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IRVING WIDMER BAILEY, 1884-1967

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*With portrait **

THE SUDDEN DEATH OF Irving Widmer Bailey on May 16th ended the long and productive career of a brilliant scholar and a son of Harvard in every sense of the word. His place cannot be filled; his kind of contribution cannot be repeated; his leadership and inspiration are not to be duplicated. He was "Professor Bailey" to all but a very few, and the appellation was offered in respect and admiration.

Irving Widmer Bailey was born in Tilton, New Hampshire, August 15, 1884, the only child of Solon Irving Bailey and Ruth Elaine (Poulter) Bailey. His father, an assistant professor of astronomy at Harvard, was sent to Peru in 1889 to select a site for a high altitude observatory. He chose the summit of El Misti at 19,000 feet and, with his family in residence, supervised the operation of an observatory constructed there. Irving Bailey wrote later, "My reactions and activities in college and subsequent to graduation were profoundly influenced by the fact that eight of the first thirteen years of my boyhood were spent in remote parts of South America rather than in the environment of New England. Having no formal and stereotyped education until the age of thirteen, having no playmates of my own race and age, I was forced to rely upon my own resources for interests and activities. Much of my time was spent in hunting, in exploring the Andes at high altitudes, in learning at first hand the traditions and beliefs of Peruvian Indians, and in observing the spectacular activities of Catholic Spanish in peace and in revolution. I developed at an unusually early age, in association with my father and other astronomers, a keenly analytical interest in natural phenomena and in the activities and foibles of the human race under differing hereditary and environmental influences."

Irving Bailey entered Harvard College in 1903 and was graduated with the class of 1907. In his 50th anniversary report he related, "In college I browsed around in history, chemistry, geology and meteorology, but it was not until my senior year that speeches of Gifford Pinchot and President Eliot induced me to undertake a career in forestry, particularly owing

* Photograph by John Brook, Boston, Massachusetts, 1955.

to the appeal of an out-of-door profession." Bailey entered the graduate school at Harvard in 1907, and his subsequent career was to parallel many changes in the administrative organization of botanical science at Harvard, in which he was to play a continuing and major role. The year 1907 marked the establishment of the School of Applied Science at Harvard with both Forestry and the Bussey Institution, the latter newly reorganized as a school for study of problems relating to agriculture and horticulture, transferred administratively to that School. The Harvard Forest was also acquired in 1907, and the following year a division of Forestry was initiated. In 1908 Bailey received his first Harvard appointment as Assistant in Botany. He was awarded the Master of Forestry degree in 1909 and almost simultaneously an appointment as Instructor of Forestry in the Graduate School of Applied Science. In 1912 a short-lived School of Forestry was formed, with Bailey on the staff as an Assistant Professor. In 1914 the Bussey Institution and the School of Forestry were combined as the Graduate School of Applied Biology, which was then known internationally and now historically as the Bussey Institution. Professor Bailey was promoted to Associate Professor of this Institution in 1920 and became Professor of Plant Anatomy in 1927. In 1931 further administrative changes abolished the Bussey Institution as a school and transferred its instruction and degree-granting privileges to the Division of Biology. At that time Professor Bailey was transferred to the staff of the Arnold Arboretum for budgetary purposes, although his office was to be in the Biological Laboratories in Cambridge until the year before his retirement. Then, with the completion of the Harvard University Herbaria building in 1954, Bailey moved his office and laboratory along with the wood collection into the new building. After his retirement in 1955, he continued to use work space in the quarters of the wood collection and followed a regular schedule in the laboratory until the heart attack that ended his life. This building represents the fulfillment of his own plan, presented to the Harvard Corporation at their request in 1945, for assembling most of the botanical institutions at Harvard under one roof.

Although he carried the title of Professor, Irving Bailey was not primarily a teacher. His students during the years at the Bussey Institution and later in the Department of Biology were those of graduate level and advanced instruction. Few students actually received their advanced degrees under his supervision. Because he was not directly responsible for student guidance, he was even more effective in giving help when it was requested and needed. The few courses he taught were organized throughout in the same meticulous fashion with which he wrote. His superb photographic techniques produced lantern slides that focused on the exact point to be made. His lectures were a pleasure to listen to and a student's delight to annotate, yet he worried incessantly before and after each scheduled presentation. His talent for teaching, however, was also evident in his association with younger people who served as his technicians. The junior authors of many, many papers, Mary Vestal, Anna Faull, Richard Howard, Charlotte Nast, B. G. L. Swamy, were assistants who shared the

honor of being included in some of Bailey's writing and "graduated" to contributions of their own.

