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Reed C. Rollins

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December 7, 1911-April 28, 1998

BY IHSAN A. AL-SHEHBAZ

REED ROLLINS, ASA GRAY professor of systematic botany emeritus at Harvard University, was one of the outstanding and most insightful scientists of this century. He was one of the founding fathers and second president of both the International Association for Plant Taxonomy and the Organization for Tropical Studies. His 30-year leadership as the director of the Gray Herbarium elevated Harvard to one of the world's top centers for studies in systematic and evolutionary botany. He was one of the pioneering botanists who promoted the extensive use of genetics, anatomy, and cytology to solve taxonomic problems.

Reed, the eighth of thirteen children (ten boys and three girls) of Mormon parents, was born in Lyman in southwestern Wyoming on December 7, 1911. His father, Clarence Rollins, was a rancher and at one point a deputy sheriff of Uinta County, who along with his family and neighbors, leased the land from the federal government. The children were always encouraged to study hard and read the various books at home and the daily newspaper, as well as sing and play the piano at night. During the evenings, the family spent many good times singing, while the girls took turns playing the piano.

Reed attended elementary and high schools in Lyman. He enjoyed plants as a child, and at the age of fifteen, he attended a presentation by Aven Nelson, then director of the Rocky Mountain Herbarium at Laramie, about plants in general and those of the Rocky Mountains in particular. The summer after finishing high school, Reed, his brother Bill, and their cousins worked during the day on a gas pipeline, but at night their band, The Happy Jack Jazz Band, played in neighboring towns. Reed played the trumpet.

In 1929 Reed entered the University of Wyoming to become an agricultural teacher. His travel expenses from Lyman to Laramie were covered by a scholarship from the Union Pacific Railroad; his tuition was paid by a scholarship from the University of Wyoming. After finishing his freshman year, Reed decided to major in botany. He worked as a mounter in the herbarium during the academic year and waited on tables in the university dining hall. During the summers of the following three years, he worked for the U.S. Department of Agriculture, conducting plant disease surveys designed to trace the movement of smuts and stem rust on cereals in eastern Wyoming.

Reed's first introduction to the flora of Wyoming was in a summer camp class that he took with Nelson in 1930. Reed was the top-ranking student in his class. After receiving his A.B. degree with honors in 1933, he worked for a year at the University of Wyoming in the Public Works Administration examining the records of farms and ranches. The following year, he attended Washington State University in Pullman and received his M.S. degree in 1936 under the supervision of Lincoln Constance. Reed joined Harvard University in the fall of 1936 and received his Ph.D. in mid-1940 under the supervision of Merritt Lyndon Fernald. He worked on the mustard genus *Arabis* for his masters and

doctorate dissertations (1941); he continued working on the genus throughout his life.

Shortly after joining Harvard as a student, Reed impressed his mentors by his innovative approach and courage to use various fields of biology, especially cytology (with Karl Sax) and anatomy (with Ralph Wetmore), to understand the evolutionary relationships and to solve some difficult taxonomic problems. In April 1937 he was unanimously chosen by the senior fellows to the Society of Fellows and was awarded a three-year Junior Fellowship (1937-40), which allowed him to take classes free of tuition and provided him with an annual salary of \$1,250, a three-room suite, and free meals.

Reed took courses in cytology, biochemistry, and related fields, and he divided his time between working on taxonomy in the Gray Herbarium and on cytology in Karl Sax's lab. Reed was among the first North American taxonomists to use chromosome data in monographic studies, as evidenced by his account of the genus *Physaria* (1939).

Perhaps among the most important thing Reed advocated in his classes and even in his writings was that, to have a better understanding of the group at hand, taxonomists should use whatever knowledge they can get from any field. This was elegantly stated in his (1952) presidential address to the American Society of Plant Taxonomists (ASPT): "Thus viewed, taxonomy becomes an integrative and synthesizing subject, in a way rising to the shoulders of its sister disciplines."

