



Howard Samuel Fawcett

HOWARD SAMUEL FAWCETT: PIONEER IN PHYTOPATHOLOGY

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Howard S. Fawcett was born April 12, 1877, of Quaker parents on a farm near Salem, Ohio.¹ He attended high school in Salem, then studied botany under Henry S. Conrad at the Westtown School, a Friends preparatory school at Westtown, Pennsylvania, graduating in 1899. Fawcett then taught science for a year in a preparatory school at Le Grande, Iowa. After that he enrolled at Iowa State College, where he completed the science course in 1905 with a B.S. degree. The first part of Howard Fawcett's professional life was spent in Florida, where he had his first exposure to citrus diseases. These were to become the focus of his long and distinguished career, during which he was located primarily at the University of California, Riverside. Fawcett's first position was as Assistant in Botany and Horticulture at the University of Florida, beginning in 1906. He became Assistant Plant Pathologist there in 1907, and Plant Pathologist in 1908, when he also earned the M.S. degree from the University of Florida at Gainesville.

During his seven years in Florida, Fawcett made a number of important contributions on fungus diseases of citrus insects and on the newly observed diseases of scaly bark and gummosis of citrus trees, as well as on stem-end rot of citrus fruit. During this period at Gainesville, he was associated with several of the pioneer scientists in citrus research, including H. J. Webber, W. T. Swingle, and P. H. Rolfs.

My first contacts with this kind, gentle, soft-spoken, energetic man were at meetings of the American Phytopathological Society in the late 1930s and

¹Much valuable information on Howard Fawcett was obtained from an obituary published in 1949 by Klotz & Carsner (4), as well as from an anonymously written appreciation of Fawcett that appeared in 1978 (1).

on a visit to the Citrus Experiment Station in Riverside, California, in 1941. For a notable figure among American plant pathologists, with a fine international reputation, he was very human and approachable. It was a great thrill for me (as a young pathologist just beginning his career) to meet this former president of the American Phytopathological Society and a noted researcher who was recognized worldwide for his studies of citrus diseases.

In 1944, a position opened up at the University of California Citrus Experiment Station at Riverside. This post sounded very interesting to me, even though I had at the time an exciting and productive position at the Connecticut Agricultural Experiment Station. This began my close professional and personal contacts with this remarkable man, who was considerate, concerned, compassionate, and also absentminded in his dealings with the members of his department. Much of the correspondence from him about the new position came to me on the backs of old envelopes, scraps of paper—notes that he scribbled in his effort to take as little time as possible from his all-consuming and fascinating research on citrus diseases.

Howard Fawcett came to California from Florida in 1911, serving first for two years with the California Commission of Horticulture, investigating the gummosis disease of citrus. This work began his distinguished career in California studying the diseases of citrus, including those caused by *Phytophthora*. In 1916 Fawcett obtained a special leave from his position at Riverside to attend John Hopkins University, where, under Burton E. Livingston, he studied the temperature relations of fungi parasitic on citrus trees and also developed apparatus for temperature control that subsequently proved very useful in botanical investigations. He received a doctorate from John Hopkins University in 1918. Through detailed and intensive study, Fawcett soon found that gummosis was caused by a species of *Phytophthora*. He developed measures that helped to control this severe disease worldwide. He proved that the fungus causing brown rot of citrus fruit also caused gummosis. Through this discovery and subsequent implementation of control measures, the California lemon industry was saved. A second highlight of Fawcett's career was his discovery in 1922 of the treatment for, then 11 years later the cause of, citrus scaly bark (psorosis)—by dint of much imaginative and careful research he demonstrated in 1933 the virus nature of the disease.

An excerpt from an obituary published in 1978 (1) provides a fascinating insight into Dr. Fawcett's career: "On the morning of May 15, 1933, Howard Samuel Fawcett stood beneath an orange tree in a grove affected with a mysterious disease that had baffled plant pathologists for decades. Suddenly a group of leaves hanging in just the right light against the sky caught his attention. Eleven years earlier, Fawcett had discovered a therapeutic treatment for the disease, but the cause still eluded him. Now he was 'seized with a sensation as if the eyes of the scientific workers in this subject

for the preceding eleven years were looking through mine.' flecked markings on the leaves broke upon Fawcett as a light of instantaneous understanding. Years later he could recall the exact instant—eight o'clock—that he reached a completely new hypothesis about the cause of psorosis. From that moment of prescience, he proceeded methodically to gather the data leading to the first discovery of a virus disease in citrus".

Sudden creative insights were said to be a notable characteristic of Howard Fawcett. He emphasized the need for "constructive dreaming" in research, and cited as an example August Kekule, the organic chemist who had formulated the benzene ring structure as the result of a dream. Fawcett often had hunches that directed him to the most productive area of research on a certain problem; often this aspect had been completely ignored by other researchers. He was truly a pathfinder at the frontier of citrus disease investigations. He was the founder of citrus virology, and his discoveries greatly outweigh those of any other citrus pathologist of his time.

In the 1940s, working with a team of research scientists at the University of California, Riverside, Fawcett played the leading role in the investigation of the cause of tristeza, or quick decline of orange trees. In collaboration with J. M. Wallace, he demonstrated that this disease was caused by a virus. This led to the development of effective measures for controlling tristeza, which was then threatening citrus production in California, as well in many other countries around the world. During this period also, Dr. Fawcett studied other virus and virus-like diseases of citrus, including stubborn disease of sweet orange, wood pocket of lemon, exocortis of trifoliolate orange, and various forms of the disease known as psorosis. He had earlier demonstrated that stubborn was also a virus disease. He was recognized internationally for his citrus disease investigations. Fawcett's research had a tremendous influence on knowledge of the cause, biology, and control of nearly all of the major diseases affecting citrus. In 1940 he proposed a simple, easily applied pro tem manner of naming viruses by adding the stem "vir" to the Latin genitive of the genus of the host in which the virus was first discovered and recognized, and dropping the final consonants of this genitive.

