

which can not be continued without deterioration of invaluable botanical materials and permanent impairment of its basic work.

To meet this situation, and at the same time enable the institution to fulfill its obvious responsibilities to

science, education and the public, the Garden's permanent endowment funds must be increased from \$4,275,000 to at least \$7,000,000, and urgent physical improvements made to the extent of \$2,305,000 in its plant, grounds and equipment.

## SCIENTIFIC NOTES AND NEWS

THE Theobald Smith Gold Medal of the American Academy of Tropical Medicine has been awarded to Dr. Charles M. Wenyon, protozoologist and retired director of the Wellcome Foundation Research Laboratories of London, England. In view of the circumstance that the state of Dr. Wenyon's health makes a journey to the United States to receive the presentation in person impossible, arrangements will be effected for a presentation in London through the United States Embassy.

DR. CHARLES M. POMERAT, professor of anatomy at the School of Medicine at Galveston of the University of Texas, has been elected a corresponding member of the Mexican Academy of Science. Dr. Pomerat recently spent several weeks in Mexico City in the study of tropical diseases and in assisting in establishing laboratories for tissue culture experimentation.

AT the recent meeting of the Society for the Study of Development and Growth, the following officers were elected for the year 1945-1946: *President*, Dr. Albert F. Blakeslee, Smith College; *Secretary*, Dr. J. Walter Wilson, Brown University; *Treasurer*, Francis O. Schmitt, Massachusetts Institute of Technology.

THE statement that Dr. George B. Pegram would become acting president of Columbia University was reported erroneously in the press and was announced in the issue of *SCIENCE* for August 31. This statement was based on the fact that it was planned in case of emergency incapacitating the president, in succession, the dean of the Graduate Faculties, the dean of Columbia College, etc., should take on the duties of the president. Since a regular meeting of the trustees of the university will occur on October 1, when President Butler's retirement goes into effect, the trustees will at that time and not before determine who shall become president in the interim before a new president can be obtained.

DR. P. DUNSHEATH, director and chief engineer of W. T. Henley's Telegraph Works Co., has been appointed president of the British Institution of Electrical Engineers.

DR. OSCAR RIDDLE has retired from the Department of Genetics of the Carnegie Institution of Washington. Starting in September, under the auspices of the Division of Cultural Relations of the Depart-

ment of State, he will become visiting professor from the United States in Brazil, Uruguay and Argentina.

DR. W. C. PRICE, formerly associate of the Rockefeller Institute for Medical Research, has been appointed associate research professor of biology at the University of Pittsburgh. He will continue his work on plant viruses as a part of the natural sciences research program of the university.

DR. FREDERICK E. EMERY, associate professor of physiology at the University of Buffalo School of Medicine, has been appointed professor of physiology and head of the department of physiology and pharmacology of the School of Medicine of the University of Arkansas, Little Rock.

DR. REYNOLD A. JENSEN, associate professor of child psychiatry in the department of pediatrics of the University of Minnesota, under the auspices of a grant from the Rockefeller Foundation, is visiting lecturer in child psychiatry during August and September at the School of Medicine of the University of Utah.

DR. LAURENCE MCKINLEY GOULD, for the past thirteen years professor of geology and geography at Carleton College, has been elected president of the college. Dr. Duncan Stewart, associate professor of geology at Lehigh University, who has twice previously been a member of the faculty of Carleton College, has succeeded him as professor of geology and chairman of the department.

DR. GEORGE C. KENT, of the Iowa State College, has been appointed professor of plant pathology at Cornell University.

DR. O. W. BRANDHORST has been appointed to succeed Dr. Benno E. Lischer, retired, as dean of the School of Dentistry of Washington University.

THE department of mining and civil engineering of the Michigan College of Mining and Technology at Houghton has been divided, and a department of engineering administration has been established which will include work previously assigned to the departments of economics and government and of psychology and sociology. Professor Murray Riddell will be the head of the department of mining; Professor W. C. Polkinghorne head of the department of civil engi-

neering, and Associate Professor E. J. Townsend head of the department of engineering administration.

GEORGE WESLEY AUSTIN, of Birmingham, has been elected Goldsmiths professor of metallurgy at the University of Cambridge to succeed Professor R. S. Hutton, who recently retired.

THE retirement is announced of Professor L. Bairstow, Zaharoff professor of aeronautics in the University of London.

PROFESSOR ERNEST HORACE LAMB, for thirty-two years professor of civil and mechanical engineering at Queen Mary College, London, will retire at the end of the present session. As already announced, he will be succeeded by Dr. Edmund Giffen, since 1940 director of research at the Institution of Automobile Engineers' Laboratories at Brentford.

