Symposium on Industrial Processes (Section C)

The papers presented at this symposium, which was held on the afternoon of December 26, 1947, in Chicago, dealt with some of the research developments at the industrial laboratories represented by the five speakers. After the opening remarks by Charles D. Hurd, chairman, H. J. Hagemeyer, of Tennessee Eastman Corporation, presented new reactions of ketene. Of particular interest was the production of β-lactones at 10° by reaction of ketene with aldehydes or ketones in the presence of zinc chloride catalyst. Various aspects of the chemistry of thionyl chloride were presented by Alphonse Pechukas, of Pittsburgh Plate Glass Company. The merits of the syntheses using sulfur trioxide and sulfur chloride (SCl_2) or sulfur dioxide and chlorinating agents (such as SCl_2, PCl_5, SO_2Cl_2, PCl_3, $COCl_2$, CCl_4) were presented, together with the industrial process: $SO_2 + SCl_2 + Cl_2 \rightarrow 2\ SOCl_2 + 63$ kcal. The last reaction is carried out at 200° over a carbon catalyst.

Recent advances in drying oil and fatty acid technology were outlined by Ralph H. Manley, of General Mills. Some interesting developments in the field of plastics were mentioned. Jerome Martin, of Commercial Solvents Corporation, spoke on some recent developments in antibiotics, especially referring to streptothrycin, penicillin, and bacitracin. Streptothrycin, once seemingly promising, was abandoned because of its poisonous nature. Data on the remarkable stability of the crystalline potassium salt of penicillin G were presented. Attention was called to the fact that in dollar volume of sales, penicillin is now exceeded in the pure chemicals list only by sucrose, methane, and ethanol. The 20 tons of penicillin representing the present annual production sell for $120,000,000. Butadiene dextrose and methanol are next in line.

Arthur L. Fox and S. R. Buc, of General Aniline and Film Corporation, described interesting experiments designed for the synthesis of very large conjugated ring systems. (CHARLES D. HURD, *Chairman.*)

Symposium on Antibiotics (Section Nm)

It is prudent during the evolution of a rapidly developing discipline to pause frequently to review the past, scrutinize the present, and plan for the future. The symposium on antibiotics, organized by the officers of Section Nm (Medical Sciences) for the Chicago meeting of the AAAS, appropriately provided just such an opportunity in connection with one of the outstanding triumphs of modern science.

Back in 1928, when Dr. Fleming saw colonies of bacteria disappear from his culture dishes because of the presence of a mold, he was merely observing a type of microbic action which had previously been noted and described in some detail—a laboratory curiosity. However, he proceeded purposefully to grow the mold and attempted to recover from the metabolic products the substance, designated penicillin, which was believed to be responsible for the unusual phenomenon. Crude extracts incorporated in culture media proved to be unusually effective in preventing the multiplication of some germs, and impure preparations gave encouraging clinical results. Nevertheless, the simultaneous accounts of the therapeutic action of the sulfanilamides held in abeyance general interest in Sir Alexander's discoveries because of the ease of synthesis. Following the initial waves of enthusiasm, the sulfanilamides proved to have definite limitations. This and the menace of war influenced Dr. Florey and his associates to reinvestigate the possibility of the isolation of penicillin. From test tube cultures their studies emerged as a type of cooperative industrial research and production totally unheard of before. Penicillin was made available for the alleviation of untold human suffering during the war years. In the postwar period extension of this method, with the enlistment of individuals trained in many branches of science, has introduced refinements enabling the use of 20,000-gallon fermenters and a monthly production in the United States alone of approximately 3,000 billion units—a remarkable achievement.

Penicillin, although relatively nontoxic for man, has a limited microbic spectrum. It is ineffective against such germs as the tubercle bacillus, the *Rickettsia,* the virus, and the protozoa. These forms account for a tremendous annual toll in human life. The challenge to discover antibiotics for the treatment of diseases caused by these agents is being accepted by an unusual group of ardent investigators. Streptomycin, bacitracin, subtilin, and several other compounds are now in commercial production.

The papers prepared for the symposium were grouped under four captions. The first program was devoted to contributions covering the industrial production of penicillin and streptomycin; the chemistry of streptomycin, especially the chemical structure; and the chemistry of subtilin. Antibiotics obtained from the tomato plant and from the Irish potato were discussed, but they, like many other promising agents, are toxic. The basidiomycetes were referred to as worthy of intensive study as potential sources of potent compounds. The session concluded with a very timely report on the recently discovered antirickettsial substance, chloromycetin.

