

A PORTRAIT OF E. G. ANDERSON 1891-1973

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When Ernest G. Anderson or Andy, as he was known to all his friends, died on 30 January of this year, the science of Genetics lost one of its most devoted practitioners. We are all the poorer for the passing of a warm, compassionate and decent man who steadfastly held to his high standards of personal and scientific integrity.

It is not easy to describe a complex individual like E. G. Anderson and I may do him an injustice in attempting to do so. Each of us sees another human being through a different set of eyes and I can only say how he appeared to me. It has been 45 years since our paths first crossed. I was a senior at Michigan majoring in Botany and Mathematics and he a member of the Botany faculty. My plans for the future were vague, my steps uncertain and faltering; I was in a quandary as to what career I should follow. It was Andy who became my friend, who heard me out sympathetically and who introduced me to the excitement and challenge of genetic research. For this, I am truly grateful and I write with affection and admiration.

He was a big man with slightly stooped shoulders, sparse hair and piercing blue eyes; a shy man, ill at ease with strangers, he loved to talk with people he knew. He was a man with deep loyalty to his friends, a man scornful of pomp and pretense, a man with certain idiosyncrasies, e.g., he was literally tortured by certain sounds and could not abide whistling or the blaring of a radio. I suppose in some ways he was a difficult man, but there was no questioning his high intellect and his essential decency. He was a sensitive and at times a moody individual, a lonely man who needed companionship and understanding. Andy married late in life and it was his good fortune to woo and win the charming and gracious Florence Larson. Their daughter Jean, borne of this union, became in time the mother of three youngsters. Andy loved children and, strenuous though at times he must have found their activities, his grandchildren undoubtedly brought him great pleasure. Marriage was good for Andy and his later years were his happiest.

Andy did his undergraduate work at the University of Nebraska where he came under the influence of Professor R. A. Emerson. During his senior year, Anderson decided to pursue graduate study under Emerson's direction and when Emerson left Nebraska in 1915 to become the head of the Department of Plant Breeding at Cornell, Anderson accompanied him. He thus became a charter member of the now legendary Cornell school of maize genetics. He received the Ph.D. degree in 1920. His thesis on the inheritance of salmon silk color must rank as the shortest, or at least one of the shortest, of all the Ph.D. theses at Cornell.

He left Cornell in 1920 to spend two years as a Research Associate of the Carnegie Institution of Washington. In 1922, he became for a year an instructor in biology at C.C.N.Y. Although he did not enjoy teaching undergraduates, his sojourn at City College had wide ramifications culminating in a professorship at the California Institute of Technology. While in New York, he had no formal connection with Columbia, but he quickly became an active worker in Morgan's fly lab in Schermerhorn Hall. It was at this time that he and Calvin Bridges began their classic study on crossing over in triploid *Drosophila*. A preliminary note appeared in the 1923 Year-Book of the Carnegie Institution of Washington, but the completed work was not published until 1925 when it appeared under joint authorship in *Genetics*, back-to-back with his paper on

attached-X crossing over. In these two papers, Anderson's unusual analytical ability is clearly evident. The Columbia geneticists became his powerful friends, as will shortly be evident.

From 1923 to 1926, he was a fellow of the National Research Council working as a Guest Investigator in the Department of Botany at Michigan. His research was primarily on X-ray induced nondisjunction in *Drosophila*. Maize genetics was subordinated but not forsaken during these years. In 1923, he published a short paper in the *Botanical Gazette* on the maternal inheritance of chlorophyll variegation. I recall Andy somewhat ruefully remarking that he had many more requests for reprints of this paper than he did for others which represented much more sophisticated and demanding research. In 1926, he was an Assistant Professor of Botany at Michigan and a Lloyd fellow in science for 1927-28. It was at this time that T. H. Morgan agreed to go to Cal Tech to organize a new department of biology. The primary interest of the new department was at first to be in genetics. Sturtevant and Dobzhansky were given faculty appointments in biology. Bridges and Schultz, staff members of the Carnegie Institution of Washington, were accompanying Morgan to Cal Tech from Columbia. This was a distinguished group of geneticists but Morgan felt he should complement their research interests by making two additional appointments in genetics. One of these coveted positions went to Anderson, who was offered an Associate Professorship, and the second to Sterling Emerson. Both went to Pasadena in 1928.