DR. JOHN A. SHELLENBERGER, professor of milling industry, has been appointed head of the department at the Kansas State College, Manhattan, to succeed Dr. E. G. Bayfield, who has resigned.

AT Rutgers University associate professors have been appointed to full professorships as follows: Dr. James Boyd Allison, professor of physiology and biochemistry and director of the Rutgers Bureau of Biological Research; Dr. Gilbert Harold Ahlgren, professor of farm crops and research specialist in farm crops; Dr. Helgi Johnson, professor of geology and director of the Geological Museum, and Dr. William Riemann, III, professor of analytical chemistry. Dr. Ellwood Meachem Hammaker, analytical chemist for the General Electric Company, has been appointed assistant professor of chemistry.

DR. HUGH R. LEAVELL, Louisville, Ky., director of the Jefferson County Board of Health, who has been on leave with the UNRRA in Europe, has been appointed an assistant director for the medical sciences of the Rockefeller Foundation.

DR. W. F. B. McLINTOCK, since 1937 deputy director of the Geological Survey of Great Britain and of the Museum of Practical Geology, has been appointed director.

THE committee on professional education of the American Public Health Association announces that Professor Charles-Edward Amory Winslow, chairman of the department of public health of Yale University, for thirty years Anna M. R. Lauder professor of public health, has been appointed counsellor in charge of a group of investigators who will compile data to be used in creating a body of accredited institutions to give degrees of master of public health, doctor of public health and the diploma in public health.

DR. J. H. SIMONS, professor of physical chemistry

at the Pennsylvania State College, has been named director of the Fluorine Research Laboratories. Under the direction of Dr. Simons these laboratories have been engaged for some time on fundamental research and development in fluorine chemistry. Fellowships for research are provided and research projects undertaken.

DR. WILLIAM RANDOLPH TAYLOR, of the University of Michigan, has received a card dated August 6 from Professor H. H. Gran, the distinguished Norwegian marine biologist, indicating that in spite of wartime difficulties and his advanced age of seventy-five years he is well and happy.

DR. JOSEPH STOKES, JR., professor of pediatrics in the Medical School of the University of Pennsylvania, gave the first lectures of the Intermountain Pediatric Lectureship of the Medical School of the University of Utah on July 16 and 17 on "Studies of Infectious Hepatitis" and "The Use of Gamma Globulin in Infectious Hepatitis and Other Communicable Diseases." Dr. Ashley Weech, professor of pediatrics and head of the Children's Research Foundation of the University of Cincinnati, presented two lectures on July 26 and 27 on "The Physiologic Consequences of Inadequate Dietary Protein" and "The Role of Cortical Development in the Behavior of the Infant."

THE fifty-first summer meeting of the American Mathematical Society will be held at the New Jersey College for Women, Rutgers University, New Brunswick, N. J. The summer meeting of the Institute of Mathematical Statistics will also be held at the same place on September 16. Sessions will begin on Saturday, September 15, at 9:30 A.M. and continue through Monday morning. In addition to the addresses previously announced for Saturday, by Professor S. S. Chern, Professor Samuel Eilenberg and Professor Witold Hurewicz, there will be a symposium on "Recent Developments in Numerical Methods" at 2:00 P.M. on Sunday, consisting of three addresses: "Interpolation, Smoothing and Curve Fitting," by Professor I. J. Schoenberg, of the University of Pennsylvania; "Laurent Expansions of Algebraic Functions," by Professor Hans Rademacher, of the University of Pennsylvania, and "Numerical Solutions of Integral Equations," by Professor A. T. Lonseth, of Northwestern University.

It is reported in *Nature* that an Anglo-French conference on cosmic rays will be held in the H. H. Wills Physical Laboratory, University of Bristol, on September 25, 26 and 27. It is hoped that some ten French delegates will attend, including Professor P. Auger, Professor F. Joliot and Professor I. Curie-Joliot.

THE Special Libraries Association published in August "A List of Subject Headings for Chemistry Libraries." It was compiled by a committee of the Section of Chemistry of the Science-Technology Group of the Special Libraries Association, under the chairmanship of Mrs. Grace R. Cameron, of the Louisiana State University Library. This list was compiled for use in assigning subject headings to the entries in a catalogue of books, pamphlets and other literature in a chemical library. General or main headings are used which can be expanded as needed. Subdivisions

which may be used under general headings are also given. Examples of expansions for specialized fields such as dyes, paper and rubber are included. This publication is for all college, university, public and special libraries containing any chemical material.

THE Georgia Power Company has made a gift of \$100 to the Alumni Foundation of the Georgia Institute of Technology at Atlanta. The fund will be used largely to buy equipment to further electrical research at the school.