The second meeting stressed the pharmacology and mode of action of antibiotics. More than a hundred have been described with little or no chemical relation-

ship. Unfortunately, the majority have no value. Antibiotics seem to owe their effectiveness to an interference with the vital enzyme systems of the susceptible organisms. Impure penicillin and streptomycin have been found to have greater value than the crystalline products in protecting animals against bacterial infection and intoxication. The enhancement factors in the amorphous preparations are as yet unidentified. Until they are isolated, there seems to be little reason to employ the apparently superior amorphous products in preference to large doses of the crystalline forms.

One of the first shortcomings of penicillin from *in vitro* studies, subsequently confirmed on *in vivo* observations, was the development of resistance by sensitive strains of organisms. Similar research with streptomycin revealed the tubercle bacillus to have an unusual capacity for developing fastness, an attribute which was retained after many serial passages of the bacillus on laboratory media or in animals. This phenomenon reached alarming proportions when it was found that sensitive cultures of the meningococcus could be induced to give rise to forms which actually required streptomycin for growth and multiplied best in high concentrations of the drug. Animals infected with such strains promptly succumbed following streptomycin therapy, while untreated control animals remained alive indefinitely. The seeming growth requirement for streptomycin has been produced in variants of a wide variety of genera and species of bacteria and is a most disturbing observation.

The advent of the antibiotics has completely revolutionized the treatment of the infectious diseases. Many maladies which were formerly scourges of mankind are now under control. The perfect drug has not as yet been discovered; hence, investigators should be encouraged to keep up the present avid search. In papers covering the clinical use of penicillin and streptomycin, repeated reference was made to the false sense of security engendered by reports of miraculous cures. The laity was warned against accepting extravagant claims for new substances and was apprised of the distinct limitations of antibiotic therapy. The greatest problem confronting the clinical use of the antibiotics is the production of resistant and antibiotic dependent disease agents. Combination therapy is under investigation to combat this trend.

In bringing the two-day symposium to a close, E. V. Cowdry postulated with some optimism that the answer to the cancer problem lay in the fields of antibiotics (*Science,* January 30, p. 101). (MALCOLM H. SOULE, *Secretary.*)

NEWS and Notes

Plans are gradually being formulated for the next meeting of the Association, to be held in Washington, D. C., September 13–17. The AAAS Centennial Policy Committee, pictured on this week's cover, held its most recent meeting in Association headquarters in Washington on January 24–25. The group includes: *left to right* (standing)—F. R. Moulton, administrative secretary; Wendell M. Stanley, Rockefeller Institute; Roger Williams, University of Texas; John M. Hutzel, assistant administrative secretary; (seated)—Harlow Shapley, Harvard University; Edmund W. Sinnott, Yale University; and E. U. Condon, National Bureau of Standards. James Gilluly, of the University of California at Los Angeles, also a member of the Committee, was unable to attend. *Science* will from time to time publish brief reports of plans for the Centennial Meeting. The first of these will appear in next week's issue.

About People

William L. Slate, director of the Connecticut Agricultural Experiment Station and vice-director of the Storrs Agricultural Experiment Station since 1923, retired on December 31. Director Slate began his career in Connecticut in 1913, when he joined the Storrs Station as an agronomist.

W. H. Twenhofel, of the University of Wisconsin, editor of the *Journal of Sedimentary Petrology,* received the honorary D.Sc. degree from the University of Louvain, Belgium, on October 20, 1947.

Sherman Dickman, recently a research associate in biochemistry at Columbia University, has joined the staff of the Department of Biochemistry, University of Utah School of Medicine, Salt Lake City, as assistant professor.

Gian C. Wick, professor of physics, University of Notre Dame, has been appointed professor of physics, University of California, Berkeley, effective July 1.

Philip T. Kirwan has been appointed technical editor in the Information and Editorial Branch, Technical Services Division, Chemical Corps Technical Command, Army Chemical Center, Maryland. He was previously a senior technical aide in the Office of Scientific Research and Development, Washington, D. C., serving in the Liaison Office and in Division 3, NDRC (Rocket Ordnance).

C. L. W. Swanson, head of the Soils Department at the Connecticut Agricultural Experiment Station, has been named chairman of the Subcommittee on Soil Surveys of the North-