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ROLLINS ADAMS EMERSON

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BY

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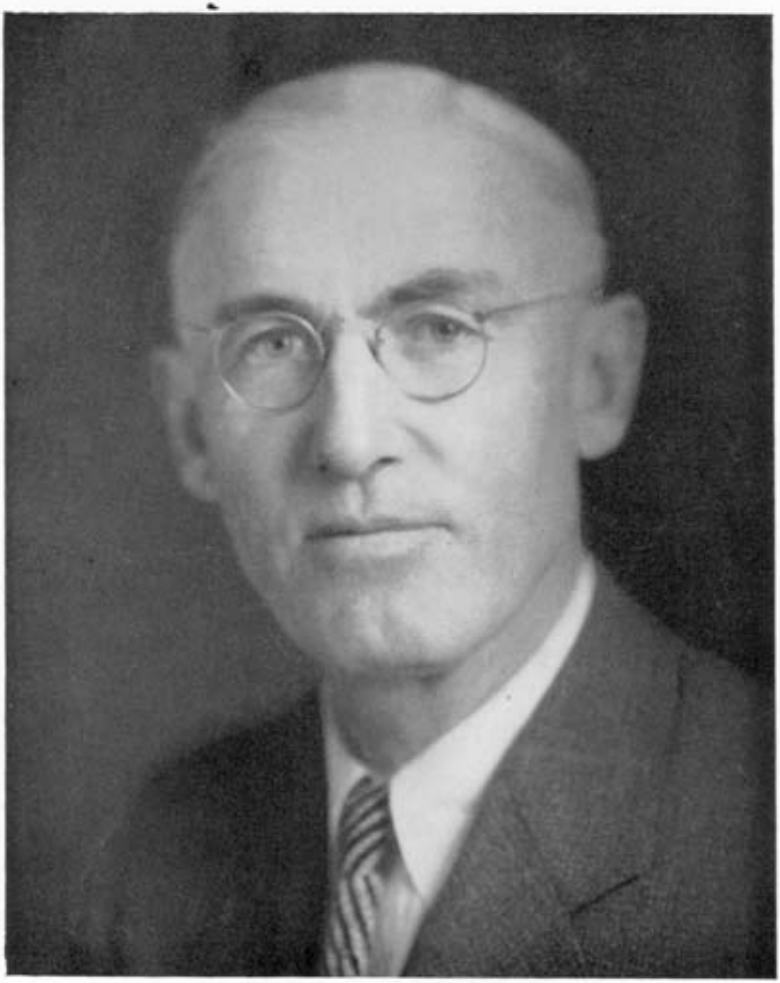

ROLLINS ADAMS EMERSON

1873–1947

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Rollins Adams Emerson, born at Pillar Point, Jefferson County, New York, on May 5, 1873, was the son of Charles D. and Mary Adams Emerson. The first years of his life were spent on his father's farm in Jefferson County. However, when he was seven years of age his parents decided to leave their relatively poor upstate New York farm for the virgin prairie soil of Kearney County, Nebraska, and it was in this mid-western environment that he completed his primary and secondary education. He then enrolled in the College of Agriculture of the University of Nebraska and received the degree of Bachelor of Science from this institution in 1897. Following his graduation he accepted a position as Assistant Editor in Horticulture with the Office of Experiment Stations of the United States Department of Agriculture in Washington, D. C., where his duties were largely concerned with the abstracting of scientific papers. This sedentary occupation was not to his liking so in 1899 he returned to his Alma Mater as Horticulturist in the Nebraska Agriculture Experiment Station and as Assistant Professor of Horticulture on the college faculty. He remained on the Nebraska faculty until 1914, when he left for Cornell. In 1910-11 he took a year's leave of absence which he spent doing graduate work at Harvard University. He was awarded the Sc.D. degree from Harvard in 1913.

