Washington University, St. Louis, were announced recently. Eugene Feenberg, New York University; F. N. D. Kurie, director of the U. S. Navy Electronics Laboratory, San Diego; and J. H. Manley, director of the Physics Division, Los Alamos, became associate professors. Henry Primakoff, New York University; and Robert D. Sard, research associate, Massachusetts Institute of Technology, were made assistant professors. Franco Rasetti, director of the Physics Department, Laval University, Quebec, will be visiting professor during part of 1946–47. All appointments were effective on 1 July.

The Wellcome Historical Medical Museum, 183/193 Euston Road, London, N.W.1, is preparing a catalogue of its extensive library, according to an announcement by E. Ashworth Underwood, director. It will be some time before the work is published, but if any person who is preparing a bibliography of the works of any writer in the field of medicine or the allied sciences desires to include the location of known copies of the different works, Dr. Underwood has offered to send him on request a list of the various works and separate editions of that writer which are in the library of the Museum. Applications should be made in writing.

It is hoped to open the library for the use of students at an early date which will be announced.

Estinyl, Schering's ethinyl estradiol, said to be the most potent oral estrogen known today, has been accepted by the American Medical Association Council on Pharmacy and Chemistry. Estinyl is marketed by the Schering Corporation, of Bloomfield and Union, New Jersey. The manufacturers state that estinyl has been proven of great value clinically in estrogenic deficiencies in the female and that it is also used in the male to palliate the symptoms of metastatic prostatic carcinoma.

The Middle Atlantic Division, American Society for Professional Geographers, arranged a two-day field trip to the Shenandoah Valley and West Virginia on 18 May. Surface features were pointed out and described by Lt. Cdr. L. O. Quam and W. VanRoyen; farms and farming practices in the valley were described by O. E. Baker; and Robert Goodman arranged a visit to a mountain home near Mathias, West Virginia. The Zigler cooperative cannery and freezer near Timberville demonstrated methods of packing local products, such as apples, peanuts, chickens, and turkeys.—*Ernest M. Harwood, Jr.*

A bus tour of the eastern, middle western, and southern parts of the United States has been made by a group of 35 Swedish civil engineering students from the Royal Institute of Technology, Stockholm. The group was led by Georg Västlund, professor at the Institute, and S. O. Asplund, a construction engineer. Ragnar Woxen, president of the Institute, expects to arrive sometime in August. On tour the students observed the construction of dams, bridges, airfields, waterworks, sewage disposal plants, and other engineering projects.

The itinerary was as follows: New York, 1–6 July; Marblehead, Massachusetts, 7 July; Boston, 8–9 July; Troy, New York, 10 July; Niagara Falls, 11–12 July; Ann Arbor, 13 July; Chicago, 14–16 July; Louisville, Kentucky, 17 July; Knoxville, Tennessee, 18–20 July; Huntington, West Virginia, 21 July; Pittsburgh, 22–24 July; Washington, D. C., 25 July; New York, 26 July. The party will return to Sweden on the S. S. "Drottningholm" on 27 July.

The Archiatrus Society of Tusculum College, Greeneville, Tennessee, became the 37th chapter of Alpha Epsilon Delta, national honorary premedical fraternity, on its installation as the Tennessee Alpha Chapter, 18 May. The initiation of 15 active and 6 honorary members was conducted by Hugh E. Setterfield, associate professor of anatomy, Ohio State University College of Medicine, Columbus, and national president of Alpha Epsilon Delta, who addressed the chapter and guests on the subject, "Education for Medical Service." The Archiatrus Society was organized at Tusculum during the fall of 1927 as the Pre-Medic Club.

The Life Insurance Medical Research Fund is making available postgraduate and student research fellowships to qualified residents of the United States and Canada. For the present, preference will be given to those who wish to work on fundamental problems broadly related to cardiovascular function and disease. Fellowships are granted for one year and may begin at any time. Applications for grants to be held for the academic year 1946–47 will be acted upon in September. For subsequent academic years, applications must be received before 1 January.

The postgraduate research fellowships are open to persons holding a M.D. or Ph.D. degree or the equivalent. Recipients are expected to devote full time to research. The annual stipend will probably vary between $2,500 and $3,000, though larger amounts may be granted in individual instances. These fellowships may be renewed for one or two years.

