4. H. Zinsser, J. F. Enders, and L. D. Fothergill, *Immunity Principles and Application in Medicine and Public Health* (Macmillan, New York, 1946).
5. L. Pillemer *et al., Federation Proc.* **13**, 508 (1954).
6. Hans Hirschmann, Department of Biochemistry, Western Reserve University, suggested this name, which is derived from the Latin word *perdere*—to destroy.
7. Detailed reports will be published later on the role of the properdin system (i) in total body irradiation with A. R. Moritz; (ii) in infectious and noninfectious diseases with W. S. Jordan, Jr., Harold Ginsberg, and R. H. Seibert; (iii) in virus neutralization with Harold Ginsberg and R. H. Seibert; (iv) in paroxysmal hemoglobinuria with C. F. Hinz, Jr., and W. S. Jordan, Jr.; (v) in clotting and plasmin systems and in hepatic disease with O. D. Ratnoff. Physical characterizations of properdin are being conducted with M. D. Schoenberg.
Thanks are due to Leona Wurz and Jack Pensky for valuable technical assistance.
8. This investigation was supported by a grant from Lederle Laboratories Division, American Cyanamid Co., Pearl River, N.Y. Zymosan was kindly supplied by Fleischmann Laboratories, Standard Brands, Inc., Stamford, Conn.
9. L. Pillemer and E. E. Ecker, *J. Biol. Chem.* **137**, 139 (1941).
10. L. Pillemer *et al., J. Immunol.* **71**, 331 (1953).
11. L. Pillemer, I. H. Lepow, and L. Blum, *ibid.* **71**, 339 (1953).
12. E. A. Kabat and M. M. Mayer, *Experimental Immunochemistry* (Thomas, Springfield, Ill., 1948).
13. L. Pillemer *et al., J. Exptl. Med.* **76**, 93 (1942).
14. H. F. Deutsch *et al., J. Biol. Chem.* **164**, 109 (1946).
15. A. Kleczkowski, *Brit. J. Exptl. Pathol.* **22**, 192 (1941).
16. F. C. Bawden and A. Kleczkowski, *ibid.* **23**, 178 (1942).
17. N. H. Hole and R. R. A. Coombs, *J. Hyg.* **45**, 480 (1947).
18. C. E. Rice and R. J. Avery, *Am. J. Vet. Research* **38**, 98 (1950).
19. H. S. Ginsberg and F. L. Horsfall, *J. Exptl. Med.* **90**, 475 (1949).
20. C. P. Miller, C. W. Hammond, and M. Tompkins, *Science* **111**, 540 (1950).
21. ———, *J. Lab. Clin. Med.* **38**, 331 (1951).
22. S. Koletsky and J. H. Christie, *Proc. Soc. Exptl. Biol. Med.* **75**, 363 (1950).
23. C. P. Miller *et al., J. Lab. Clin. Med.* **39**, 462 (1952).
24. A. N. Stroud and A. M. Brues, *Federation Proc.* **13**, 147 (1954).
25. T. H. Ham and J. H. Dingle, *J. Clin. Invest.* **18**, 657 (1939).
26. W. H. Crosby, *Blood* **8**, 769 (1953).

Edward Monroe Freeman, Pioneer Plant Pathologist

EDWARD MONROE FREEMAN, pioneer plant pathologist and Dean Emeritus of the College of Agriculture, Forestry and Home Economics of the University of Minnesota, died at his home near the St. Paul Campus of the University on 5 February 1954. Dr. Freeman was born in St. Paul 12 February 1875, attended public schools in his native city, and obtained the B.S., M.S., and Ph.D. degrees from the University of Minnesota in 1898, 1899, and 1905, respectively. Except for 1 year at Cambridge University, England, in 1901–02, and 2 years in the United States Department of Agriculture, 1905–07, Dr. Freeman's professional life was spent at the University of Minnesota, from which he retired to emeritus status in 1943.

Not only was Dr. Freeman one of the most eminent of the pioneers in the development of scientific plant pathology in the United States, but he also contributed significantly to the development of a broader and deeper scientific basis for education and research in the general field of agriculture. He was especially well qualified for his extraordinary contributions by exceptional native ability, a liberal education, and wide experience.

Freeman's education was unusually extensive and intensive. He did not have formal education in agriculture; he studied in the College of Science, Literature and the Arts of the University. And he actually studied sciences, literature, and the arts. Everything interested him but especially the sciences. For a time he studied mathematics, astronomy, physics, chemistry, geology, zoology, and botany with approximately equal avidity. Gradually, however, he developed special interest in zoology and botany and finally chose botany as his major in graduate work

It was characteristic of Freeman that he tried to learn everything possible about everything that he decided to study. It is natural, then, that he acquired unusually extensive knowledge about the plant kingdom—slime molds, algae, fungi, liverworts, mosses, ferns, and seed plants. He became an exceptionally good general botanist. But the fungi finally captured his special interest, partly because they were so interesting in themselves and partly because they were so important as parasites on other plants. Freeman never lost interest in the evolution and nature of parasitism, but he also developed a very deep interest in preventing the devastating effects of fungus parasites of economic plants. He became a plant pathologist.

