NATIONAL ACADEMY OF SCIENCES

EDWIN BROUN FRED

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A Biographical Memoir by

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Photograph by Edgar L. Obma, Dodgeville, Wis.

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March 22, 1887–January 16, 1981

BY IRA L. BALDWIN

EDWIN BROUN FRED[1] returned to his undergraduate alma mater, Virginia Polytechnic Institute, in the fall of 1911 with his doctorate from the University of Goettingen. His trip to Germany came near the end of that steady stream of young American scientists who went to Germany for advanced study during the period between our Civil War and World War I. Dr. E. B. Fred, like so many of those with degrees from European universities, returned to his native land to devote his life to the strengthening of U.S. universities and to the development of their research potential. The University of Wisconsin was his home institution for most of his life, and the chief beneficiary of his work. Nevertheless, his influence spread widely among U.S. universities through his own activities in governmental and private organizations and through the activities of his graduate students, who later served in universities throughout the nation.

[1] Although many references have been consulted to secure certain data, the major themes of this essay were derived from my remembrances of almost six decades of close association with Dr. Fred, both in bacteriology and in administration at the University of Wisconsin. *The Biography of Dr. Fred*, by Diane Johnson, and his *Autobiography*, prepared with the assistance of the University of Wisconsin Oral History Project, were both valuable sources of information. The list of scientific publications came in large part from the Johnson biography of Fred. An extensive quotation is included in the essay from the memorial resolution of the University of Wisconsin faculty.

Dr. Fred's first love was microbiology, and he, with his associates and students, made significant contributions to that science. Gradually he came to realize that the advancement of U.S. science was in large measure dependent on the growth and strength of the U.S. universities. He believed that these institutions must nurture the country's basic science research, as well as provide both excellent educational opportunities and an appropriate philosophical environment for the nation's youth. The strength of these beliefs, along with a yen to make things happen, led him to accept university administrative responsibilities that gradually forced him to give up direct participation in teaching and research. At the University of Wisconsin he progressed from service on faculty committees, to the deanship of the Graduate School for nine years, deanship of the College of Agriculture for two years, and the presidency of the University for thirteen years, with an additional two decades as University consultant after official retirement.

Actually, he never retired. He was in his University office every day until the onset of his final illness, several months before his death in Madison on January 16, 1981.[2] His schedule remained the same; only the nature of the work was different. He devoted a great deal of time during his later years to collecting and preserving what he called "building blocks" for the use of some future author of a history of the University of Wisconsin, but his interests were much broader than the University of Wisconsin. To the end he followed closely the activities of the various national educational and scientific organizations.

[2] Only a few months separated the deaths of Edwin Broun Fred and his wife, Rosa Parrott Fred. She preceded him in death. They are survived by their two daughters, Ann Conway Fred of Washington, D.C., and Rosalie Fred Moffatt (Mrs. Thomas Moffatt) of Madison, Wisconsin, and by three grandchildren and one great-grandchild.

FAMILY BACKGROUND
EARLY EDUCATION

Edwin Broun Fred was born March 22, 1887 in Middleburg, Loudoun County, Virginia, the eldest son of Samuel and Catherine Broun Fred. Dr. Fred always identified Middleburg as the halfway point between Alexandria, *not Washington*, and Winchester. His grandparents on both his mother's and father's sides were strong southern sympathizers during the "War Between the States." Farms and businesses were occupied and devastated during the war, and the grandparents lost practically everything. Edwin's father, Samuel Rogers Fred, seems to have been an astute and farsighted man. Recognizing the potential value of land in the vicinity of Washington, Samuel slowly but steadily acquired some 2,000 acres, including much of the land lost by his and his wife's parents.

Although Edwin Fred was born in Middleburg and spent much of his early life there, his earliest boyhood memories were of Anadarko, Oklahoma. Edwin's grandfather, Frank Lee Fred, had secured an appointment as Indian agent at Anadarko. Edwin's parents accompanied his grandfather to Oklahoma. Edwin always remembered with pleasure those first few years with his Indian playmates.

During Edwin's formative years his parents were prosperous enough to provide appropriate educational advantages. His first schooling was at the local Middleburg school. In his University of Wisconsin Archives Oral History *Autobiography*, Dr. Fred described his early education:

> I had to walk to the country school. I was always in trouble in school. They had a very kindly soul as teacher, Miss Maude Rogers. There were about sixty children she had to look after. And "the baddest boy of all," she said, "was Edwin Fred." One day she saw me playing with something; she wanted me to take the things out of my pocket. I did. I walked over to the desk and pulled out one little fish, which I had caught on my way to school,

and put it on her desk. And she suggested it would be a good idea for mother to take me out of school.

Next, Edwin and his older sister were taught at home by a governess, who lived in the Fred home. This arrangement was broken off when Edwin put chestnut burs under the saddle of the horse ridden by the governess's suitor. The home instruction was followed by a few years at the Randolph–Macon Academy in Front Royal, Virginia and then study at the Virginia Polytechnic Institute.

Edwin's mother, whom he adored, was a devout Methodist. She held regular religious services for the family and servants and attended the yearly Camp Meeting Services. This early religious training and experience made a deep and lasting impression on Dr. Fred. Although he rarely attended church in his later years, he always kept a Bible on his desk and frequently surprised office callers with an appropriate Bible quotation.

Another experience of his youth is credited by Dr. Fred for the development of his wholehearted devotion to the task at hand. This was the military discipline he experienced in his four years of undergraduate work at Virginia Polytechnic Institute, where military training was required. There his active and wide-ranging mind, which had caused trouble for himself and his family in his earlier years, was brought under control.