It is his research and his published contributions that are the expression of the true talents of Irving Bailey. His first paper was published in 1909, and one remained in manuscript at the time of his death. In the 58 years of his productive career Bailey published the 142 papers listed in the bibliography which follows. These cover a variety of fields and show a return, often years later, to an original subject for further elaboration or, when needed, a change in direction. Professor Bailey is credited with two books. In reality one is a small printed report on the status of forestry education and the other a collection of his papers reprinted in book form. He was often visited by representatives of book publishing firms pleading for him to write a book. He was most generous in giving his time to reading manuscripts of other writers and offering his criticisms or compliments. His own failure to write a book he once explained as his willingness to let others summarize for, while he could, he preferred to contribute his original ideas and investigations.

Bailey recalled in the Fiftieth Anniversary Report of the Harvard Class of 1907, "Upon obtaining my degree of Master of Forestry, I spent several years studying lumbering and wood-using industries, and became convinced that the existing economic, social and political status in North America was such as to inhibit for many years an extensive application of intensive European silvicultural methods. At the same time, I became increasingly impressed by the lack of accurate and reliable information regarding the anatomical structure, physical properties and chemical composition of wood and the vital processes by which it is formed in plants. Thus, since joining the staff of the reorganized Bussey Institution in 1914, I have devoted my attention largely to research in various aspects of this pioneering field. As data accumulated, they became increasingly significant in the discussion of theoretical botanical problems of plant identification, plant classification, plant physiology and evolution, as well as in the solution of practical problems of wood utilization. Therefore, at present I am generally regarded both in this country and abroad as a botanist rather than as a forester."

In reviewing his own publications for reprinting in book form in 1954, Bailey agreed to eight chapters grouping his contributions into the broad categories of cytology and ontogeny, biochemistry and biophysics, phylogeny, taxonomy, entomology, paleobotany, wood technology, and cooperation in scientific research. These areas truly reflect the scope of Professor Bailey's abilities, and each is used often in his writings or returned to in the course of his research.

Every scholar has in his background an individual influential in the development of his career. Regrettably, there is little acknowledgement of the role of Edward Charles Jeffrey in the development of the career of Irving Bailey. Jeffrey was Assistant Professor of Vegetable Histology and General Morphology at Harvard from 1902 to 1907, when Bailey was an undergraduate. He became Professor of Plant Anatomy in 1907 and

retired in 1933. In many ways Irving Bailey can be regarded as his successor. Bailey's early publications, often recorded as "Contributions from the Phanerogamic Laboratories of Harvard University," acknowledged the valuable assistance of Jeffrey or the courtesies of his laboratory. Their subject matter certainly followed the same interests of Jeffrey and in the beginning followed his theories. In 1914 in the early numbers of a series of six papers titled "Investigations on the Phylogeny of the Angiosperms," Bailey and his co-author Edmund Sinnott dissented from Jeffrey's theories, the split largely starting with the subject of the "aggregate ray." Jeffrey's book, "The Anatomy of Woody Plants," published in 1917, contained many ideas and descriptions which Bailey did not accept, and a conflict between them continued in print. Following the appearance of two papers by Jeffrey and R. E. Torrey in the *Botanical Gazette* in 1921, Bailey and Sinnott wrote, "a vigorous attempt is made to discredit our work. The unfortunate tone of this attack we can afford to ignore but in view of the misrepresentation of our position which they have introduced into the discussion we feel that it is wise to restate our conclusions in the light of all the facts which have been brought forward, and to endeavor to clarify the real point at issue." The wounds created were never healed, yet the training Jeffrey had offered the young Irving Bailey came to an imaginative mind and an energetic body.

During World War I Bailey's talents as a wood technologist were used at Wright Field in Dayton, Ohio. His early interest in the preservation of wood he also associated with studies of the structure of the stem. At Wright Field he was Chief of the Wood Section of the Materials Engineering Department of the Bureau of Aircraft Production. The principal woods used in wing and frame construction of World War I aircraft were spruces and firs. The methods of cutting, curing, milling and splicing these occupied Bailey's interests and were his responsibilities. When the supply of spruce was threatened by insect attacks in the postwar years he took part in studies which led to nearly classical papers on the spruce budworm biocoenose. Bailey tendered his resignation as "Aeronautical Mechanical Engineer" effective December 23, 1918, and returned to the Bussey Institution in Jamaica Plain.

