eral cleaning. A great part of the herbarium as well as a portion of the library have been placed in repositories outside Munich. The date of their return will depend on Army priorities and transport facilities.

(d) *The over-all activities of the Botanischen Staatsanstalten:* Research, analysis and general administrative functioning is inhibited for the moment by the shortage of illuminating and fuel-gas and the impossibility of obtaining essential chemicals.

(e) *Personnel consulted:* Professor Dr. F. C. v. Faber.

On August 27 Dr. Haas writes: "To-day a serviceman, Dr. V. Rudolph, of Philadelphia, Pa., stationed in Burghausen, Bavaria-Germany, sends to me the following information about the situation of the University of Munich. Dr. Rudolph is a student of forestry. His letter is dated August 13, 1945. He talked with Dr. Gustav Krauss, a soil specialist in the Forest Department. His letter reads:

The Forest Department of the university is nearly completely destroyed. There are a few of the class rooms still intact. The upper rooms are utter shambles. The building to the rear of the one on the Amalien Strasse where the specimens of Dr. Münch and Dr. Escherich were kept are all destroyed. (Dr. Münch was the successor to Dr. v. Tubeuf whom I knew personally and who showed to me his forest-botanical collection. Dr. Escherich is one of the most famous experts in insects; he was commissary rector of the university when the Nazi came to power. Th. H. Haas). The insect collection, one of the most famous in the world, has been completely wiped out by fire.

The following well-known staff members of the department of forestry have been retired: Professor Münch, now in Lechbruck, near Kaufbeuren (Algäu); Professor Escherich in Munich 19, Prinzenstrasse 26 (this is near Nymphenburg), and Professor Fabricius in Grafrath, about 30 km S.W. of Munich.

Dr. Harry Grundfest writes that the national secretary of the American Association of Scientific Workers has received the following information, signed by Dorothy M. Needham, from the Sino-British Science Cooperation Office, 1, Victory Village, Liangfu Lu, Chungking, China:

The inaugural meeting of the Chinese Association of Scientific Workers was held on July 1 at the National Central University, Shapingba, Chungking. About fifty scientists were present. Since the difficulties of transport in China are so great, those present were practically all from Chungking and the neighboring academic centers of Shapingba, Koloshan and Beipei.

Dr. Rjen Hung-Chang was in the chair, and made a speech on behalf of the Science Society of China. Other speakers were Dr. Shen Chi-I, representing the Natural Science Society of China; Dr. Liang Hsi, a veteran of Chinese forestry, representing the Chinese Agricultural Association, and Dr. Ku Yuan-chuan, head of the National Institute of Industrial Research, representing interest in industry of the new association. I was invited as representative of the Sino-British Science Cooperation Office, and was asked to speak about the work of the Association of Scientific Workers in Great Britain. Dr. Tu Chang-wang, who has been very active in the founding of the Chinese Association, described the work of the preliminary stages.

The American association has sent greetings to this latest addition to the list of associations of scientific workers. At the present there are associations in Great Britain and in the following Commonwealths: Canada, Australia, New Zealand and South Africa. In France there has been founded the Association Française des Travailleurs Scientifiques.

Recent correspondence from abroad to Robert T. Hatt, of the Cranbrook Institute of Science, carries the following news of vertebrate zoologists: S. Frechkop, of the Royal Museum of Natural History, Brussels, is active at his post and continued publishing in 1944. Paul Rode, of the Museum of Natural History, Paris, reports that he is enjoying his first leave from Paris in two years; that they managed to keep up publication of *Mammalia* during the war despite the shortage of paper. Count Nils Gryldenstolpe, of the Royal Natural History Museum, Stockholm, is now in charge of the mammal collections there. He reports the death of Professor Einar Lonnberg.

SCIENTIFIC NOTES AND NEWS

THE Chemical Industry Medal for 1945 of the American Section of the Society of Chemical Industry has been awarded to Sidney D. Kirkpatrick, editor of *Chemical and Metallurgical Engineering,* in recognition of "his leadership and his contributions to the advancement of chemical engineering and research."

THE Joseph Sullivant Medal was awarded to Dr. Paul J. Flory by the Ohio State University at the summer commencement exercises. The medal is given once every five years to a graduate of the university or to a faculty member who has completed a "really notable piece of work" in the arts or in pure or applied science in the preceding five-year period. Dr. Flory, now with the Goodyear Tire and Rubber Company, was awarded the medal in recognition of his work in the field of high polymers.