Another characteristic of Dr. Fred's life—his courteous respect for others of every station of life—was formed early by his parents and grandparents. Dr. Fred often referred to his early training regarding the respect to be paid to everyone whose work might be considered of lower status. The university janitor received the same courteous treatment from Dr. Fred as did the distinguished professor.

VIRGINIA POLYTECHNIC INSTITUTE AND THE UNIVERSITY OF GOETTINGEN

Some time during Edwin's stay at Randolph–Macon Academy, he decided that he wanted to become a scientist and that the study of agriculture was the most appropriate route to his goal. The nearby U.S. Department of Agriculture in Washington was, at that time, a leader in governmental scientific activity, and the agricultural colleges of the nation were experiencing rapid growth in enrollments. The field interested the inquisitive mind of Edwin Fred, and in the fall of 1903 he enrolled as a student at Virginia's land grant college, the Virginia Polytechnic Institute.

A first course in bacteriology aroused his interest and determined his choice of a scientific field. Dr. Meade Ferguson, with his doctorate from the University of Goettingen, was the instructor. This man had a profound influence on young Edwin Fred. Not only did Fred decide to make bacteriology his life work, but also to continue his training in the field at the University of Goettingen. But, following his bachelor's degree in 1907, he continued at Virginia Polytechnic Institute, and he earned the master's degree in 1908. During this period he served as an assistant in bacteriology, both in teaching and in research. His master's thesis, was well as other research work at the Experiment Station, dealt with a subject that became a lifelong interest, the symbiotic fixation of nitrogen by leguminous plants and *Bacillus radicicola*, now known as Rhizobia.

In the late summer of 1909 he sailed for Bremerhaven and entry into the University of Goettingen for advanced work in bacteriology under Koch and in chemistry under Tollens. He also attended some lectures in mathematics. His thesis dealt with the effects of small amounts of toxic agents on the metabolism of bacteria and higher plants. The con-

cluding sentence, in translation, from that thesis: "These investigations thus confirm the old physiological law that substances which in higher quantities are poisonous to living organisms, can stimulate the same organisms if administered at low concentrations, and can thus cause increased manifestations of life." The nitrogen-fixing bacteria were among others studied.

The young scientist was impressed by the organization of the German University, with its emphasis on research and the authority vested in the professor. He was interested in how research was combined with a faculty concern for each individual student. Although attendance at lectures was voluntary, close contact was maintained between faculty and students in the laboratory. This method of teaching was so congenial to the young scientist that it became the hallmark of his graduate teaching methodology.

Upon completion of his work in Germany he returned to Virginia Polytechnic Institute as an assistant professor of bacteriology in 1912–1913. His major interest continued to be centered on the biological fixation of nitrogen, but his field of responsibility was much broader and he devoted considerable attention to the development of rapid methods to determine the bacteriological quality of milk. Dr. Ferguson had left Virginia Polytechnic Institute for a post in Richmond, Virginia, and Dr. Fred was responsible for all the work in bacteriology.

For some time Edwin Fred had maintained more than a casual interest in Rosa Parrott, the young daughter of a VPI professor of engineering. They planned their marriage for the spring of 1913. Shortly before the wedding, Dr. Fred received a telephone call from Conrad Hoffmann, a young bacteriologist at the University of Wisconsin. The two young men had become acquainted in Germany and Fred had been impressed with Hoffmann's account of the work in bacteriol-

ogy at Wisconsin. Hoffmann asked Fred whether he would be interested in applying for the position that Hoffmann was leaving for work with the International YMCA. Fred expressed interest, but thought little about it because his attention was fixed on his approaching marriage.

The honeymoon of Edwin and Rosa Fred in North Carolina was cut short by a telegram from Dean H. L. Russell of the University of Wisconsin, asking Fred to meet Russell in Washington, D.C. The young couple went to Washington, where Russell offered Fred a job for one semester. He emphasized that the position was only temporary. Hoffmann had been a good salesman for Wisconsin. Fred accepted immediately, even though it meant leaving a secure position at his alma mater for a temporary one with little promise for future employment.

BACTERIOLOGY AT THE UNIVERSITY OF WISCONSIN

The uncertainty regarding Dr. Fred's continued employment after the first semester of 1913–1914 was resolved by University action far removed from Fred himself. Work in bacteriology at Wisconsin had started in the College of Letters and Science. H. L. Russell, one of Wisconsin's earliest bacteriologists, had at one time headed the program in bacteriology in both Letters and Science and in the Wisconsin Agricultural Experiment Station. In 1907 Russell was appointed dean of the College of Agriculture and director of the Agricultural Experiment Station and gave up teaching in the College of Letters and Science. In 1913 Dean Birge of the College of Letters and Science agreed to the transfer of the work of the Hygienic Laboratory to the School of Medicine and the remainder of bacteriology to the College of Agriculture. Funds became available in the College of Agriculture for the continued appointment of Fred.

Dr. Fred's first assignment consisted of teaching a course

in soil bacteriology and an extension assignment for work with the dairy, canning, and other food processing plants of the state. The extension work was both an enjoyable and a valuable experience for the young bacteriologist from Virginia. It was valuable because it provided a rapid orientation to Wisconsin agriculture. Dr. Fred had early embraced the land grant college philosophy of service to the state. This, with his innate desire to be helpful to others, made the extension experience enjoyable. Nevertheless, his intense desire to find answers to problems—he called it "the itch to know"—and the many problems he found in the field soon convinced him that research rather than extension was the field for him. Although he long taught the course in soil bacteriology and at one time taught a part of the general course in bacteriology, he soon found that he was far more effective as a teacher in the laboratory than he was behind a podium.