The student research fellowships are open to persons who have completed at least one year of medical school, but who are not experienced investigators. Holders are expected to devote at least three-quarters of their time to research under the direction of an experienced investigator. Students will necessarily spend an extra year in obtaining the M.D. degree. The annual stipend usually varies between $1,500 and $2,000. Applications must be made by a sponsor who is normally the investigator under whom the applicant will work.

Further information and application forms may be obtained by writing to: Dr. Francis R. Dieuaide, Scientific Director, Life Insurance Medical Research Fund, 333 Cedar Street, New Haven 11, Connecticut.

Members of the Advisory Council are: Francis G. Blank (chairman), E. W. Goodpasture, A. Baird

Hastings, Eugene M. Landis, Robert F. Loeb, C. N. H. Long, Seeley G. Mudd, and C. J. Watson.

The National Registry of Rare Chemicals, Armour Research Foundation, 35 West 33rd Street, Chicago 16, Illinois, lists its new needs in the following list of chemicals: lysolecithin; montanic acid; daphnetin; 3,5-dimethoxy pyrene; hydroxy citric acid; sodium stanni chloride; 1,2-hexanediol; ribitol; 1,4,5-xylenol; xanthein; hexamethylene glycol; galactoflavin; 3-hydroxy diphenyl; ribonuclease; silicomethane; sodium dithio oleate; 5-amino-l-pentanol; 1,8-diamino naphthalene; and 3-bromo-l-propine.

Closer ties between scientists here and abroad have been facilitated by the formation of a new American-Swiss Foundation for Scientific Exchange, Inc., which will sponsor trips by prominent American scientists to Switzerland and arrange for a similar number of Swiss specialists to visit centers of scientific work in this country.

During the year 1946 the following American scientists are invited to spend from six to eight weeks lecturing and visiting laboratories abroad: Robert C. Hackett, scientific director of the Sugar Research Foundation, Inc.; Robert R. Williams, Nutrition Board of the National Research Council; Tom D. Spies, Cincinnati General Hospital and the nutritional clinic of the Hillman General Hospital, Birmingham, Alabama; Conrad C. Elvehjem, professor of biochemistry at the University of Wisconsin; O. Kraier, physiologist, Harvard University; and C. N. H. Long, biochemist, Yale University.

Tadeus Reichstein, professor of pharmacy at the University of Basle, known for his synthesis of ascorbic acid, and Leopold Ruzicka, professor of organic chemistry at the Federal Institute of Technology, Zurich, 1939 Nobel Prize winner, are completing a six-week tour of industrial laboratories, government projects, and leading universities in this country. Paul Karrer, professor of organic chemistry at the University of Zurich, 1937 Nobel Prize winner known for his vitamin studies, and P. Scheerer, professor of physics at the Federal Institute of Technology, Zurich, will make similar visits to acquaint themselves with new developments later in the year.

In addition to facilitating and preparing itineraries so that visitors can derive the greatest benefit from their trips, the Foundation this year is bringing eight young Swiss physicians to study techniques here. It is also planned to exchange a larger number of scientists drawn from the level of associate professors and instructors, and perhaps eventually to provide fellowships for postgraduate workers in the fields of medicine, biochemistry, pharmacy, and the natural sciences.

Through contacts made by Drs. Reichstein and Ruzicka independently, a number of Swiss chemists will be able to work in laboratories here, while Americans will have an opportunity to study operations in similar laboratories in Switzerland.

The Foundation was formed through the combined programs of Raymond De Saussure and H. M. Wuest, who were interested in restoring contact in the medical and natural science fields, respectively. Through their affiliations with American concerns of Swiss origin a nonprofit organization has been incorporated, with headquarters in Montclair, New Jersey, to carry out this program.

At the present time the following firms are supporting members: Ciba, Geigy, Givaudan, Hoffmann-La Roche, Maggi, Nestle, and Sandoz. E. H. Bobst and H. M. Wuest are private sponsors.

Officers of the Foundation are: J. J. Brodbeck, president; H. M. Wuest, executive vice-president; M. F. Furter, treasurer; G. Huguenin and Raymond De Saussure, trustees.

The Foundation's address is: P. O. Box 26, Nutley 10, New Jersey.

Research fellowships, through the aid of the Ellen B. Scripps Foundation, have been announced by the Zoological Society of San Diego. One or more fellowships will be available after 15 August for research work at the Biological Research Institute, in the fields of bacteriology, parasitology, pathology, veterinary medicine, and the comparative physiological and biochemical features of animal nutrition. The stipend of each fellowship (covering a 10-month university year) will be from $1,000 to $2,000, depending upon qualifications of the holder. Adequate research materials and facilities are available in the Zoological Hospital, Research Institute Laboratories, and the Zoological Gardens for the successful pursuit of problems in the fields mentioned.