In his presidential address to the International Association for Plant Taxonomy, Reed (1959) emphasized the use of population genetics as an important field in enriching the knowledge of a taxonomic group, and stated that "with our natural interest in the dynamics of variation, survival and migration, we not only need the information that can be provided by genetic studies of populations, but we are in a position to exploit this area of research as part of the

usual taxonomic research program." In fact, his work on the genetic evaluation of a taxonomic character in *Dithyrea* (1958) led the way to questioning the validity of numerous cruciferous species, subspecies, and varieties that were based primarily on differences in the presence or absence of trichomes (hairs). That work showed that the occurrence or lack of trichomes in *Dithyrea* is controlled by a single gene with two alleles that follow simple Mendelian inheritance.

Reed continued to promote the use of new approaches in evolutionary and systematic studies (1957, 1965), and his extensive use of scanning electron microscopy in the study of pollen (1973) and trichomes (1975, 1979) was instrumental in understanding the evolution of the mustard genus *Lesquerella*. Unlike the previously prevailing thought that the Brassicaceae universally have uniform pollen, he (1979) discovered that a number of western North American genera have pollen with more than three colpi, thus providing solid evidence of the direct relationships among them.

Reed joined Stanford University as assistant professor in January 1941, and two years later he took leave of absence to join a U.S. Department of Agriculture team of plant breeders and geneticists in Salinas, California, to work as an associate geneticist on the Guayule Rubber Research Project, a position that he held through 1945. At that time the United States and Japan were at war, and the Japanese had full control of the *Hevea* rubber production in Malaysia and southeastern Asia, whereas the rubber in Brazil and elsewhere in the New World was suffering from rust diseases. Reed continued working on guayule (*Parthenium argentatum*) until late 1950, and his research on rubber resulted in 15 papers published between 1944 and 1951. Among his most important discoveries (1944, 1946, 1949, 1950) was the first genetic evidence for apomixis in *Parthenium*, coupled with

detailed study of natural and artificial interspecific hybridization in the genus.

Reed returned to Harvard as associate professor and director of the Gray Herbarium (effective July 1, 1948) and became the fifth director (1948-78) of that prestigious herbarium, succeeding his mentor, Fernald, who followed Benjamin Robinson, Sereno Watson, and Asa Gray.

At the international level, Reed was one of the founders, the first vice-president (1950-54), and the second president (1954-59) of the International Association for Plant Taxonomy (IAPT). Since its foundation on July 18, 1950, Reed's thirty-one-year membership of the IAPT council continued uninterrupted through the Thirteenth International Botanical Congress (IBC) that was held in 1981 in Sydney. With his untimely death, we lost the last survivor of the "founding fathers" of IAPT and one of the truly outstanding systematists of this century.

Reed was the key person in organizing the Eleventh International Botanical Congress that was held in 1969 in Seattle. Prior to the selection of Seattle as the city for that congress, he did all of the initial home work to receive the support of the president of the University of Washington (Seattle), the National Academy of Sciences, and the Botanical Society of America. He also had to select members of the congress's national committee, chairman of that committee, and president of the IBC.

At the national scene, Reed was one of a six-person executive committee that founded, in February 1963, the Organization for Tropical Studies (OTS), a consortium of research institutions and universities, to educate, promote, and coordinate studies in tropical biology of students and scholars in the United States. Following the death in February 1964 of Norman E. Hartweg, the first president of OTS, Reed was elected by mail ballot as the second president.

During his two-year presidency, he was instrumental in resolving a number of the organizational and funding problems that faced the young organization, and his actions marked a turning point in the establishment of a clear identity and stability, especially in the development of an infrastructure to supervise and run the graduate courses in Costa Rica. Reed served as a member of the executive committee from 1963 to 1968 and continued to attend the OTS board meetings through 1973.

At the Harvard level, Reed played a major role in unification of the plant and library material of the five botanical institutes (Gray Herbarium, Arnold Arboretum, Farlow Herbarium, Botanical Museum, and Harvard Forest). As a result of his dedication, patience, and leadership, unification of the collections became a reality, and he took on the responsibility of supervising and coordinating the entire process. These collections were later renamed the Harvard University Herbaria. He served as the Harvard's chairman of the Institute for Research in General Plant Morphology (1955-65), chairman of the Institute of Plant Sciences (1965-69), supervisor of the Bussey Institution (1967-78), and chairman of the Administrative Committee of the Farlow Library and Herbarium (1974-78). During his thirty-year (1948-78) tenure as the director of the Gray Herbarium, systematic and evolutionary botany reached a "golden era" and was the strongest in the history of the Harvard. Although Reed supervised twenty-one Ph.D. students between 1954 and 1980, he did not publish a single joint paper with any of his students based on their Ph.D. theses.