During his boyhood in Nebraska, Emerson's interest in natural phenomena was stimulated and fostered by his friendship with a local physician, himself a naturalist, whose friendly counsel encouraged the youthful Emerson to collect and identify the local flora. It is difficult to say how important a rôle this physician played in directing the boy's energy along scientific lines, but it was not an insignificant one. Years after he left Nebraska, Emerson often spoke with affection of this local doctor. As an undergraduate at the University of Nebraska, Emerson was a student of Charles A. Bessey, and this great teacher also exerted a profound influence on the youthful and eager student. Most important of all, at least in his formative years, was the wholesome atmosphere of the parental home. His father and mother were people of unusual ability and character who had a strong sense of civic responsibility and played a leading rôle in community affairs (his mother was

a direct descendant of Henry Adams from whom sprang the illustrious Adams family). Better schooled than their neighbors, although his father was largely self-educated, they would on occasion teach school when teachers were unavailable; both were determined that their children should have the best possible education. His parents were strict Methodists and young Emerson was reared in a well-ordered home where a high value was placed on ethical standards.

Emerson was one of the insatiably curious who are forever seeking a greater understanding of natural laws; he was a born investigator and experimenter. Even as a youth he designed and conducted experiments. His strong predilection for scientific inquiry is evident from the fact that he published a scientific paper in 1897, the same year he received his B.S. degree from Nebraska, on the internal temperature of tree trunks. These experiments; the results of which were read in 1896 before a meeting of the Nebraska Academy of Science, were begun in the summer of 1894 and continued during the vacation periods of 1895 and 1896. This first publication was a simple and unpretentious bit of experimenting yet it shows clearly the qualities of lucidness and objectivity which characterize all of his published works. A reader of Emerson's papers never is left in doubt as to the purpose of the experiment, the experimental attack on the problem, the data obtained, and the conclusions drawn. He rigorously tested every hypothesis in an admirably dispassionate way. He was not given to speculations which could not be subjected to experimental test.

Emerson's position at Nebraska, first as Assistant Professor and later as Professor of Horticulture, required him to spend considerable time on matters of practical importance to the agricultural interests of the state. During his tenure at Lincoln, a number of papers and bulletins on subjects such as mulching of garden vegetables, handling of fruit trees, etc., appeared; but he managed to find time to do a great deal of experimental work of a more fundamental nature. In a sense Emerson was fortunate in the time of his arrival in the scientific arena. The turn of the century saw the great impetus to experimental biology given by the rediscovery of Mendel's laws; physical and chemical techniques were becoming useful tools in the biologists' hands, and a new and exciting era lay ahead. Emerson began breeding work with beans, prior to the rediscovery of

Mendel's laws in 1900, with the expressed intent of learning more concerning the underlying principles of plant breeding. His hybridization of beans began in 1898 while with the United States Department of Agriculture, and in 1902 he published a "Preliminary account of variation in bean hybrids." In this paper he showed that he was conversant with Mendel's work and that he proposed to ascertain the validity of Mendel's laws in his Phaseolus material.

Emerson realized the tremendous implications of Mendelian inheritance and early embarked on a career of genetical research which was not to end until his death. He first concerned himself with the heredity of the bean plant. In 1904 appeared a second publication on bean hybrids and a number of papers dealing with inheritance of seed coat colors and other characters appeared while he was at Nebraska. His first paper on maize genetics appeared in 1910, but he used maize as breeding material in 1899 when he conducted a cooperative experiment with H. J. Webber on the hybridization of ordinary field corn, sweet corn, and Peruvian corn. His 1910 publication deals with a latent factor for aleurone color (actually the recessive gene pr for red aleurone color present in a strain with colorless aleurone) but he stated in the introduction that he had been studying the heredity of the corn plant for several years and four problems were under investigation. One of these concerned modifying factors affecting intensity of aleurone color; a second, the appearance of mottled aleurone from the cross of purple by nonpurple; a third, the nature of the red-white coloration of "calico" corn; and the fourth, on latent color factors. The year in which he forsook beans for maize as his experimental plant is not certain, but the circumstances which led to his doing so are of interest. Desirous of obtaining laboratory material illustrating 3:1 Mendelian ratios for a course he taught, he made a cross of Rice popcorn with a sugary strain and self-pollinated the F_1 plants which were expected to segregate starchy and sugary seeds in a ratio of 3:1. These selfed ears were distributed to the class with the request that the data be reported to him. To his surprise and chagrin, the students' counts showed a marked deficiency of sugary seeds. Puzzled by this deviation, he felt that he could not set aside this material until he had determined the cause of the aberrant ratio. Thus began his maize studies in genetics which were ultimately to lead to