His list of scientific publications during his early years at Wisconsin indicates both his continuing interest in soil bacteriology and the limited time left for research after the time spent in the field on food processing problems. The single 1913 paper reported on experimental work done in Virginia. Because of involvement in the war effort and a serious illness, there were no publications in 1914. At the outset of World War I, Dr. Fred accepted an appointment as a second lieutenant in the Chemical Corps, but saw only a short period of service before he was rushed to the hospital for emergency surgery. This was followed by a long period of convalescence. The illness forced his release from Chemical Corps service, and Dr. Fred returned to the University, but with an urge to contribute in some way to the war effort.

At Virginia, Dr. Ferguson had prepared pure cultures of the legume root nodule forming bacteria and had distributed them to farmers as a part of his experimental program on

biological nitrogen fixation. Dr. Fred had seen the value of pure culture inoculation of legume seed in Virginia. In his extension work with Wisconsin vegetable canneries he had seen many poor pea crops caused by a lack of root nodulation. He recognized the possibility of greatly increasing the canning pea crop, and the boost this would give the nation in its role as provider of food for the war-torn nations of Europe. The first year he arranged with canners throughout the state for experimental test pilots, prepared the cultures, took them to the field, inoculated the seed, and came back at harvesting time to measure yields on inoculated and check plots. The value of inoculation was readily apparent, and the next year the Agricultural Extension Service offered cultures for sale.

This practice, started to aid the war effort, was expanded and continued for some two decades to aid Wisconsin agriculture. At that time commercial cultures for the inoculation of legume seeds were generally unreliable. The University provided such distribution until commercial cultures were improved and it became clear that farmers could use commercial cultures with confidence in their quality. For the first few years Dr. Fred carried the responsibility for the preparation of the cultures. Later, as the volume of culture distribution rose, other staff members were given the responsibility for this work, but Dr. Fred never lost his interest in the program. It was one way in which a soil bacteriologist could be of direct service to Wisconsin agriculture. In addition, he recognized that the problems encountered in producing, distributing, and using cultures in the field charted the course for fundamental as well as applied research on biological nitrogen fixation. This was the foundation on which the University of Wisconsin's reputation as a worldwide leader in the study of biological nitrogen fixation was built. Biological nitrogen fixation was the subject of

Fred's first research publication at Virginia in 1908 and his last bacteriological research paper from Wisconsin in 1939.

He also found other problems in the field to bring back to the laboratory. Observation of silage spoilage in the field led to a series of research studies directed first toward finding ways to preserve silage without spoilage, and later to elucidating the biological and chemical actions occurring in silage fermentation. This was characteristic of all Dr. Fred's research: find a problem in the field, bring it to the laboratory for study, and enlist the cooperation of other scientists in finding a solution to the problem. Frequently basic research into microbial processes are necessary to find an answer to the applied problem. For example, biological nitrogen fixation studies on applied problems led to studies designed to determine the enzymes involved in the fixation of free atmospheric nitrogen into protein nitrogen. Other widely differing field problems that were brought to the laboratory for study converged with the silage study to provide the impetus for Dr. Fred's collaborative series of investigations with Dr. W. H. Peterson of the Biochemistry Department on biological fermentative reactions, namely, "Pink" sauerkraut of the Wisconsin Kraut Manufacturers and problems in the commercial use of a fermentation process for the wartime production of acetone. Although these applied problems differed widely in character, both were manifestations of bacterial action.

From the early 1920s to the late 1930s, every year saw a series of papers on some aspect of microbial fermentation by Drs. Fred, Peterson, and their associates. Some of these dealt with solutions to applied problems; at times they were very simple solutions for serious commercial problems. Many of the papers dealt with the processes by which complex carbohydrates are converted to simpler organic compounds, such as organic acid and alcohols, and the microbial enzymes

responsible for the chemical reactions. But they also covered such practical findings as the discovery that much spoilage of kraut can be avoided by stripping the outer leaves from the cabbage heads and washing thoroughly to remove any remaining dirt.

Dr. Fred was an American pioneer in his two principal areas of research interest. European workers during the latter part of the nineteenth century had established that certain microorganisms were able to assimilate atmospheric nitrogen. Little attention had been given to this fact for several decades. Fred's work with the root nodule bacteria of leguminous plants was a pioneering effort, both to develop practical techniques for the use of the phenomenon and to study the basic chemical reactions involved in the assimilation of free nitrogen by the microorganisms. Currently, hundreds of scientists throughout the world are studying biological nitrogen fixation, and much of that study is based on the pioneering work of Fred and his associates.

The work of Drs. Fred and Peterson on the biological degradation of carbohydrates was another pioneering American effort. At the start of the Fred-Peterson collaborative studies in the field, their laboratories were among the first in America to give sustained attention both to the chemical reactions and enzyme systems involved in the biological degradation of carbohydrates. These basic studies were accompanied by others concerned with making practical use of the basic findings.

Dr. Fred's admiration for the close personal contact that his German professors had maintained with their students influenced his method of graduate instruction. He knew that lectures might be useful, but he was firmly convinced that his most effective teaching was with an individual student at the bench discussing the student's research project. He visited with each student morning after morning. Between visits his

inquisitive mind was busy, and he came in day after day with new suggestions for further work on each student's problem. For the graduate student, already faced with more work than he could accomplish in the allotted time, these new suggestions sometimes seemed an imposition. Not all of Dr. Fred's new ideas for further work had equal merit. Fred knew this, but often the student did not recognize that he knew it.