The two distinctive types of research which were to occupy Bailey's time on his return to academic life were to develop quickly. His war time studies of wood structure developed into a long series of papers on the cambium and its derivative tissues. At the Bussey he undertook a special study of the stem structure of some African myrmecophytes for the director, William M. Wheeler. This involved a study of the feeding habits of plant-inhabiting ants, and in 1920, Bailey spent the summer in British Guiana working at the tropical research station of William Beebe. He had received a grant of \$500 from the AAAS for this field work and during a portion of the time he was in the company of Wheeler. The observations they made on species of *Cordia*, *Cecropia*, *Triplaris*, and other ant plants were not published until 1942, after Wheeler's death in 1937. The work in entomology with Wheeler and the expedition to British Guiana were

apparently among the most enjoyable experiences of Bailey's life, for tales of these were often repeated in social gatherings.

In the course of the work in British Guiana, Bailey found a new species of *Cecropia* which he described in 1922. He was also able to make observations on other plants including species of *Marcgravia*. The flowers of the unusual inflorescences of *Marcgravia* plants were often considered to be pollinated by birds. Bailey's observations on these plants and their pollination formed a series of papers which also included two new species of *Marcgravia*. Bailey did not collect many plant specimens and his collections for that trip numbered 195 in the figures he cited.

Bailey's ventures into taxonomy were not many. In addition to the three species described from South America he is credited as the senior author of the family Degeneriaceae. This resulted from the cooperative study with A. C. Smith on plants of the Fiji Islands and was a phase of the study of the primitive Angiosperms which Bailey insisted on calling inaccurately the "woody Ranales."

Bailey is well remembered for his cooperation with taxonomists, and his work on the Icacinaceae is representative. Perhaps from his survey work with Sinnott on the nodal structure of plant families he had retained an interest in families of flowering plants which showed diverse habits or structure. His attention had been drawn to the anomalous structure in one genus of the Icacinaceae in the thesis of Benjamin Robinson, then director of the Gray Herbarium. Professor Bailey assigned to me the task of preparing the anatomical slides needed for an investigation of the remainder of the genera. These materials were then studied and discrepancies were soon obvious in the taxonomic classification of the specimens. In some cases the specimens were incorrectly named and in others the species were incorrectly placed. The value of anatomical characters in taxonomy soon became evident in this family. A series of papers by Bailey and Howard, by Howard, and by Dahl resulted from this work. One taxon of the Icacinaceae with distinctive anatomical characteristics could also be shown to be distinct on the basis of characters commonly used. The genus then distinguished was named in his honor, *Irvingbaileya*. In later years Swamy described a new species of vesselless angiosperms as *Sarcandra irvingbaileyi* to honor his early association with Professor Bailey and Bailey's long interest in such primitive plants.

Professor Bailey was frequently asked for his opinion on aberrant species or genera as plant materials came into the Arnold Arboretum for determination. The taxonomic research published in the Journal of the Arnold Arboretum often carries a few words of anatomical description or notes on relationships supplied by Bailey or an acknowledgement of his assistance in finding the right place for the material.

A report to the Dean of the Faculty of Arts and Sciences prepared by Professor Bailey and entitled "Botany and its application at Harvard" has been called the "Bailey Plan" or the "Bailey Report." It was the subject of an acrimonious controversy which lasted over two decades while Professor Bailey was active, and after his retirement. Although initially

submitted as a confidential report in 1945, its recommendations were accepted by the Dean and an "unclassified" edition was prepared and published. The report and plan which Professor Bailey himself described at an annual meeting of the American Association for the Advancement of Science (1946) created discussion which was to involve the faculty, the Board of Overseers and its committee to Visit the Arnold Arboretum, the Corporation, many teams of lawyers, and two decisions of the Supreme Judicial Court of Massachusetts. In particular the wisdom of the recommendations regarding the Arnold Arboretum was challenged and after due consideration the Harvard Corporation as trustees of the Arnold Arboretum voted in 1953 that the "plan contained in the Bailey Report of June 1945 shall not apply to the Arnold Arboretum or to the principal or income of its endowment." The Harvard Corporation approved the construction of a new building in Cambridge, the implementation of the Bailey plan for other departments, and the removal of a portion of the collections of books and specimens of the Arnold Arboretum from Jamaica Plain to Cambridge. The transfer of these resources was approved with the understanding that a working herbarium and a library were to remain in Jamaica Plain. The division created an area of horticultural interest in Jamaica Plain with the library and herbarium there devoted to the study of plants under cultivation and associated with the living collections and the greenhouses. The second unit to be formed in Cambridge would contain the larger portion of the herbarium and library and would be specialized in its application to the native floras of the world, and to basic problems in plant anatomy and morphology.