As a plant pathologist, Freeman developed concepts and charted fields of investigation that contributed richly to the understanding and control of plant diseases. His concepts were compounded of shrewd speculation, tempered by thorough scientific scholarship, and buttressed by results of keen observation and persistent experimentation. He was essentially curious, imaginative, and speculative, but he was practical also. He had a passionate interest in the facts and theories of science, but he also had an impelling desire to learn their practical values. As a graduate assistant, he taught pharmacognosy; he went to Cambridge to study plant parasite-host relationships in the laboratory of the eminent Marshall Ward; as assistant professor of botany in an academic department, he gave courses in economic botany and plant pathology and in 1905 he published the 400-page book, *Minnesota Plant Disease.*

In the preface to his book, Freeman emphasizes the

need for basic understanding of plant diseases and for wider dissemination of knowledge regarding their causes and control. In his own words,

> Upon such knowledge, widely disseminated, can be built a substantial system of disease prevention. In short, the aim of this work is rather educational than immediately practical, for in the former feature the author hopes that it will be ultimately most useful.

In autographing a copy of the book in 1948, Dr. Freeman wrote,

> I realized that this book could not then be more than a crude, inadequate and pioneering presentation of and in its field. But it was to me, in a very real sense, the expression of a dream of a life-long scientific adventure and profession in the new, attractive and useful field of plant pathology. Now, almost 50 years later, I find that dream more completely realized than I ever had reason to hope for. . . . But I am not deluding myself. I furnished a dream; the symbol is *Minnesota Plant Diseases*. . . .

A dream, a symbol: the dream and symbol of a scientific pioneer who loved the academic tradition but loved also to help solve human problems by the application and dissemination of science. Freeman loved people as well as science; he loved research and he loved teaching.

> It is a very evident fact that all agricultural pursuits are taking great strides, and the education of those boys and girls who are about to cultivate or manage the cultivation of lands is becoming more and more imperative.

This quotation from the preface to *Minnesota Plant Diseases* presages the final phase in the application of Dean Freeman's talents.

On 1 August, 1907, Dr. Freeman was appointed chief of the newly created Division of Vegetable Pathology and Botany in the College of Agriculture of the University of Minnesota, the first department of plant pathology in an American university. Returning after 2 years' service in the United States Department of Agriculture, he immediately began to organize teaching and research in plant pathology and agricultural botany. And, characteristically, he combined the basic with the applied. He laid the foundation for a sound program of instruction, research, experimentation, and public service in his own department and helped significantly in raising standards in the entire institution. He enthusiastically promoted activities ranging from the establishment of a seed-testing service for farmers to studies on the phylogeny of fungi; and he was one of the early pioneers in breeding for disease resistance in crop plants.

But Dr. Freeman's genius for dealing with students was soon recognized, and more and more he was pressed into official positions in the College of Agriculture. After serving for several years as chairman of the Students' Work Committee, he was appointed assistant dean of the College in 1913, and dean of the College of Agriculture, Forestry and Home Economics in 1917. The College was one of the units of the Department of Agriculture, now the Institute of Agriculture, of the University, which included all agricultural activities, under the administrative supervision of a dean and director. Freeman therefore was essentially dean of undergraduate students, but he also contributed greatly, officially and unofficially, to the development of high standards in graduate work in agriculture. He also continued as chief of the Department of Plant Pathology and Botany until 1940, for, despite his devotion to students, he remained devoted to his science.

Few men have sacrificed so much as Dean Freeman of personal desire and ambition to the welfare of students. He had insatiable curiosity and an emotional zeal for understanding scientific phenomena. But he had equal zeal for understanding students and their problems; and, inevitably, the problems of students took precedence over his own. He never complained but merely regretted that time and energy did not suffice for both. When a choice had to be made, however, he chose the students and denied himself.

Dean Freeman incarnated the principle that everyone was entitled to education in proportion to ability and desire, and he succeeded in organizing curriculums accordingly. Every student was an individual phenomenon to him, worth as patient and thorough study as any scientific phenomenon; but every student was also a human being, worth understanding, encouraging, and helping toward a life of happiness and usefulness. And, if it seemed that discipline would be helpful, there was no hesitation in applying it. But discipline was always tempered with mercy born of understanding and sympathy. The barriers between student and dean, between youth and age, melted away under the dean's warm and sympathetic personality. Almost universally students looked serene when emerging from his office, even after reprimand or sentence of punishment, for they realized that their troubles were the dean's troubles, that justice had been done, and that they themselves had helped formulate the verdict.

Dean Freeman's personality and contributions are a vivid memory to those who knew him. Although future generations of students and investigators cannot know him as he really was, they will still owe him a deep debt. His dreams were translated into sound concepts by his scholarship; his concepts were translated into effective and far-reaching programs by his skill and wisdom. Time may dim the memory of the man but many future generations will continue to profit by his works.

E. C. STAKMAN
J. J. CHRISTENSEN
Department of Plant Pathology and Botany,
Institute of Agriculture,
University of Minnesota, St. Paul