THE degree of doctor of science was conferred on

Dr. John R. Dunning, professor of physics at Columbia University, at the fifty-sixth commencement exercises of the Nebraska Wesleyan University. Dr. Dunning, an alumnus of the university, gave the commencement address.

DR. G. S. FRAPS retired on August 31 from administrative work as state chemist and chief of the Division of Chemistry of the Texas Agricultural Experiment Station. He remains with the Experiment Station on a part-time basis with the title of collaborating chemist. Dr. Fraps joined the Texas Agricultural and Mechanical College on September 1, 1903, and has been state chemist since 1905.

R. H. BURTON, superintendent of schools in Idabel, Okla., has been elected president of the Southwestern Institute of Technology.

DR. JOYCE C. STEARNS, professor of physics at the University of Denver, has been appointed to the newly established post of dean of the faculties of Washington University, St. Louis.

DR. N. HOWELL FURMAN, professor of analytical chemistry at Princeton University, has been named to the Russell Wellman Moore chair of chemistry.

DR. FRANK RALPH KILLE, associate professor of zoology at Swarthmore College, has been made professor of zoology and dean of men at Carleton College. He has been a member of the faculty of Swarthmore College for the past eleven years.

DR. RAYMOND E. MYERS has been made dean of the School of Dentistry of the University of Louisville, to succeed Dr. Philip E. Blackerby, now dental director of the Kellogg Foundation.

DR. PAUL CRAMER, assistant professor of physics at Denison University, Ohio, has been appointed chairman of the department of mathematics and physics of Huron College, South Dakota.

DR. MONROE D. BRYANT, for the last three years engaged in war work serving as an administrator in the food-processing industry of Denison, Texas, has been appointed assistant professor of zoology and assistant curator of mammals in the Museum of Vertebrate Zoology of the University of California at Berkeley.

DR. STUART M. PADY, who for the past nine years has been head of the department of biology of Ottawa University, Kansas, has joined the staff of the department of botany and plant pathology of Kansas State College.

DR. FREDERICK R. DUKE, of Princeton University, will become an assistant professor in the department of chemistry of Michigan State College at the opening of the fall term.

DR. JOE E. MOOSE, formerly assistant professor of chemistry at the University of Oklahoma and for the past twelve years research chemist for the Monsanto Chemical Company, has been appointed professor of organic chemistry at the University of Nevada.

DR. KARL TERZAGHI, known for his work on soil mechanics, has been appointed lecturer and research consultant in civil engineering in the Graduate School of the University of Illinois, under the newly established "Distinguished Professorship Fund."

DR. EDMOND C. CALAVAN has joined the staff of the division of plant pathology of the Citrus Experiment Station at Riverside of the University of California. His work will be devoted to a study of the various factors causing lemon decline, with special emphasis on the role of shell bark in the deterioration of lemon orchards in California.

DR. TURNER ALFREY, research chemist of the Monsanto Chemical Company of Springfield, Mass., is joining the staff of the Highpolymer Research Bureau of the department of chemistry of the Polytechnic Institute of Brooklyn to teach specialized courses in polymer chemistry and to engage in research.

AT the University of London, Dr. L. Dudley Stamp has been appointed to the chair of geography tenable at the School of Economics and Political Science. He has been Sir Ernest Cassel Reader in Economic Geography at the school since 1926.

THE following have been appointed to full professorships in the department of zoology of the University of British Columbia; G. J. Spencer (entomology); Dr. Ian MacTaggart Cowan (vertebrate zoology); Dr. W. S. Hoar (fisheries).

DR. C. J. MACKENZIE, president of the Canadian National Research Council, has announced that a special medical committee has been appointed to act as general directing body on medical research in the field of atomic energy. The members are Dr. Duncan Graham, Toronto; Dr. J. B. Collip, McGill University, and Dr. J. S. Mitchell, Montreal.

DR. E. C. AUCHTER, director of the Pineapple Research Institute of Hawaii since February of this year, has been appointed president of the institute to take effect at once. He will continue to direct its research activities, in addition to his work as president. Dr. Auchter was formerly administrator of agricultural research of the U. S. Department of Agriculture.

DR. GEORGE S. AVERY, JR., director of the Brooklyn Botanic Garden, announces the following new appointments: horticulturist, Dr. Conrad B. Link, assistant professor of floriculture, Pennsylvania State College; curator of elementary instruction, Miss

Frances M. Miner, assistant curator of elementary instruction at the garden, succeeded in this position by Dr. Barbara Shalucha, of the department of horticulture of the Ohio State University; research fellow, Miss Sally Kelly, assistant in botany at the University of Wisconsin; research assistant, Miss Margaret Piper, a graduate of Connecticut College.