The combination of Dr. Fred's southern courtesy, his own single-minded devotion to his work, and his genuine interest in the welfare of each student served to stimulate them. Those who fared well learned early that the best defense against the continued flow of new ideas for research proposals from Dr. Fred was to be prepared to ask his opinion of the new ideas that the student had developed. He was always interested in new ideas, both his own and those of others. Although many of his graduate students felt that Dr. Fred expected too much of them, they admired him and in later years gave him credit for the habits that enabled them to succeed in life.

GRADUATE SCHOOL DEAN

Dr. Fred served as dean of the Graduate School from 1934 to 1943. He found his work, first on the Research Committee and later as dean of the Graduate School, both interesting and stimulating. He started the deanship on a half-time basis, but as the years went by he turned over his bacteriology teaching and research to younger colleagues. From an average of about eight research papers a year in the late 1920s and early 1930s, the number of his publications gradually dropped off to one each in 1938 and 1939. His belief in the significant role of the Graduate School in the development and maintenance of excellence in the University inevitably led to an expansion of that role. An example of the increasing significance of the dean of the Graduate

School in University operation was the institution of a rule that the dean be consulted on all appointments of faculty at tenure rank. Fred took this responsibility seriously. It is a tribute to his ability to work with people that this expansion came with the support of both the other deans and the faculty.

In Dr. Fred's Oral History *Autobiography* he listed a number of actions during his graduate deanship that he considered important. The first of these was the development of a series of science inquiry bulletins, ten in all. Each was the result of the work of a committee of senior faculty members. Each dealt with a single broad aspect of University work and cut across college, school, and departmental lines. During the dark days of the depression, when the faculty morale was at a low ebb, the studies leading to these publications served to awaken faculty interest in University service to the state.

The Wisconsin Alumni Research Foundation, which had been formed in 1925 to handle the marketing and control of the Steenbock Vitamin D patent, gradually expanded the grants made to the University for the support of research during the years of Dr. Fred's deanship. He made it his business to serve as a liaison between the Foundation and the faculty to ensure that each group was aware of the needs and the problems of the other. The funds from WARF during Dr. Fred's deanship were not large by modern standards, but they were very important to the University during those depression years, because they gave the University of Wisconsin an advantage in attracting and holding first-class graduate students and faculty.

Dr. Fred was proud of his role in reactivating the University Press and making it more broadly useful to the faculty. Its budget, which was in the Graduate School, was greatly enlarged, enabling publication of many significant contribu-

tions from faculty members. He had served for many years on the Library Committee of the College of Agriculture and had always felt the library was the most important unit of the University. It is not surprising that his first request to the legislature for building funds was for a university library. He later was able to secure funds and arrange for the purchase of the Thordarson Library. This was a large and valuable collection of old books, largely but not entirely in the sciences. It included one of the very few complete "Elephant" folios of Audubon's *Birds of America* and also one of the few copies of the Cloverdale Bible.

The University found him as graduate dean to be a likeable and successful administrator.

DEAN OF THE COLLEGE OF AGRICULTURE

In 1943 Dr. Fred became the fourth dean of the College of Agriculture, but he moved from this deanship to the presidency in 1945. Under normal circumstances he would have enjoyed the position as dean of agriculture, for as he often said, "I am a farmer at heart." But this was wartime, and he was carrying a heavy wartime responsibility.

One activity started under his deanship was the rehabilitation of the branch experiment stations. During the depression years buildings and equipment had deteriorated badly. With Dr. Fred's concern for state service, this was an intolerable situation. He reorganized the administration of these branch stations so that they were able to serve both the research and extension needs of the area and started the process of rehabilitation, both of facilities and staff. Two years was scarcely long enough to survey what was a very abnormal period in the College. Dr. Fred often referred to this deanship as a "holding operation."

NATIONAL ACTIVITIES

His active mind, his love for people, and his constant work combined to make Dr. Fred a leader in the young Society of American Bacteriologists, but he always preferred to work behind the scenes and to avoid the limelight. As World War I progressed, he, with many others, recognized that the United States could no longer depend on Europe to furnish the publication facilities for scientific and research papers. Hence he was an early and active proponent of the establishment of the *Journal of Bacteriology* by the Society of American Bacteriologists in 1916. For the next two decades he was a strong supporter and an active participant in shaping the nature of this Society, and in 1932 he served as president.

His interests in the total field of natural science were quickened by his election to the National Academy of Sciences in 1931 and his appointment as dean of the Graduate School at the University of Wisconsin in 1934. He was a member of the Botany Section in the National Academy of Sciences and of the Division of Biology and Agriculture of the National Research Council. He served on the Executive Committee of this Division during 1938–1940. Here, as in the Society of American Bacteriologists, only the memories of those who served with him record fully the influence he exerted on the formulation and adoption of policies.

One assignment he accepted in 1941 after considerable urging was that of chairman of a National Academy of Sciences committee to study the feasibility of biological warfare and make recommendations regarding United States' activities in this field. This committee was established by the Academy at the request of the Secretary of War. The deliberations and reports of the committee were classified

top secret. One paragraph of the committee report, however, was made public:

> The value of biological warfare will be a debatable question until it has been clearly proven or disproven by experience. The wise assumption is that any method which appears to offer advantages to a nation at war will be vigorously employed by that nation. There is but one logical course to pursue, namely, to study the possibilities of such warfare from every angle, make every preparation for reducing its effectiveness, and thereby reduce the likelihood of its use.