his founding one of the most active and productive schools of genetics in the world. Many years later, in 1934, a well-documented paper appeared in GENETICS in which he showed the aberrant sugary ratios were due to linked gametophyte gene effecting differential fertilization.

In addition to the four problems mentioned in his 1910 paper, Emerson, in 1908, began experiments on the inheritance of quantitative characters in maize which were designed to test whether or not these differences were due to numerous factors inherited in a strictly Mendelian manner. His results, together with similar data obtained by E. M. East, were published jointly in 1913 in what constitutes, even today, one of the best papers on the inheritance of quantitative characters. Emerson's interest in this problem never lagged and for many years, up to his death, he studied the inheritance of ear row number. Unfortunately his vast assemblage of data on row number was never published. It is to be hoped that some method will be found whereby his extensive data can be made available.

Emerson was called to Cornell in 1914 as head of the Department of Plant Breeding, and it was there that his most important work was accomplished. Two of his students, E. G. Anderson and E. W. Lindstrom, accompanied Emerson to Ithaca and they were soon joined by others. Many prominent geneticists studied with Emerson at Cornell and his laboratory became known throughout the world, attracting many foreign students. Except for his first years at Cornell, he never engaged in formal teaching. His time was divided between administrative duties as Head of the Department of Plant Breeding and research in maize genetics. His method of handling graduate students was as effective as it was unique. He looked upon graduate students as mature individuals who should not be led by the hand but who should be given the opportunity to develop their own ideas. Above all he tried to encourage independent thinking. Although always available when students sought his help, he felt that the initiative lay with the student. When a new student appeared, he would usually assign him some routine problem. He often remarked that he found this a very satisfactory method, because if the student were good, he would soon find a more interesting and exciting problem for his doctoral dissertation, while if the student were mediocre, it didn't matter what kind of a problem he had.

Emerson was the spiritual father of his students and the impress of his personality was left in part upon all who studied with him. His contagious enthusiasm, his prodigious energy, his absolute integrity and objectivity were such that all who were intimately associated with him caught in some measure these attributes of the man. Close personal ties bound him to his students. He once remarked that he looked upon them as sons. It is certainly true that he took almost as much pleasure in the achievements of his former students as if they were of his own flesh and blood. Graduate students are prone to be hypercritical of their professors, seizing upon any real or fancied weakness with a zest which must be disconcerting to their elders; but Emerson's students never spoke of him save with respect and affection. Standing six feet in height, possessing a powerful physique, Emerson was a fine figure of a man. His fine personal qualities endeared him to all who knew him.

Emerson was completely absorbed in his scientific work. In July of 1947 he underwent a major surgical operation which disclosed that he was critically ill. Although 74 years of age he made a remarkable, but temporary, recovery and during the latter part of the summer and the early fall months did as much field work as the average man in good health. His condition was so weak that he would work for a short interval, then rest in his car until his flagging strength returned, whereupon he would again resume his tasks. Finally he was forced to his bed from which he never arose. But even in his last days his mind was occupied with genetical problems and he spoke of his work with his usual enthusiasm and fire. Truly his spirit was indomitable. He was a man in every sense of the word.

It might be said of Emerson as of Morgan that his greatest contribution to science lay not so much in his own research, however significant, but in the great influence he exerted as the inspiring leader of an active and productive school of genetics where young and promising students found a stimulating intellectual atmosphere. Nevertheless Emerson's researches were of the highest order. His masterful analysis of plant color inheritance, published in 1921, did more than any other single paper to establish maize genetics on a sound basis. His demonstration that pericarp variegation was due to a mutable gene was the first proof of such a genetic basis for variegation. His studies on sex expression, on quantitative inheritance, on Zea-

Euchlaena hybrids, on multiple alleles, were all milestones of progress. More than any other single investigator he was responsible for the determination of the ten linkage groups of maize.