DR. ARDA ALDEN GREEN, assistant professor of biochemistry in the School of Medicine of Washington University, St. Louis, has become associated with the Research Division of the Cleveland Clinic. Dr. Green, who recently succeeded in the crystallization of phosphorylase from muscle, will continue biochemical investigations in connection with vascular disease.

THE units for the manufacture of penicillin of the Lederle Laboratories, Inc., Pearl River, New York, have been placed under the direction of Dr. Sidney H. Babcock, Jr., head of the chemical process development and manufacturing division.

THE Rockefeller Foundation has provided funds to establish a program in child psychiatry at the Medical School of the University of Utah. Dr. Reynald Jensen, associate professor of neuropsychiatry and pediatrics at the Medical School of the University of Minnesota, in charge of the Child Psychiatric Clinic at the University Hospital, Minneapolis, is in Salt Lake City in the interest of the project for a period of two months.

DR. JOHN F. G. HICKS, member of the Division of Glass Technology of the Corning Glass Works, left on August 31 for São Paulo, Brazil, where he becomes technical and scientific consultant of the Cia. Vidraria Santa Marina, an affiliate in Brazil of the Corning Glass Works of South America.

DR. LOURDU M. YEDDANAPALLI, S.J., who has been engaged for the past three months in postdoctorate work in the laboratories of the Highpolymer Research Bureau at the Polytechnic Institute of Brooklyn, sails on September 3 for England on his way to India. He has been appointed head of the department of chemistry at the Jesuit College of the University of Madras.

SHARP AND DOHME, INC., of Glenolden, Pa., has made a grant to the department of pediatrics of the Medical Branch at Galveston of the University of Texas for the study of sulfa drugs in the control of intestinal infection. The grant is to be administered by Dr. Arild E. Hansen, professor of pediatrics and director of the child health program, with the cooperation of Dr. Edgar J. Poth, professor of surgery and director of the Laboratory of Experimental Surgery, and Dr. MacDonald Fulton, visiting professor of pediatric research.

DR. JOHN H. GARDNER has resigned as associate professor of chemistry at Washington University, St. Louis, to become associated with the J. T. Baker Chemical Company as research organic chemist.

DR. HENRY KREIDER, of the Mead Johnson Company, will join the analytical and control department of the Research Laboratories of the Wm. S. Merrell Company, Cincinnati. Dr. Irwin Gibby will become associated with the department of bacteriology, and Dr. Stanley M. Parmerter, who has held the Merrell post-doctorate fellowship at the University of Illinois for several years, with the department of organic chemistry.

PROFESSOR CHARLES M. GENAUX, of the department of forestry of Iowa State College, has six months' leave, beginning on September 15, to serve the War Department as civilian educational specialist. In England or in France, he will give instruction and counsel to military personnel under the Army educational program.

CHARLES E. JACKSON, formerly assistant deputy coordinator of fisheries for the Federal Government, has been appointed general manager of the National Fisheries Institute, Inc.

CHANGES at the Federal Experiment Station in Puerto Rico of the U. S. Department of Agriculture include Barton C. Reynolds, formerly associate agricultural engineer, who has joined the staff of the Office of Experiment Stations as research administrator. Edward P. Hume, of the War Department in the Camouflage Division, has become horticulturist in charge of research with mango, avocado, other fruits and plant introductions. Dr. Arnaud J. Loustalot, assistant plant physiologist at the Tung Oil Laboratory of the U. S. Department of Agriculture at Gainesville, Florida, has been appointed associate chemist. His research will deal primarily with a study of the quinine content of *Cinchona*, grown under different cultural and environmental conditions.

THE American Ethnological Society has been informed by its publisher, J. J. Augustine, that the Glueckstadt plant in Germany, which has housed some of their recent publications, has not suffered from bombing so that certain of these older works will again be available for distribution.

IT is reported in *Science and Culture* that the Government of India has decided to appoint a committee to advise the Government on the steps to be taken to manufacture penicillin in India. This decision was made at a meeting of the governing body of the Council of Scientific and Industrial Research held

under the presidentship of Sir Ardeshir Dalal, member for planning and development. Following the conference in London in October of last year, attended by representatives of Britain, the United States, Canada, Australia and Free France and specialists from South Africa and India, with the advice of Sir Alexander Fleming, the discoverer of penicillin, an international agreement on a worldwide uniform standard and unit of penicillin was reached by the Health Committee of the League of Nations. Announcing this decision, Sir Henry Dale, president of the Royal Society, stated that British manufacturers would pool all their information and give all their results to the British Medical Research Council and make the manufacture of penicillin a genuinely national effort.