Reed conducted extensive field work throughout his professional career and concentrated primarily on collecting the mustards of the Pacific, mountain, southwestern, and southeastern states, as well as of northern Mexico. Although such work spanned nearly sixty years (1934 through 1993),

the most productive period was between 1974 and 1993, when he and his second wife, Kathryn, covered all of the continental United States minus the northeastern and central states. Reed did not concentrate on the mustards of Greenland, Alaska, the Caribbean, Central and South America, or Canada, though he studied a few of the taxonomically difficult South American genera, especially *Menonvillea*.

During the 1950s, Reed concentrated his field research in Tennessee, Alabama, and neighboring parts of Texas, Mississippi, Georgia, and Kentucky, where he focused primarily on the genera *Lesquerella* and *Leavenworthia*. His principal goals were to study the extensive interspecific hybridization in the former genus (1954, 1957, 1973) and the sympatric isolation and breeding systems of the later (1963, 1977). His fifteen years of research and field work on the lesquerellas of the Nashville Basin, Tennessee, were quite rewarding. Not only did he discover several new species, but his painstaking and intensive field work, which was followed by extensive crossing experiments in Cambridge, led to publication of one of the classic studies on natural interspecific hybridization. It is interesting to note that Reed discovered and named *L. densipila* in 1952, but when he found several populations of suspected hybrid origin at the fork of Stones River, Tennessee, he immediately postulated that there ought to be yet another undescribed species that, with *L. densipila* of the western fork, was hybridizing at the fork of Stones River. Further continuous search along the east fork led to the discovery of *L. stonensis*, which was described in 1955. He later discovered that the latter species also hybridizes with *L. lescurii* and that all of the auriculate-leaved species are interfertile in experimental hybridization, though they were initially isolated geographically, coming into contact subsequently due to human clearing of the areas where their ranges did not overlap.

I took Reed's graduate seminar course in plant bio-systematics in the fall of 1968, and I was very much impressed by his elegant reasoning and soft-spoken approach in discussing any taxonomic problem. Although students did most of the talking and discussions, ideas did not become crystallized until Reed gave his authoritative opinions. He used his extensive collections of *Parthenium*, *Lesquerella*, and *Leavenworthia* as models to introduce diverse taxonomic problems (e.g., hybridization, apomixis, polyploidy, allopatric and sympatric speciation, phenotypic plasticity) and to show how critical systematic methodology would lead to sound solutions. Reed's impressive approach provided us with a wealth of knowledge and helped us develop into young systematists with clear concepts. Perhaps the best reward that I and two of my colleagues (James E. Rodman and Charles Schnell) received from that course was to accompany Reed in his car for a one-week drive from Cambridge to the Nashville Basin, Tennessee, to study the populations of various species of *Leavenworthia* and *Lesquerella*. Unfortunately, that was the only time I joined Reed in any field work.

When the time came to select a thesis problem in 1968, I wanted to work on the Cruciferae. The Middle East, where I intended to work after my degree, is one of the richest centers of the family and I wanted to learn from Reed's extensive thirty-five-year experience with the family. Reed introduced me to several potential subjects and carefully pointed out where the problems were. He then told me to take as much time as I wanted to decide, and when the choice was made, he was instrumental in securing funds for me to conduct field work in mountain and Pacific states during the summers of 1968 and 1969. Reed gave the same absolute freedom to his other twenty Ph.D. students in deciding what to do, and he was always successful in find-

ing the financial resources to support the field studies of his students.

Reed's pioneering work on the guayule rubber plants in the late 1940s provided him with first-hand experience in genetics, hybridization, and asexual reproduction (especially apomixis) that he applied so elegantly in studies of the mustard family. Most of Reed's field work was specifically designed to solve a number of taxonomic problems, though he concentrated primarily on *Arabis*, *Physaria*, and *Lesquerella*, the three genera closest to his heart, the study of which resulted in numerous discoveries of new scientific novelties.

