24 Aug.: Speaker to be announced, "Optical and electrical properties"; speaker to be announced, "Application of fundamental data on plant design."

25 Aug.: J. O. Hirschfelder and R. W. Zwanzig, "Transport phenomena under pressure"; speaker to be announced, "Design and construction in industrial high-pressure processes."

26 Aug.: Henry Margenau and E. W. Montroll, conference summary and discussion of future research.

FATS AND OILS

Daniel Swern, *chairman*;
D. H. Wheeler, *vice chairman*

29 Aug.: R. T. O'Connor, "Infrared spectroscopy"; H. J. Dutton, "Countercurrent distribution"; E. S. Lutton, "Glyceride composition of fats"; R. W. Riemenschneider, discussion; Erich Baer, "Phosphatide synthesis."

30 Aug.: R. O. Feuge, "Dibasic acid glycerides"; L. A. Goldblatt, discussion; W. J. Gensler, "Synthesis of fatty acids"; D. H. Wheeler, "Isomerization of fatty acids"; W. D. Celmer, "Chemistry of mycomycin and related acetylenic compounds."

31 Aug.: Klaus Hofmann, "Lipids from microorganisms"; Guido V. Marinetti, "Lipids of brain and nerve tissue"; W. C. Ault, "Significance of chemical purity in fatty materials for biological investigations"; Hans Kaunitz, "Abnormal effects of autoxidatively treated fats."

1 Sept.: R. T. Holman, "Essential fatty acids in nutrition"; H. C. Tidwell, "Absorption of fats"; Sidney Weinhouse, "Biochemical breakdown and synthesis of fatty acids"; J. W. Gofman, "Role of fats and lipids in heart disease."

2 Sept.: R. P. Geyer, "Intravenous feeding of fat emulsions"; E. W. Crampton and R. H. Common, "Abnormal effects of thermally treated fats."

Contribution of "a Simple Bacteriologist" to Humanity

WITH the death of Sir Alexander Fleming, there passed from our midst one of the most colorful figures in the field of science. Although Fleming made many important contributions to our knowledge of disease-producing microorganisms and the natural defenses of the human body, his name will be forever associated with the discovery of one of the greatest weapons for combating infectious disease that has come out of the laboratory—penicillin.

Born on 6 August 1881, in Ayrshire, Scotland, the youngest of eight children, Fleming spent his first years on his father's farm. He received his early schooling in the immediate neighborhood, where "he took easily to his lessons." Later he joined his brother, Thomas, who had set up a medical practice in London. It was his brother who encouraged him, in 1901, to take up medicine. By a fortunate coincidence, he selected St. Mary's at about the same time that Dr. Almroth Wright, the famous pathologist, joined that school as a teacher of bacteriology.

Fleming won the senior entrance scholarship in natural science. His "formidable memory" and "instinctive sense of observation" greatly impressed his fellow-students. He was always at the top of the examination lists. As a medical student he fell under the immediate influence of Wright, whose classical work on vaccine therapy was influenced greatly by Metchnikov's ideas on phagocytosis. After qualifying in medicine in 1906, Fleming joined Wright's laboratory, on "the quest beyond the ranges." Here he was to combine his laboratory skill with the knowledge gained from his constant contact with the sick.

Fleming was an indefatigable worker, his physical resources being a great asset to him. Within less than 2 years, he was the author or joint author of two papers on opsonin and vaccine therapy. The subject of vaccination occupied his attention during the next 5 years. He was one of the first, in 1911, to study the effect on syphilis of the recently discovered salvarsan. He was profoundly impressed by the dramatic action of this drug as compared with the leisurely effect of vaccine therapy.

The experiences he gained as a medical officer during World War I directed his particular attention to the limitations of the chemical antiseptics commonly used at that time in the treatment of septic wounds. Following Wright's lead, Fleming demonstrated the ability of leucocytes to destroy bacteria, both in the pus of a wound and on a plate heavily infected with staphylococci or streptococci. Since leucocytes are more sensitive to chemical antiseptics than are bacteria, the logical conclusion was that such agents would destroy the tissues before killing the bacteria. These experiments convinced him that "probably the most important antibacterial agents in the body are the cells themselves."