The Biological Research Institute of the Society is not directly affiliated with any one university, but qualified students may make arrangements to work toward an advanced degree under the jurisdiction of a department in a cooperating university. Only the thesis or dissertation, or parts thereof, may be fulfilled at the Biological Research Institute. Preference will be given to advanced graduate students, who should furnish full information concerning academic preparation, degrees, and the specific problem of proposed research. Letters of recommendation are necessary, and a recent photograph is desirable. Each applicant should state his or her government income, if working as a student under the G. I. Bill of Rights.

Further information will be sent on request. Applications should be sent before 15 August 1946 to: The Research Committee, Biological Research Institute, Box 551, San Diego 12, California; Attention Mrs. Belle J. Benchley, Executive Secretary, San Diego Zoological Society.

Research Progress in Mellon Institute, 1945-46

During the past four years our Armed Forces have been brought close to war science and technology. Our nation has leaned heavily on all research and development services, and science has been taken from its groundwork of facts and raised into a world of new meanings and values. The research spirit pervading our country in wartime has enabled scientists to see life and its needs in the aggregate and to unify efforts in facing problems rationally and aggressively.

In 1945–46, as in previous years of the war period, there have been many essential governmental demands on Mellon Institute, leading to noteworthy research accomplishments but restricting the inception of new basic programs and the resumption of intermitted long-term projects.

During the fiscal year 1 March 1945 to 1 March 1946, according to the relevant report of the director, E. R. Weidlein, to the Institute's board of trustees, requirements of wartime origin as to more personnel and more space for imperative projects have limited to 82 the number of fellowships in action—29 individual fellowships and 53 multiple fellowships. Of these 82 fellowships, 4 have been proceeding 30 years or longer and others at least as follows: 4 for 25 years; 9 for 15 years; and 15 for 10 years. An additional 28 fellowships have completed 5 years of investigation. As various fellowships have grown in size in 1945–46, with marked increases in the volume of their work, the Institute has been filled to its present operating capacity. Also evident throughout the institution is the constant collaboration of the Robert Kennedy Duncan Club, the organization of the members that is continually assisting to advance their well-being and proficiency, giving firm substance to the Institute's professional and social structure, and of the servicing staff numbering 175. These conditions have conduced exceptional productivity by the industrial research staff of 261 fellows and their 264 aids. There have been 19 more fellows and 32 more aids than in 1944–45. Of the total fellowship personnel, 11 women have the grade of fellow and 139 are aids. There are also 4 women in the department of research in pure chemistry, 3 of whom rank as fellows, along with 4 men, and 2 female assistants in the analytical department. During 1945–46 the Institute's expenditures for pure and applied research have totaled $2,410,384.

In this period fellowships have been started on aircraft adhesives, optical cements, and silica gel, and the urgent adhesives project has already been finished. There have been 12 fellowships on war-emergent intermission: air-pollution control, carbon black, cork, cotton processing, enamels, foundry practice, iodine, leather reclamation, meter technology, new plastics, pine chemicals, and raolin. In the meantime research on iodine as an antiseptic is being sustained at the Philadelphia College of Pharmacy and Science under a grant through the iodine fellowship. Intermitted fellowships will be reinstated and new programs waiting for inception will be begun just as soon as personnel and space become available. Brought to conclusion in 1945–46 were the programs of the fellowships on cellulosic molding, cigarette technology, constructional resins, disinfectants, lignin, phenol chemistry, tape technology, and tar derivatives. The fellowships on phenol chemistry and tar derivatives have been merged with the multiple fellowship on tar synthetics. Other terminated programs have released research specialists and facilities for further pressing work.

In 1945, 1 book, 11 bulletins, 43 research papers, and 38 other articles were published by the Institute's members. Altogether, for the 35 years ended 31 December 1945, there have been 22 books, 196 bulletins, and 2,157 journal contributions. During 1945, 32 U. S. and 25 foreign patents were issued to fellows of the organization, making the totals, since 1911, 979 U. S. and 920 foreign patents. Literature concerning the Institute's research procedure, facilities, and activities is sent gratis to interested persons.