This recommendation was accepted by the U.S. government and Dr. Fred served as chairman of committees directing U.S. research activities in the field, first on a nonmilitary basis and later under War Department auspices. After World War II was over, the general nature of the U.S. research activities was made public. Dr. Fred was concerned over the emphasis by the media on the offensive possibility of biological warfare and the lack of emphasis on the defensive nature of the research efforts of the U.S., particularly in the development of measures to defend our food supplies against the introduction of exotic plant and animal diseases. He was awarded the Medal of Merit in 1945 for his services to the nation.

After World War II, as he had after World War I, Fred recognized that the U.S. must accelerate its work in basic science, and he became an active supporter of the plan to establish the National Science Foundation. After the Foundation legislation was enacted, Dr. Fred was appointed a member of the first governing board, and elected vice chairman. He served on the National Science Board from 1950 to 1956, and he continued his interest in the Foundation throughout the remainder of his life.

From his early experience with U.S. Department of Agriculture support of cooperative extension and experiment station work and his later administrative relationship

with state agencies, Dr. Fred concluded that universities and governmental agencies could work harmoniously together to solve human problems. Thus he was among the leaders in higher education who urged broad federal support for higher education. He felt that such cooperation need not compromise faculty independence, and when the support began to increase he worked hard at making sure that scholarly efforts were not warped by supporting agencies.

Over the years, Dr. Fred served on many governmental and private boards and committees. Some of these appointments came as a natural outgrowth of his University administrative posts. Others came because his abilities were widely known and his wise counsel was highly respected. He was elected to membership in the American Philosophical Society in 1945 and enjoyed their meetings. He gave freely of his time and effort, however, to only one professional society, the Society of American Bacteriologists, now the American Society for Microbiology. He refused many appointments to boards and committees during the years in which the load of the University presidency was very heavy, but he gave his best to those assignments he accepted.

THE PRESIDENCY

The University of Wisconsin faced many difficult problems when Dr. Fred assumed the presidency. Many derived from the profound changes in University programs of all types due to World War II. The nation's attention had been focused on war and not on university education for four years. Large numbers of university professors were on leave of absence for military service or other war-related work. Their research programs were abandoned, as were many of the advanced courses. Graduate enrollments were much reduced. Early in the war period undergraduate enrollments of both men and women were greatly reduced. Later in the

war period the military services contracted with the university for specific types of collegiate training including housing, food, and medical services for relatively large numbers of enlisted personnel, both men and women. The enlisted personnel were accompanied by a complement of officers who handled the military aspects of the training program. As a result the university campus, in common with other major American universities, became a hybrid university-military institution, and faculty morale was low. The rapid dismantling of the military programs and the establishment of the University of Wisconsin traditional programs was a difficult task in itself. But this task was complicated by the necessity to prepare the university for a large influx of students who were returning from military service. No one knew how the wartime experiences of these veterans would influence the instructional programs of the university. But all recognized that many of those returning students were now married and that there would be a severe shortage of married-student housing. Dr. Fred recognized these facts when he became president, but he could not have foreseen the tremendous changes, both in size and in nature of programs, that occurred during his presidency.

In the thirteen years of the Fred presidency, enrollments on the Madison campus tripled. Research expenditures increased almost eight times, and expenditures for extension and public service functions more than doubled. A dozen extension centers were established with the cooperation of county governments at strategic locations over the state, each offering two years of liberal arts work. A Milwaukee unit of the University was developed, which offered a broad range of liberal arts and professional programs at the bachelor's and master's degree levels. To accommodate these increased loads, a large building program was started and the value of the physical plant more than tripled.

Although President Fred may never have formulated in

words the goals of his term as president, his actions clearly demonstrated the principles that guided him. He was first of all a "faculty man." He believed firmly in faculty control of educational policy and in strong support of the principle of academic freedom. The depression followed by World War II had distracted the faculty and lowered their morale. He made the development of high faculty morale a matter of top priority.

Fred was fond of quoting a remark attributed to Charles Slichter, former dean of the Graduate School, that "every dollar spent on Administration is a dollar wasted." Although this philosophy guided President Fred's administration, the rapid increase in size of the University and the increasing role of the national government to both support and control University activities forced him to expand his administrative staff.

The increase in administrative staff did not influence his strong commitment to faculty control of educational policy, and he knew that the budget was often a controlling factor in forming educational policy. The development of a budget for consideration by the Board of Regents had long been delegated to the president and his administrative associates. On one occasion, legislative appropriations were reduced for the coming year below those of the previous year. Building a budget under these conditions was difficult. After the president and his staff had developed a tentative budget, he called the University Committee of the faculty to his office and asked them to study it and suggest any changes they thought desirable. He provided office space and clerical assistance. After more than a week of intensive study by the six members of the University Committee, they recommended only a few changes, which the president accepted. As a result the faculty accepted reductions in the budget—with resignation but without rancor.

Not only did President Fred believe that the formation of

educational policy was a prerogative of the faculty, but also that it was a responsibility that could not be shifted. When the extension center system of two years of liberal arts courses was being established, he insisted that the appropriate resident departments must be responsible for the selection of all extension center staff and for the quality of the work offered by the staff.

He not only demanded academic responsibility, but he also vigorously defended academic freedom. During the dark days of McCarthyism, he steadfastly defended the right of faculty and students to bring radical speakers to the campus. Few, if any, other major universities followed such a course. Dr. Fred felt such strict adherence to the principle of academic freedom essential, and he willingly spent many hours defending the view before irate citizens. His own conservative personal views were widely known, and this knowledge helped to allay the fears of those who opposed the policy of allowing extreme leftists the privilege of speaking on the University campus.