One of the unusual aspects of Fawcett's career was his assumption of the pseudonym Mr. I. C. Bigg. In the guise of this amazing character, he wrote imaginative and informative tales of his excursions into the realm beyond the microscope. Like Alice in Wonderland, Mr. Bigg would reduce himself to 1/50,000 his real size and explore the innermost recesses of citrus trees, soil particles, etc. For a number of years these fantasies were popular and informative reading in the California Citrograph, as Mr. I. C. Bigg explored the submicroscopic aspects of the psorosis virus, blue and green mold of citrus, and other citrus diseases. Some of the titles of these informative articles were:

“The Green and Blue Mold Spores Protest”; “Rain, Hail, Lemons, and Black Pit”; “Copper Ion Talks to Zinc”; and “The Voice of Cottony Rot”.

An article on lemons and black pit began as follows: “It was the last day of October, the first severe rain had come for the year. I put on my all-rubber suit and using the old secret formula I became 50,000 times smaller, about one four-hundredth of an inch tall. No human eye unaided could see me, but I saw small things as if they were big. I walked into a drop of water on a lemon fruit. The drop seemed enormous, like a great reservoir. Around me were numerous bacteria whirling about. I thought I had greatly reduced in stature but these bacteria were still 10 to 15 times smaller than my reduced size. I reached out and grabbed a bacterium. It was about the shape of a sausage and had numerous appendage or cilia at one end for swimming. . . .”

He took two major trips abroad, which increased considerably his stature as an international authority on citrus problems. In 1929 and 1939 he studied citrus and date diseases in the Mediterranean countries of Europe and North Africa and in Palestine. At this time, he was a Collaborator of the U.S. Department of Agriculture. In 1936 and 1937, he added to his knowledge of citrus diseases and to his value in California citrus studies by investigating citrus problems in Brazil and Argentina.

Howard Fawcett was a devoted Quaker, an ardent member by birthright of the Society of Friends, and a leading figure in the establishment and support of the Riverside Friends Meeting. From 1922 to 1923, he was on sabbatical leave with a mission sent by the American Friends Service Committee to provide assistance to the famine-stricken area of southeastern Russia, ministering to the people in that devastated area. Fawcett worked quietly and persistently in many ways for the advancement of peace and goodwill in the world. His humanitarianism permeated his nonscientific writings, and was evident even in his Faculty Research Lecture, “Adventures in the Plant Disease World,” presented at the University of California, Los Angeles, in 1940.

Fawcett was quiet and soft-spoken, but his associates paid sincere and lavish tribute to his genius as a scientist and to the inspiration, stimulation, and leadership that he gave to his scientific discipline and to his colleagues throughout the world. I might mention too that his monumental absentmindedness provided many humorous anecdotes.

Dr. Fawcett’s policy was to select the right man for the job and permit him to work without interference. He maintained an active interest in, and an awareness of the research that we were doing, and gave as much help as possible, but permitted all of us to conduct research as we thought best.

During his career at Riverside, Howard Fawcett reported on the nature and control of citrus diseases in nearly 300 papers published in scientific and trade journals. His most notable publication was the internationally recognized

book *Citrus Diseases and Their Control* published in 1926 (2), and revised and expanded in 1936 (3) and again in 1947 with Fawcett as the sole author. H. A. Lee, who was junior author of the 1926 edition, had given up research on citrus diseases and requested that his name be omitted from the later editions. His textbook has been translated into Hebrew and published also in Spanish and Portuguese editions. In 1948, Fawcett contributed to Volume II of *The Citrus Industry* as senior author, a chapter entitled "Diseases and Their Control," as well as one on control of citrus insects by fungi and bacteria. With L. J. Klotz, he authored a *Color Handbook of Citrus Diseases*, which appeared in two editions, one in 1941, the other in 1948. This work provides citrus growers, packing-house men, horticultural inspectors, and extension workers with a ready means of identifying citrus diseases, together with the essential information on control.

Professor Fawcett was a charter member of the American Phytopathological Society, and vice president of the society in 1929 and president in 1930. He was a member of Phi Beta Kappa, the Botanical Society of America, the Mycological Society of America, Sigma Xi, Societa Internazionale di Microbiologia (Milan), and a Fellow of the American Association for the Advancement of Science. In the fifth edition of American Men of Science (1933), Fawcett's name was starred, indicating his selection that year as one of 250 leading American scientists and one of 25 leading botanists. In 1940, Fawcett received a special honor from the University of California: he was selected as Faculty Research Lecturer. That spring he presented a lecture at the University of California, Los Angeles, with the title "Adventures in the Plant Disease World." This lecture provided a fascinating description of much of his research on citrus diseases over the years.

In 1965, the memory of Howard S. Fawcett was honored by the Regents of the University of California who named a new laboratory on the Riverside Campus the Howard S. Fawcett Laboratory. This laboratory houses the statewide Air Pollution Research Center and personnel of the Department of Plant Pathology and other departments. It includes a citrus-fruit processing line for studying fruit handling and processing and studying the effect of various environmental factors on fruit.

Fawcett retired as Chairman of the Department of Plant Pathology in 1946 and died in 1948. He was a very involved and concerned citizen of the city where he and Mrs. Fawcett made their home for 37 years.

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