In a paper presented in 1922 before the Royal Society, "On a remarkable bacteriolytic element found in tissues and secretions," Fleming drew attention to the presence in the tissues of a substance having properties "akin to those of ferments," which he called *lysozyme*. This substance was found to have a lytic effect on certain bacteria. Lysozyme was found in tears, nasal mucus, egg white, and leucocytes. These investigations enabled Fleming to develop the procedures that he so successfully employed 6 years later in his studies on penicillin. What is now known as the cross-streak method for screening antibiotic-producing organisms can be traced directly to Fleming's method of assaying lysozyme. He attributed great importance to this agent in the natural immunity of natural defenses of the body.

The groundwork was thus prepared for the dis-

covery of penicillin, This happened when Fleming's attention was drawn to a staphylococcus culture undergoing lysis around a contaminating colony of a green *Penicillium*. The dictum of Pasteur that "chance favors only the prepared mind" has not been applied with greater accuracy than to this observation of Fleming's. This story has been told many times and need not be dwelt upon here. It is important to mention, however, that it was Fleming who subcultured the *Penicillium* and tested the effect of the broth upon different bacteria. He demonstrated the formation of a diffusible antibacterial substance (penicillin) that possessed a selective action against bacteria. Fleming also made the first comparisons of various mold cultures for their ability to produce penicillin and found this ability to be characteristic of only one particular group of molds.

Fleming further established that penicillin had no injurious effect on leucocytes and was not toxic to animals. This led him to suggest that penicillin might find application in the treatment of diseases caused by sensitive organisms. In fact, he used the active broth for the treatment of septic wounds. This led him to predict that "penicillin would one day come into its own as a therapeutic agent."

True, Roberts in 1874, Tyndall in 1876, Duchesne in 1897, Gratia in 1925, and many others in those intervening years had observed that green molds belonging to the *Penicillium* group were able to produce chemical substances that could prevent bacterial growth and even dissolve bacterial cells. But most of these observers did not have the background to appreciate the significance of these phenomena. None labored so arduously or understood so well the natural defenses of the body as did Fleming. None was so well prepared to take advantage of this observation as was Fleming by his previous studies on lysozyme.

Unfortunately, Fleming did not have at his disposal the necessary chemical assistance or the help of a large group of collaborators. It remained, therefore, for the team of Florey and Chain, 10 years later, to bring about the isolation and purification of penicillin and to demonstrate its potentialities as a chemotherapeutic agent. It is generally conceded that the Nobel Prize Committee reached a fair decision in linking the names of Florey and Chain with that of Fleming in making its award in 1945. A certain degree of credit for the development of penicillin should also be given to several American Government and university laboratories as well as to the pharmaceutical industry, with its excellent teams of chemists and bacteriologists, pharmacologists, and engineers.

As one of his biographers emphasized, Fleming possessed curiosity, insight, ingenuity, and persistence. He had the natural curiosity of a scientist, the insight required for successful experimentation, the ingenuity needed to enable him to develop the methods necessary to solve a problem, and the persistence to carry his study through to a successful conclusion.

In spite of the adulation of the public and the honors constantly showered upon him, Fleming remained modest in his claims; he was just "a simple bacteriologist," as he put it. Asking nothing in return, he gave to the world one of the greatest discoveries that has ever fallen to the hand of man to bestow. Because of his discovery, the world has become a better and healthier place in which to live.

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New Adrenal Cortical Steroid

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IT has long been known that extracts of the adrenal cortex possessed activity that, in some respects, far exceeded that of the known adrenal steroids. Although attempts to isolate the substance(s) responsible for this activity were unsuccessful for more than 20 years, much was learned of the properties of the "amorphous fraction" in which it remained (*1*) after the six known biologically active steroids had been removed.

This fraction had little effect on carbohydrate metabolism or on prolonged muscle work performance and did not produce appreciable atrophy of the adrenal cortex or involution of the thymus (*2, 3*). It was highly active, however, in tests of survival and of maintenance of the growth and well-being of adrenalectomized animals. The weight, the clinical state, and the serum electrolytes of adrenalectomized dogs could be maintained with daily doses of 1 to 2 μg/kg. Although it thus resembled desoxycorticosterone (DOC) in its properties, it differed from DOC in possessing far greater activity by weight and in its failure to depress the serum potassium even when given in large doses (*3*).

In 1951 Tait, Simpson, and Grundy (4) subjected adrenal cortical extract to paper chromatography and assayed the material eluted from serial sections of the paper for its activity in depressing the Na^{24}/K^{42} ratio in the urine of suitably prepared adrenalectomized rats. They found that the region occupied by cortisone possessed a high degree of activity that was clearly not caused by the cortisone itself.

In succeeding studies (*5*) the separation of the