During those turbulent years Dr. Fred also was insistent that the national government could not dictate University policy. During and after World War II, the Department of Defense contracted with many universities for the preparation and teaching of extension courses taken by members of the armed forces. In the mid-1950s the Department of Defense proposed making two significant changes in the contracts with the universities, which would allow the Department of Defense to "screen" all instructors involved and reject any it felt to be unsuitable. President Fred refused to accept this contract and urged other colleges and universities to join in the refusal. Thirteen colleges and universities joined the University of Wisconsin in refusing to sign their contracts. Twenty-eight colleges and universities did sign their contracts. Two years later the Department of Defense

removed the offending clause. A few years later he insisted that the administration of the International Cooperation Administration withdraw a directive issued to all U.S. university faculty members serving in India under ICA–University Technical Assistance contracts that would require the faculty members to submit in advance to the director of the Indian ICA Mission all manuscripts intended either for publication or for oral delivery. The University of Wisconsin insisted that it could not allow anyone to interfere with the freedom of the University of Wisconsin faculty members to speak their minds freely. After several interchanges of letters, the ICA directive was withdrawn.

A second basic principle guiding Dr. Fred's actions was his strong belief that a state university had an obligation to serve the entire state. He did not originate the slogan, "the boundaries of the University of Wisconsin are the boundaries of the State," but he strongly supported it. Edwin Fred grew up in the land grant college idea of service to the state. He distributed root nodule bacteria for the inoculation of legumes first in Virginia and then in Wisconsin. One of his first assignments at the University of Wisconsin was that of helping Wisconsin food processors improve their product. In his short period as dean of the College of Agriculture, he placed in first priority the modernization and improvement of several branch agricultural experiment stations.

This desire to improve the service of the University to the state resulted in the establishment of two-year liberal arts extension centers on a permanent basis. Another innovation in service to the state was the establishment in the Graduate School of an office to carry to the citizens of the state the results of University research. It was also under Dr. Fred's aegis that the University of Wisconsin-Milwaukee was founded from an extension center and a state college.

Dr. Fred entered the presidency of the University as

World War II was entering the final terrible months. As the War drew to a close, he recognized that the University would soon be faced with the task of providing educational opportunities for a flood of veterans wanting to make up for lost time. Serving the educational needs of Wisconsin veterans was his first priority. From one year to the next enrollments more than doubled. Instructors were found, space was created by the erection of Quonset huts and temporary structures from military bases, vacant rooms near the University were rented, and a church auditorium was used for lectures. Living space for the students was rapidly expanded by taking over two vacated military installations—one about 30 miles from the campus, requiring the operation of bus service. In addition to the expansions on the home campus, extension programs were established in some thirty communities. Usually these were in cooperation with the local vocational or high school. He was proud of the fact that every Wisconsin veteran who desired a university education was offered an opportunity. His love of people and innate urge to help others, together with his conviction that a state university had a moral responsibility to serve the veteran, combined to make his introduction to the presidency a happy one.

Dr. Fred held high standards for himself, his associates, and his University. As one associate said, "He worked everlastingly." He was the first at work in the morning, joining the janitor in opening the building. He made only minor concessions to the observance of Sundays and holidays. His work was his life, and he hoped for a similar devotion to work from his close associates. Although none of his associates reached his high plateau, his example had a salutary influence on both his administrative associates and the faculty. He frequently quoted a remark attributed to an earlier dean that one could easily identify the excellent

departments in the University by observing the percentage of offices and laboratories that were lighted at 10 o'clock in the evening.

But hard work and devotion to the task were not enough. He demanded accuracy and excellence. Each year at budget making time he asked departments to present with their budget recommendations lists of three to five of the department's best teachers, best research workers, and best University public representatives. These lists were compared with the departmental recommendations for salary increases. Frequently a query would go back to the department, "Why was so little salary increase recommended for the one you rated as your best teacher or best public representative?" He tried, with some measure of success, to give equal reward for equal excellence in each aspect of University work, but as every university administrator knows, the excellent research worker quickly gains a national or international reputation, while the excellence of the teacher or public representative is only known locally. Although falling short of his goal of equal pay for equal service, his continued insistence on the principle was widely appreciated and served as one factor in uniting the faculty.

Dr. Fred knew that the attainment and retention of excellence required money. He was deeply appreciative of the financial assistance that came to University research work from the Wisconsin Alumni Research Foundation. This was the first University of Wisconsin associated foundation, and it was designed to market patents secured by University research workers, with the earnings returned to the University for the support of research. Through good fortune and good management, the Foundation was able to turn over to the University substantial funds for research. Dr. Fred recognized the great help that this had been in the advancement of the University's excellence in natural science. At the

same time, he saw that the University needed similar assistance from the private sector for other aspects of University work. He, with his associates, was able to arouse the interest and secure the assistance of a powerful group of alumni and friends of the University in the formation of the University of Wisconsin Foundation. The purpose of this new foundation was to secure gifts of private funds for the support of any University program. This new foundation was immediately successful in attracting gifts to build the Wisconsin Center to house the University's on-campus noncredit adult education program, and it also secured substantial gifts for other University programs during Dr. Fred's presidency. He followed the continued growth of the two University foundations with much interest throughout his life. He believed that support from diverse sources helped guard the independence and freedom of the University.