SPECIAL ARTICLES

MODIFICATION OF GRAMICIDIN THROUGH REACTION WITH FORMALDEHYDE

THE toxicity of tyrothricin and of its components, gramicidin and tyrocidine, has been a limiting factor in the general applicability of these antibacterial agents in medicine.[1] In connection with other work in progress in this laboratory,[2,3] an attempt was made to reduce this toxicity by means of reaction with formaldehyde. Since the toxicities of these materials are at least partly due to their hemolytic action,[4] *in vitro* assays of the latter property were used as a tentative measure of changes in toxicity of modified preparations, although no strict correlation between these two properties appears to have been demonstrated.

It was found that the treatment of tyrothricin with formaldehyde resulted in a loss of 80 to 90 per cent. of the original hemolytic activity and a loss of up to 50 per cent. of the antibiotic activity. The action of formaldehyde on gramicidin gave a similarly reduced hemolytic effect but the antibiotic activity, estimated with *Staphylococcus aureus,* was found to be unchanged. Preliminary tests with rats (intraperitoneal injections) indicated that the modified gramicidin was considerably less toxic than untreated gramicidin (Table 1). This was particularly striking inasmuch as the derivative was more water-soluble than gramicidin. Because of the possible usefulness of the derivative as a chemotherapeutic agent, this preliminary announcement is being made while further, more detailed studies of its chemical and biological properties are in progress.

TABLE 1

EFFECT OF FORMALDEHYDE ON THE PROPERTIES OF GRAMICIDIN

	Toxicity[a] mg/kg	Hemolytic activity[b] ppm	Antibacterial activity[c] ppm
Formaldehyde-treated gramicidin	>450	0.6	0.003
Gramicidin	20	0.05	0.003

[a] Approximate lethal dose. The products were dissolved in 80 per cent. propylene glycol, 20 per cent. alcohol solution and injected intraperitoneally into a limited number of rats weighing 150–200 gm.

[b] Ppm to achieve 50 per cent. hemolysis of rat erythrocytes in 40 min. at room temperature.

[c] Ppm to achieve 50 per cent. inhibition of *Staphylococcus aureus* growth in 4 hours at 37° C.

The reaction of gramicidin with formaldehyde was usually accomplished in the following manner: To 10 parts of a 5 per cent. solution of gramicidin in 95 per cent. alcohol, 1 part of 1 *N* aqueous sodium hydroxide and 5 parts of commercial 40 per cent. formaldehyde solution were added. The mixture was kept at 53° C. for 2 days; it was then at approximately pH 8. These conditions were not critical. Preparations with similar biological activities were obtained with 4 times as much alkali, or with one tenth of the amount of formaldehyde, at room temperature, or at 70° C., and for various time periods. A marked loss in antibacterial as well as hemolytic activity occurred when the reaction was performed at pH 3.0–3.5. The modified gramicidin was isolated by precipitation with about 5 volumes of 0.1 *N* sodium chloride, washed with water of decreasing salt content, and dried from the frozen state. The average yield was 106 per cent. by weight of the starting material.

The method used for the hemolytic assay of gramicidin was a modification of that published for tyrothricin.[5] The rate of hemolysis of a suspension of rat erythrocytes was measured over a period of up to 90 minutes after the addition of 0.025 to 0.2 ppm of gramicidin.

The antibacterial potency against *Staphylococcus aureus* was estimated by means of serial dilution tests in "medium II" of Schmidt and Moyer.[6] Practical sterilization of dilute solutions of the test substances in 70 per cent. ethanol was achieved by permitting them to stand for several days. Dilution tubes were incubated at 37° C. for 4 hours, at which time they were sterilized by autoclaving and the turbidities due to growth of the organism measured photometrically.

[1] R. D. Hotchkiss, *Adv. in Enzym.*, 4: 153, 1944.

[2] J. C. Lewis, K. P. Dimick and I. C. Feustel, *Ind. Eng. Chem.*, in press, 1945.

[3] H. Fraenkel-Conrat, M. Cooper and H. S. Olcott, *Jour. Am. Chem. Soc.*, 67: 950, 1945.

[4] W. E. Herrell and D. Heilman, *Jour. Am. Med. Asn.*, 118: 1401, 1942.

[5] K. P. Dimick, *Jour. Biol. Chem.*, 149: 387, 1943.

[6] W. H. Schmidt and A. J. Moyer, *Jour. Bact.*, 47: 199, 1944.