Once at Cal Tech Anderson devoted himself to maize genetics. Many of his early years at Pasadena were spent in organizing the experimental field that Cal Tech had purchased at nearby Arcadia. The ranch, as it was called, was intensively used by Anderson, his graduate students and post-doctoral fellows for studies in maize genetics. His research was focused on the hereditary effects of radiation. In 1944, A.E. Longley, a cytologist with the U. S. Department of Agriculture, was assigned to work at Cal Tech where he held the rank of Research Associate. Longley collaborated with Anderson in a study of the genetic effects induced in maize by the atomic bomb. Anderson, the geneticist, and Longley, the cytologist, did a tremendous amount of detailed work on radiation-induced chromosomal aberrations and mutations. More than 1000 reciprocal translocations were isolated and identified as were a number of inversions and a host of mutants. The task of assembling and classifying these genetic modifications was so demanding that little time remained to exploit the more interesting aberrations. I have long felt that Anderson sacrificed his own interests to the common good by devoting so much of his energy to the isolation and cataloging of these diverse genetic changes. On the whole, they have been left for others to profit by. Fortunately, most of the Anderson-Longley stocks have been saved and they constitute a legacy to future maize geneticists.

Anderson was interested in the application of cytogenetics to plant breeding and to this end developed a series of reciprocal translocations. All had in common one break in

chromosome 9 near the *waxy* locus and a second break in different heterologous chromosomes. In the segregating generations following crosses of the *wx*-marked translocations with strains possessing unlinked traits, linkage of the unplaced gene with *waxy* afforded evidence of the location of the new gene on one of the chromosomes involved in the translocation. Anderson's *waxy* translocations have been widely used to detect linkage of qualitative and quantitative characters and they constitute an efficient weapon in the arsenal of the maize geneticist.

Anderson's succinct style is evident in his first publications. He was not given to flowery prose or involved sentences but presented the data logically in simple declarative sentences with an economy of words. I remember Sturtevant describing Andy's style as telegraphic; it was an apt phrase. Recognized though he was as a master of genetic strategy, Anderson would have achieved even greater fame if he could have been persuaded to publish more. But writing up his material brought no pleasure and he was prone to put it off. Consequently his publication list is not as long as it well might be. There is, however, no doubt about the quality of his work. His magnificent analysis of crossing over in a strain of *Drosophila* with attached-X chromosomes was, and is, one of the truly significant papers in the history of genetics. It was appreciated by the cognoscenti but others failed to understand the significance of his findings. It took some years for the concept of chromatid or four strand crossing over to become an accepted part of the fabric of genetic theory. The delayed recognition of the importance of this elegant and sophisticated research may be ascribed in part to the terseness of his style.

When Andy retired from Cal Tech in 1961 he had little desire to remain at Pasadena. The experimental field on which he had lavished so much care was no longer available and he had no place to grow his genetic material. Although given the title of Professor Emeritus, he left Pasadena and spent his remaining years in the Middle West. He was a Visiting Professor at Illinois for 1961-62 and then went to the University of Missouri at Columbia where he remained until his death in 1973. His years at Missouri were pleasant ones as the senior and respected member of the lively group of plant geneticists. He enjoyed his role as elder statesman and his reminiscences of the early days of genetics gave the Missouri geneticists a historical perspective which they otherwise would have lacked.

Andy was a great admirer of L. J. Stadler. It is fitting that this biographical sketch should appear in a volume of the Stadler Genetics Symposium.