Dr. Fred was a natural scientist before he became a University administrator. He understood natural science work and how to promote it. Although he had a great admiration for the University's long-standing reputation for excellence in the humanities and social studies, he never had great confidence in his own ability to secure outside funds for the support of such work or to make the best use of the available funds. The two previous presidents had been a humanist and a social scientist. In the early years of his presidency he did not perceive the need for a close associate from the humanistic or social studies fields. About midpoint in his presidency, however, he recognized such a need and brought into his office, as an assistant to the president, a highly regarded young historian. Another attempt to balance the support for scholarly work came with the development of a third agency by a group of friends at the University to provide outside support for University programs. This new agency was designed to make money by building and

operating a shopping center. By the terms of its charter of incorporation, all net profits were to be given to the University. These gifts were dedicated by the University for scholarly work in the humanities and social studies. Although the group was unable to turn over any funds to the University until after Dr. Fred's retirement, he later watched with much interest the growth in annual gifts from this source, and the resultant support for the humanities and social studies.

Although President Fred was active in finding ways to increase outside support for University programs, he always reminded the people of the state that the University of Wisconsin was their institution and that their tax support of it would bring economic and social well being to the people of the state. Private support for University programs was only "icing on the cake," he often said to the people of Wisconsin, and he insisted that it be used only for programs and projects that could not expect state tax support.

His presidency was a happy one for the University. It was a period of rapid growth in all aspects of University operations. President Fred was highly respected both within the University and among the members of the legislature and the governor's office. He was an effective middleman, interpreting the concerns of the regents and state capitol to the faculty, and the concerns of the faculty to the regents and state capitol.

THE MAN

The measure of the man may best be seen through the eyes of a committee of his colleagues who prepared the memorial resolution on the death of Emeritus President and Professor Edwin Broun Fred, presented to the Faculty Senate meeting on April 6, 1981. The following paragraphs are quotations from that document:

Mr. Fred had a keen if somewhat wry sense of humor. For instance: he shocked a rather serious minded chairman of the Fellowships committee by declaring that surely a certain very pretty young lady should be given an appointment, presenting as his only evidence the attractiveness of her picture, not mentioning that she had an extremely high academic record. Or again, when he reported in meeting with a group of residents of Shorewood Hills who protested the building of the University Houses on a parcel of University land, he told them that the College of Agriculture would prefer to use the land as a pig farm.

Although he had a gracious personality, as president he avoided, as far as possible, social engagements, especially in the evening (almost a necessity for a person who was regularly in his office by 7 a.m.). However Mrs. Fred served for both with vivacity and charm, making it easy to overlook Mr. Fred's absence.

His skill in working with others came out of a deep interest in people. It was demonstrated at every business conference, in every visit with students as he walked the campus, in social events, and in the early morning chat with the janitor as they cooperated in opening doors for the day's work. Dr. Fred was a modest man in spite of the many honors that came to him. He was not an effective public speaker, and he knew it. But in a small group or an individual conversation he could be very persuasive. He felt it was his responsibility to interpret to the regents the concerns of the faculty and the students. He worked untold hours in doing so. He was notably successful not only in getting others to work with him but equally important to work with each other. While he was president, the University and its constituents were remarkably cohesive. The relations of Bascom Hill and the Capitol were happier than at any other comparable time in the University's history, with the possible exception of the "golden age" of the first decade of Van Hise's administration.

Mr. Fred was a person of many facets. Two he always showed. He worked everlastingly, and he sought consensus. In order to reach consensus he could delay decisions until some thought him indecisive. Moreover, he hated to say "no," and, of course could not always say "yes." He preferred that one would stop asking rather than to refuse a request. Often his mind was made up long before he told others that it was. But his support of academic freedom and the dignity of the individual were never in doubt. He faced the danger of distortion of University objectives and practices implicit in the rapid increase of federal funds coming to the University, and on several occasions his strong stand on University autonomy and academic freedom caused federal agencies to back away

from proposed regulations. He cared greatly for the University's public image and had rather conservative views, but when it seemed necessary he would risk the University of Wisconsin standing alone, and the freedom of the radical left was protected.

Mr. Fred was always thoughtful of others, but not always an easy person to work for, since he not only expected much labor but also a certain degree of mind reading in order to know what was desired. It may be that his closest colleagues were so congenial with each other because they had, in him, a common problem. It has been said that he did not believe that "too many cooks spoil the broth," but the cooks had to divide the chores amongst themselves.

Edwin Fred, as already stated, was a modest man, but he was also a proud man. He was proud of his Virginia background. He was proud of his status as a microbiologist. He was proud of the accomplishments of his students. He was proud of the balanced development of the University during his deanships and his presidency. But he did not boast, except perhaps of the fact that Traveler, Lee's famous horse, had been bred on his ancestral lands, naturally a source of satisfaction to a man whose two recreations even into old age were growing tomatoes in Wisconsin and riding a horse in Virginia. He also knew, at least instinctively, that the greatest credit came to him who claimed the least.

For us who remember him with admiration and affection, it gives great satisfaction to read the "Note of Gratitude" which he added on April 16, 1976, to the transcript of his interviews for the University's Oral History Project:

> In this story of my life I have tried to convey to the members of the University of Wisconsin faculty and to the people of Wisconsin my deepest gratitude for their wise counsel and their continued loyal support. During my sixty-three years at Wisconsin I have had wonderful cooperation from the staff. As I look back over the years at Wisconsin in my various capacities, I know that I have had the benefit of help from a great group of Wisconsin men and women, always ready and anxious to aid in carrying out the numerous University Programs. I am proud to have been associated with such a fine group and once more to make clear that I am deeply indebted to the members of the faculty of the University of Wisconsin and all the people of the State of Wisconsin.
>
> EDWIN B. FRED

HONORS AND DISTINCTIONS

DEGREES

B.S., Virginia Polytechnic Institute, 1907
M.S., Virginia Polytechnic Institute, 1908
Ph.D., University of Goettingen, 1911