Shortly after publishing his first book (1973), Reed started compiling data on his second book, *The Cruciferae of Continental North America*, but the hard work on this project did not start until about the mid-1980s. Accompanied by Kate, he intensified the field work for sixteen years (1974-90), and the actual writing of his monumental work (1993) occupied them for about six years ending in March 1991. I had the chance to read every part of the book soon after Kate typed the first draft. During that period, the discussions I had with Reed about the various ins and outs were most enlightening and educational. The one thing I did not agree with was the alphabetical instead of the taxonomic or phylogenetic arrangement of taxa. The phylogeny of North American mustards was not much known in the late 1980s and early 1990s, and only during the past four years have we started to use molecular data and gain enormous insight about generic lines and relationships in the family. Now that I have been using Reed's book on a daily basis, I find the alphabetical arrangement most practical to search for any given plant.

Reed's research career on the Cruciferae spanned more than sixty years. Of the 778 species recognized in *The Cruciferae*

of *Continental North America*, 101 were weedy species introduced primarily from Eurasia. Of the 677 native North American species, Reed's name was attached to 203 species, or a remarkable 30%. The book also included 243 infraspecific taxa, and Reed's name was attached to 121 subspecies and varieties, or 50%. In short, Reed described 156 new species and 56 new varieties, and he made 47 new combinations at the specific rank and 65 at the subspecific and varietal ranks. Following the publication of the book in 1993, Reed described four species in *Lesquerella*, thereby bringing the total North American species of the genus to 87.

Reed served as a member of the editorial committee of the International Code of Botanical Nomenclature for nearly thirty years. In addition, he was the editor in chief of *Rhodora* from 1950 to 1963, *Contributions from the Gray Herbarium* from 1950 through July 1978, *Occasional Papers of the Farlow Herbarium of Cryptogamic Botany* from June 1974 through July 1978, and *Publications from the Bussey Institution of Harvard University* from 1975 through 1979. Kate Rollins was co-editor of *Contributions from the Gray Herbarium* from January 1971 through November 1984 and co-editor of *Occasional Papers of the Farlow Herbarium of Cryptogamic Botany* from June 1974 through April 1980.

My fondest memories of Reed date back to 1969-73, when he, Kate, and the graduate students met weekly for two hours in his office. Not only were those meetings most memorable and educational but they were such great fun. The subjects ranged from science to politics, history of botany, and sports. Birthdays were never missed. Reed created such a wonderful bond with his students, and he was an exemplary friend, academic father, and true gentleman. After returning to Harvard in 1981, my wife and our two boys strengthened our bond with Reed and Kate, and we enjoyed

visiting them in their summer home in Maine and kept in close touch until five days before Reed's death.

Reed enjoyed good health basically throughout his life, but his heart problems started about two years before his death. He is survived by a daughter, Linda White, and a son, Richard, from his first marriage; a sister, Aileen Carter; his second wife, Kathryn; and five grandchildren and two stepdaughters. His memorial service was held on May 22, 1998 in the Appleton Chapel of Memorial Church (Harvard University).

Reed received several distinguished awards, including the Centenary Medal of the French Botanical Society (1954), Certificate of Merit of the Botanical Society of America (1960), medals of the Ninth (1952), Eleventh (1969), and Twelfth (1975) International Botanical Congresses, Congress Medal on the 25th anniversary of the International Association for Plant Taxonomy (1975), Gold Seal of the National Council of State Garden Clubs (1981), Asa Gray Award of the American Society of Plant Taxonomists (1987), and the Twenty-fifth Anniversary Medal of the Organization for Tropical Studies (1988). Two genera, *Reedrollinsia* J. W. Walker and *Rollinsia* Al-Shehbaz, eight species, and two varieties were named in honor of Reed.

In addition to membership of the National Academy of Sciences and the American Academy of Arts and Sciences, Reed was a member of many societies, including the Society for the Study of Evolution, the Genetic Society of America, and the Linnaean Society of London. He was president of the American Society of Plant Taxonomists (1951-52), president of the International Association of Plant Taxonomists (1954-59), president of the New England Botanical Club (1955-57), president and chairman of the board of the Organization for Tropical Studies (1964-65), and president of the American Society of Naturalists (1966).

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