Eventually, in 1967, the Supreme Court approved the division proposed but in the many hearings, published accounts, and reports the name of Professor Bailey was inevitably associated with the objectionable features. Professor Bailey was deeply disturbed, as he felt many of the attacks were directed at him personally and that he could not, or should not, reply. His loyalty to Harvard and his interest in increasing the rôle and the efficiency of use of botanical collections and botanical training at Harvard he put honestly before a personal concern for single departments or individuals.

Bailey's travels were not many. He did not attend international meetings and only infrequently attended those in the United States. His only trip to Europe was a survey of forestry schools and training made with Herman Spoeher. This resulted in the book, "The Role of Research in the Development of Forestry in North America," published in 1929. Dr. Spoeher was on the staff of the Carnegie Institution of Washington, and their cooperation resulted in Bailey's being appointed a research associate of the Carnegie Institution. For several summers Bailey regularly traveled to Arizona to work at the desert laboratory. His published papers during this period listed his association as either the Arnold Arboretum or Harvard University and as a research associate of the Carnegie Institution of Washington. Typical of Bailey is the fact that his association with a desert laboratory and studies on members of the Cactaceae in the decade

1930-40 would be revealed again in his studies of the leaf-bearing Cactaceae in the 1960's. Bailey made a trip to Cuba to visit the Atkins Laboratory at Soledad and to Honduras for a study of forestry problems associated with the United Fruit Company program in Central America.

In later years his summers were spent at his home in Norwell, where a physical battle with the brush with scythe and axe and clippers gave him a healthy skin color and a muscle tone envied by his colleagues. These were happy moments in his life which he shared with his family. A by-product of these summers usually was revealed around Christmas when special friends were presented jars of beach plum jelly which Professor Bailey made during the carefree summers, when fruits could be picked with his adored grandchildren.

Professor Bailey married Helen Diman Harwood on June 15, 1911. He is survived by his wife and their two sons, Harwood and Solon Irving II, and five grandchildren.

Bailey was a member of the National Academy of Sciences, being an Emeritus Member at the time of his death; the American Academy of Arts and Sciences, having served as vice-president from 1947 through 1949; the American Association for the Advancement of Sciences, of which he was a Fellow; the American Philosophical Society; the Botanical Society of America, of which he was treasurer 1921-24, vice-president 1928, and president in 1945; the Society of American Foresters; the American Society of Naturalists; the American Society of Plant Physiologists; the Torrey Botanical Club; the Society for the Study of Evolution; the Royal Swedish Academy of Sciences; the International Association of Wood Anatomists; the Linnean Society of London; the Ecological Society of America; the New England Botanical Club; the International Society of Plant Morphologists, of which he was president from 1960 to 1964, and an honorary member of the Indian Botanical Society. Professor Bailey served on the editorial boards of the American Journal of Botany 1915-18, the Proceedings of the Society of American Foresters 1914-16, the Journal of the Arnold Arboretum 1941-1957. He has been listed in Who's Who in America and its various subdivisions, the International Who's Who and American Men of Science. In the third edition of American Men of Science, Irving Bailey was listed for the first time along with his father, Solon Bailey. In 1931 Professor Bailey received an honorary degree of Doctor of Science from the University of Wisconsin. In 1954 he was honored with the Mary Soper Pope award from the Cranbrook Institute of Science which stated, "The wide influence of his fundamental work on the biological processes involved in the formation, growth and differentiation of cells in woody tissues has deeply affected the growth of other fields, histological chemistry, taxonomy and evolution among them. . . . As a teacher and administrator his inspiration and guidance have contributed to the growth of many leaders in modern botany."

In 1956 at the Fiftieth Anniversary meeting of the Botanical Society of America Professor Bailey was among those honored with certificates of merit, his stating "plant anatomist and inspiring teacher, for his

outstanding contributions on the structure of the cell wall and the histology of the cambium and for his application of anatomy and morphology to problems of evolution of angiosperms."

The University of Syracuse also awarded him an honorary S.D. in 1961 with the citation: "Your name is synonymous with the role of research in the development of forestry. Your dedication to truth, zeal in research, and capacity to see the unexpected are gifts you have used to enhance and ennoble all the lives you have touched. Your solid and creative scholarship still guides and challenges forestry research. We honor you as forestry's pre-eminent wood anatomist and botanist and a truly inspired teacher."

The degree he valued most highly, however, was received from his Alma Mater at the 319th Commencement of Harvard, in 1955, on the occasion of his retirement. "Irving Widmer Bailey, Doctor of Science, today your university salutes you for your direction of botanical study and for your accomplishment in searching, in the anatomy of plants, for clues to the miracle of growth."

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* Compiled in part from the bibliography in *Contributions to Plant Anatomy* (1954); and, from 1955 on, made available by Lazella Schwarten.

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