Emerson's influence among students of maize genetics was widespread. By general consent he was the dean of maize geneticists and men such as Stadler, Jenkins, Mangelsdorf, Brink, Edgar Anderson, Hayes, and Jones, who were not his students, came to counsel with him. The high esteem in which he was held by his colleagues was such that he was able to organize the Maize Genetics Cooperation and the Maize News Letter. To this News Letter, published annually, come unpublished data, progress reports, and scientific notes and comments from many laboratories. Seed stocks are both maintained and distributed by the Cooperation. This magnificent cooperative effort, which did much to advance the progress of maize genetics, was Emerson's creation.

A remarkable incident, since it involved two men destined for leadership in genetics, occurred in the pre-Drosophila days of 1909 at a meeting of the American Breeders' Association. T. H. Morgan appeared on the program with a paper entitled "What Are 'Factors' in Mendelian Explanations?" in which he expressed his skepticism of the already then commonly accepted belief that alternative conditions (alleles) undergo segregation to form two kinds of germ cells in equal numbers. Morgan stated that "equal numbers of the alternative conditions are not always present in each individual." In the same address Morgan further expressed his position with the following criticism: "If one factor will not explain the facts, then two are invoked; if two prove insufficient, three will sometimes work out." Emerson immediately followed Morgan on the program and presented a paper on "Factors for mottling in beans" in which he showed that the genetic data could not be accounted for by a single factor pair for mottling but that two factor pairs offered a satisfactory explanation for the data! Emerson was among the first to see the great promise of this new field of biological investigation. Later, in 1910, Morgan fully accepted the Mendelian interpretation of heredity and became the leader of one of the most brilliant schools in the history of all biological science.

Although most of Emerson's work was in theoretical genetics,

he was genuinely interested in the application of genetic methods to plant breeding. In the 1920's he developed an anthracnose resistant pea bean and in his later years obtained some greatly improved strains of celery and melons. He seemed to take as much pride and pleasure in his successful breeding of celery and melons as in his genetic studies. As a matter of fact one of his most striking characteristics was the whole-hearted enthusiasm with which he threw himself into every undertaking, be it genetics, plant breeding, hunting or bowling. He felt that if anything was worth doing, it was worth doing well.

Many honors came to him. He was a member of the National Academy of Sciences, the American Philosophical Society, the American Society of Naturalists, of which he was President in 1923, and the Genetics Society of America, which he served as President in 1933. He was a charter member of the American Society of Horticultural Science and a fellow of the American Association for the Advancement of Science. He was affiliated with the American Association of University Professors and the American Genetic Association. He was a member of Phi Beta Kappa, Sigma Xi, Phi Kappa Phi and Gamma Alpha. He served as Dean of the Graduate School of Cornell University for six years (1925-31). He was faculty representative on the Board of Trustees of Cornell University from 1925-27. The University of Nebraska awarded him the LL.D. degree in 1917. Emerson, however, wore these honors lightly; he was a modest man without pretense.

He made a trip in 1923-24 with F. D. Richey to the principal maize growing countries of South America for the purpose of collecting indigenous South American varieties. In 1935 he went to Yucatan at the invitation of the Carnegie Institution to study the probable food plants grown by the ancient Mayan peoples. He was a delegate to the Seventh International Genetics Congress at Edinburgh in 1939.

He was married to Harriet Hardin, on May 23, 1898. Four children were born of this union, all of whom survive. His eldest son, Sterling Howard Emerson, is now Professor of Genetics at the California Institute of Technology. All who had the privilege of visiting the Emerson home know of the strong ties of affection which bound this family together. Mrs. Emerson preceded him in death by several years. Professor Emerson passed away on December 8, 1947.

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