The report mentioned demonstrates that science and its investigation are tied firmly to the goals of useful technology, strong economics, and vigilant public health. Research, the right hand of science, is indeed the prime mover in adding to the welfare of mankind, and no longer is the field of human relations an adjacent island rather than an integral part of the mainland of science. Prominently creative during the year have been the industrial fellowships concerned with refractories, porcelain enamels, powder metallurgy, iron and steel wastes, metal working, tube technology, magnesium, new nickel compounds, coal chemistry, petroleum, synthetic lubricants, organic synthesis, foods, stream improvement, life jackets, textiles, corn products, synthetic rubber, protective coatings, organosilicon products, and chemical hygiene. The Institute's department of research in pure chemistry and the Industrial Hygiene Foundation, which operates under the auspices of the Institute, have been exceptionally productive during 1945–46.

The aim of the Institute is exploration for new

things of importance along the trails of science for the direct or ultimate benefit of the public whose advancement is the eventual proof of the value of research. In the happy fusion of science, research, and management that forms the body of thought and action in the Institute, there is constantly optimistic realism in coping with common needs and in moving forward in discovery and improved practice. The investigational philosophy of the organization has as its frame of reference all the knowledge about research and its administration accumulated during the three decades in which the Institute's principles have been in successful application.—*William A. Hamor* (Mellon Institute of Industrial Research).

In the Laboratory

Determination of Penicillin K by Partition Chromatography

HENRY FISCHBACH, MERLIN MUNDELL, and THOMAS E. EBLE

Chemical Section, Medical Division, Food and Drug Administration, Washington, D. C.

The commercial penicillin produced since May 1944 has been shown to be less effective in the treatment of early syphilis than that made available prior to this date (*1, 2*). Coincident with this trend of decreased efficacy was the development of new strains of *Penicillium notatum* and *Penicillium chrysogenum* for increasing the commercial output of active material. The existence of four penicillins, X, G, F, and K, is known (*3*). Recently it has been recognized that the increased output has resulted in the production of proportionately greater amounts of penicillin K in the commercial product at the expense of penicillin G, which had predominated in the original commercial penicillin. Under the direction of the OSRD, studies were made of the four penicillins. It was shown that penicillin G was therapeutically active in the treatment of syphilis and that results obtained with commercial penicillin produced before 1944 approximated the results obtained with crystalline G (*2*). Moreover, it was demonstrated that penicillin K was therapeutically deficient in the treatment of syphilis, and it was concluded that the reduced efficiency of the commercial products marketed after May 1944 was probably due to the content of K (*2*). Thus, it became of paramount and immediate importance to develop some means of determining the quantitative amount of penicillin K in commercial samples.

Other investigators have utilized partition chromatography for the isolation of pure crystalline penicillins. This, together with the apparent variations in the hydrophilic properties of the penicillins, turned our attention to partition chromatography. A considerable number of solvents and eluents were investigated along with buffers of varying pH in order to ascertain the optimum conditions for resolving a mixture of the penicillins. This laboratory has successfully separated and quantitatively determined penicillin K in the presence of the other penicillins by means of partition chromatography. Because of the wide interest in this problem and the general urgency for such a method, it was deemed advisable to present an early report on our findings.

The following conditions have been successfully used for concentrations of 25–55 mg. of total penicillins: Twenty-five grams of silica gel prepared by the Gordon, Martin, and Synge technique (*4*) were thoroughly macerated with 12.5–16.5 ml. of 20 per cent potassium phosphate, with a buffer pH of 6.4. The quantity of buffer was varied somewhat depending on the adsorbability of the silica gel used. Washed chloroform was added to the mixture, and the resulting slurry was poured into a glass cylinder of 22 mm. inside diameter. Slight pressure was required to facilitate the uniform settling of the silica gel. The column was then used in a 10° C. room. The penicillins to be passed through the column were extracted into chloroform from pH 2.0 buffer at 0° C. Aliquots were assayed to determine the total amount of penicillin in the extract. When pure penicillins were used, each type was extracted and assayed separately. Aliquots of the extracts were mixed, passed through the column, and followed with sufficient cold chloroform to furnish two 50-ml. aliquots of eluate. Anesthesia ether saturated with water was used as eluent from this point on. The small amount of ethanol in this grade of ether probably aids in the subsequent elution. Twenty-five-ml. fractions were collected, and the progress of the chromatographic resolution was followed by means of an iodometric assay (*5*) of each fraction. In addition, differential assays were performed on enough fractions to identify and ascertain the sequence of elution of the penicillins. The latter assays were