

# Frederick Campion Steward

*June 16, 1904 — September 13, 1993*

Frederick Campion Steward FRS, better known as “Camp” or F.C., died at age 89 at his home in Tuscaloosa, Alabama, after several years of poor health. He came to Cornell as Professor of Botany in 1950 and subsequently became Charles A. Alexander Professor of Biological Sciences and Director of the Laboratory for Cell Physiology, Growth and Development. Steward was one of the most vigorous, productive, persuasive, and scholarly faculty members in the New York State College of Agriculture and Life Sciences at Cornell University. A Symposium held at Cornell in May 1973 on the occasion of his retirement was entitled “Historical and Current Aspects of Plant Physiology: A Symposium Honoring F.C. Steward”.

Dr. Steward was a leading figure in the development of modern plant physiology, cell biology, and plant tissue culture, and his research in the late 1950s reshaped scientific knowledge of how plants regenerate. He is perhaps best remembered, certainly most cited, for his demonstration that cells cultured from carrot roots can give rise to embryo-like structures, and eventually to entire plants. This showed that individual plant cells are totipotent—they retain all the genetic information necessary to regenerate and regulate a mature plant, with all its specialized cells.

This finding revolutionized the world of plant cell biology. It established for the first time that the cumbersome process of cultivating plant cuttings and shoots was no longer required to increase clones. Instead hybrids can be propagated and mutants discovered much faster in the laboratory. His discovery of the means to obtain such regeneration has provided a foundation that supports much of modern plant molecular biology.

Steward was always concerned with broad concepts and he took pride in the breadth of the work undertaken in his laboratory. In addition to his findings on plant regeneration, he also made important contributions in other areas. His work and that of his associates provided major insights into plant cell physiology, nitrogen metabolism and protein synthesis, ion uptake and nutrient accumulation, morphogenesis, growth and development, where he recognized the significance of hormonal regulation in cell division. The importance of liquid endosperm in providing plant growth substances led some of us to regard coconut water as the “elixir of life”.

From his Cornell classrooms and laboratories, Steward was responsible for creating and inspiring a generation of botanists. Former students said that his lectures in advanced plant physiology were the high point of their education, and he taught this distinguished course to a large number of students for eighteen years. Over thirty

advanced students from various nations completed the Ph.D. degree under his direct supervision, and his laboratory attracted many postdoctoral scientists from the United States and abroad. He could be a spellbinding lecturer, and his classroom and seminars became a kind of international salon for visiting scientists from all over the world. He spoke by invitation to audiences on every continent, and it would be difficult to find a major university in the United States or Canada where he did not give one or more exciting reports of work carried on in his laboratory.

F.C. Steward, was born in London on June 16, 1904, and received a B.Sc. degree in Chemistry with First Class Honours from the University of Leeds. He completed the Ph.D. degree in Botany, also at Leeds, in 1926 under the direction of J.H. Priestley, a scientist with innovative and unconventional views, who instilled in him a strong sense of independence. From the outset of his career, Steward was often associated with scientific controversy and he often tended to be at its epicenter. He believed that one could be, and maybe should be, a “majority of one” if scientific convictions dictated it.

A Rockefeller Foundation Fellowship brought Steward to Cornell in 1927 and then to the University of California at Berkeley to work with Dennis R. Hoagland in plant mineral nutrition, and this led to his interest in ion uptake in plant cells. A second Rockefeller Fellowship in 1933 took him again to work with Hoagland and then to the Dry Tortugas, where the Carnegie Institution of Washington maintained a Marine Laboratory. Here he worked on the large coenocytic alga, *Valonia*. After returning to Britain he was appointed in 1934 as Reader in Botany at Birkbeck College, University of London, where Dame Helen Gwynne-Vaughan was Head of the Department.

During World War II (1940-45), he served Britain in the Ministry of Aircraft Production as Director of Aircraft Equipment and Assistant Secretary of the Ministry. His administrative and organization skills were crucial to the task and were further honed at this time. He returned to the United States after the war, holding appointments at the University of Chicago and the University of Rochester, where he was Professor and Chairman of the Department of Botany and where he began his work using paper chromatography to study nitrogen compounds. He came to Cornell as Professor of Botany in 1950. He was a tireless worker on University and College committees, and many major committee reports carry the stamp of his incisive thinking and literacy. His renown in research brought industrial consulting contracts with Beech Nut Packing Company, the DuPont Company, and the United Fruit Company, each of which contributed financially to his research over various periods of time. In his later years he held forth eloquently against the overspecialization and fragmentation of scientific research.

Among many honors, FCS was elected Fellow of the American Academy of Arts and Sciences in 1956, and Fellow of the Royal Society of London a year later. In 1961 he received the Merit Award of the Botanical Society of

America, and three years later the Stephen Hales Award of the American Society of Plant Physiologists. He also received several Honorary Doctorates. He wrote several books and more than 200 articles in scientific journals, and he was editor and contributor to the 10 volumes and 15 books of *Plant Physiology: a Treatise* (Academic Press, 1959-91). He had the gift of communication, both in speech and in the written word, and a very personalized style, with an intense feeling for the historical continuity of plant science.

He is survived by his wife of nearly sixty-four years, Anne Temple Gordon, whom he met when he was a Postdoctoral Fellow in the Department of Botany at Cornell; by his son and daughter-in-law, Frederick Gordon and Muir of Tuscaloosa; and two grandchildren.

*Abraham Krikorian, Pamela Ludford, John Thompson, Charles Uhl, Harlan Banks*