HONORARY DEGREES

LL.D, Lawrence College, 1945
D.Sc., Marquette University, 1945
D.Sc., Beloit College, 1946
D.Sc., Northland College, 1946
D.Sc., University of North Carolina, 1946
LL.D, Northwestern University, 1947
LL.D, Michigan State College, 1955
LL.D, University of Wisconsin, 1958
Golden Diploma, University of Goettingen, 1961

PROFESSIONAL APPOINTMENTS

Assistant, Bacteriology, Virginia Polytechnic Institute, 1907–8.
Assistant Professor, Virginia Polytechnic Institute, 1912–13
Assistant Professor, Bacteriology, University of Wisconsin, 1913–14
Associate Professor, Bacteriology, University of Wisconsin, 1914–18
Professor, Bacteriology, University of Wisconsin, 1918–58
Dean, Graduate School, University of Wisconsin, 1934–43
Dean, College of Agriculture; Director, Agricultural Experiment Station; and Director, Agricultural Extension Service, University of Wisconsin, 1943–45
President, University of Wisconsin, 1945–58
Emeritus President and Emeritus Professor, Bacteriology, University of Wisconsin, 1958–81

COMMITTEES, BOARDS, COMMISSIONS

National Institutes of Health, Advisory Health Council, 1945–50
Nutrition Foundation, Board of Trustees, 1945–50
Carnegie Corporation, Board of Trustees, 1946–58
National Science Foundation, Board member, 1950–56

Atomic Energy Commission, Advisory Committee for Biology and Medicine, 1956–57
National Institutes of Health, Advisory Commission for Biology and Infectious Diseases, 1956–57
American Council on Education, Commission on Education and International Affairs, 1958–61
President's International Advisory Board, 1959
William F. Vilas Trust, trustee, 1961–79

MILITARY

First Lieutenant, Chemical Warfare Service, 1918
Medal of Merit for services during World War II

MEMBERSHIPS

Alpha Sigma Epsilon
American Association for the Advancement of Science, Fellow
American Philosophical Society
American Society of Bacteriologists (President, 1932)
Epsilon Sigma Phi
Gamma Alpha
National Academy of Sciences
Phi Beta Kappa
Phi Kappa Phi
Phi Sigma
Sigma Xi

HONORARY MEMBERSHIPS

American Society for Microbiology
University of Wisconsin Alumni Association
University of Wisconsin Foundation
Wisconsin Academy of Sciences, Arts, and Letters

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1910

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1911

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1912

Report of the department of bacteriology. Va. Agric. Exp. Sta. Rep.:30–31.

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A study of nitrification in certain types of Virginia soil. Va. Agric. Exp. Sta. Rep.:174–201.

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A study of the quantitative reduction of methylene blue by bacteria found in milk and the use of this strain in determining the keeping quality of milk. Zentralbl. Bakteriol., Parasitenkd. Abt. II, 35:391–428.

Eine physioloische Studie uber die nitratreduzierenden Bakerterien. Zentralbl. Bakteriol., Parasitenkd. Abt II, 32:420–49.

1913

A study of the formation of nitrates in various types of Virginia soil. I. Preliminary report. Zentralbl. Bakteriol., Parasitenkd. Abt. II, 39:455–68.

1915

With Edwin B. Hart. The comparative effect of phosphates and sulphates on soil bacteria. Wis. Agric. Exp. Sta. Res. Bull., 35:31 pp.

1916

Relation of green manure to the failure of certain seedlings. J. Agric. Res., 5:1161–76.

Relation of carbon bisulphid to soil organisms and plant growth. J. Agric. Res., 6:1–19.

With Edward J. Graul. The effect of soluble nitrogenous salts on nodule formation. J. Am. Soc. Agron., 8:316–28.

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With Edward J. Graul. Some factors that influence nitrate formation in acid soils. Soil Sci., 1:317–38.

With Edward J. Graul. The gain in nitrogen from growth of legumes on acid soils. Wis. Agric. Exp. Sta. Res. Bull., 39:39 pp.

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1917

With Henry L. Fulmer. Nitrogen assimilating organisms in manure. J. Bacteriol., 2:423–34.

With Walter E. Loomis. Influence of hydrogen-ion concentration of medium on the reproduction of alfalfa bacteria. J. Bacteriol., 2:629–33.

1918

Legume bacteria in manure. Hoard's Dairyman (July): 1057.

With Audrey Davenport. Influence of reaction on nitrogen-assimilating bacteria. J. Agric. Res., 14:317–36.

The effect of certain organic substances on seed germination. Soil Sci., 6:333–49.

Inoculation of legumes. Wis. Agric. Exp. Sta. Circ., 96:13 pp.

With Edwin G. Hastings. Food for the soil: legumes. Wis. Agric. Exp. Sta. Circ., 107:11 pp.

1919

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With W. H. Peterson and Audrey Davenport. Acid fermentation of xylose. J. Biol. Chem., 39:347–85.

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1920

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1921

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1922

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1923

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1924

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1925

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variations in the ammonia and nitrate content of lake waters. J. Am. Water Works Assoc., 15:369–85.

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1927

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With George E. Helz and Ira L. Baldwin. Strain variation and host specificity of the root-nodule bacteria of the pea group. J. Agric. Res., 35:1039–55.

With W. H. Peterson, Perry W. Wilson, and Elizabeth F. McCoy. The occurrence of calcium citrate crystals in cultures of butyric acid-forming bacteria and the water of crystallization of calcium citrate. J. Am. Chem. Soc., 49:2884–88.

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1928

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