## SPECIAL ARTICLES

### ORAL ADMINISTRATION OF PENICILLIN<sup>1</sup>

ALTHOUGH it was originally assumed that penicillin could not be administered orally because of its rapid destruction by gastric acid,<sup>2</sup> a number of investigators have reported effective blood levels when relatively large doses of penicillin by mouth were given by various methods (Libby<sup>3</sup>; Charney *et al.*<sup>4</sup>; McDermott *et al.*<sup>5</sup>; György *et al.*<sup>6</sup>; Little *et al.*<sup>7</sup>; Burke *et al.*<sup>8</sup> and Moses<sup>9</sup>). In a recent review of some of these investigators<sup>10</sup> it was stated that although oral penicillin was therapeutically effective when given either as a suspension in a digestible oil or when accompanied by one of the mild antacids, the most favorable vehicle had not yet been determined. McDermott and his collaborators<sup>5</sup> found no significant difference between the administration of penicillin by the oral route when it was given (a) in corn oil; (b) in water; (c) in water preceded by a buffer; and (d) in peanut oil and 4 per cent. beeswax. The authors,

however, stated that the height of the penicillin concentrations in the blood two hours after ingestion of the oil and oil in beeswax preparations suggested that the duration of penicillin activity may be prolonged by the use of these vehicles by mouth in a manner similar to the prolongation which, as Romansky<sup>11</sup> showed, follows the intramuscular injection of penicillin in oil and beeswax. Selection of the best oral method from those previously reported is difficult because of the lack of an adequate number of blood level determinations in the same subjects with the various procedures.

In this communication the results of administration of penicillin mixed with aluminum hydroxide are compared with the results of administration of penicillin in water. When aluminum hydroxide was given one-half hour before ingestion of penicillin and not mixed with it, no significant advantage was detected by blood level curves. A few tests of penicillin by mouth with other procedures have been included in the graphs. The importance of using the same subject with different methods is revealed by the large individual variation with the same dose of penicillin. Thus, a man weighing 200 pounds would be expected to have a lower blood level than one weighing 100 pounds, irrespective of age. The factor of relationship to eating was kept relatively constant in this study. Most of the observations were made one to two hours after breakfast or lunch.

### METHODS

The penicillin was dissolved in tap water, either (1) by inserting 4 cc of water into the 100,000 unit ampoule by a hypodermic syringe, withdrawing the contents and rinsing the remaining penicillin solution in the ampoule with an additional 4 cc of water, or (2) by removing the metal band and rubber cork from the bottle and dissolving the 100,000 units of penicillin in a teaspoonful of water and then rinsing

<sup>11</sup> M. F. Romansky and F. E. Rittman, *SCIENCE*, 100: 196, 1944.

<sup>1</sup> This investigation was aided by grants from the Josiah Macy Jr. Foundation and the Foundation for the Investigation of Chronic Pulmonary Diseases. The penicillin was provided by the Office of Scientific Research and Development from supplies assigned by the Committee on Medical Research for clinical investigations recommended by the Committee on Chemotherapeutic and Other Agents of the National Research Council. The aluminum hydroxide used in this investigation was largely supplied to us by Wyeth, Inc.

<sup>2</sup> E. P. Abraham, E. Chain, C. M. Fletcher, A. D. Gardner, N. G. Heatley, M. A. Jennings and H. W. Florey, *Lancet*, 2: 177, August 16, 1941.

<sup>3</sup> R. L. Libby, *SCIENCE*, 101: 178, February 16, 1945.

<sup>4</sup> J. Charney, H. E. Alburn and F. W. Bernhart, *SCIENCE*, 101: 251, March 9, 1945.

<sup>5</sup> W. McDermott, P. A. Bunn, M. Benoit, R. DuBois and W. Haynes, *SCIENCE*, 101: 228, March 2, 1945.

<sup>6</sup> P. György, H. N. Vandergrift, W. Elias, L. G. Colio, F. M. Barry and J. D. Pilcher, *Jour. Am. Med. Assn.*, 127: 639, March 17, 1945.

<sup>7</sup> C. J. H. Little and G. Lumb, *Lancet*, 1: 203, February 17, 1945.

<sup>8</sup> F. G. Burke, S. Ross and C. Strauss, *Jour. Am. Med. Assn.*, 128: 83, May 12, 1945.

<sup>9</sup> C. Moses, *Jour. Am. Med. Assn.*, 128: 52, May 5, 1945.

<sup>10</sup> Editorial, *Jour. Am. Med. Assn.*, 127: 1129, April 28, 1945.