



Harold C. Bold

1909–1987

BIOGRAPHICAL

Memoirs

*A Biographical Memoir by
Bruce C. Parker
and R. Malcolm Brown, Jr.*

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HAROLD CHARLES BOLD

January 16, 1909–December 18, 1987

Elected to the NAS, 1973

Harold C. Bold, the C. L. Lundell Professor Emeritus of Systematic Botany at the University of Texas at Austin, died December 18, 1987. He was widely known for establishing the classification system and systematics for green soil algae (*Tetrasporales*, *Chlorococcales*, *Chlorosphaerales*). His research and that of his students showed that 1) virtually every soil, when moistened and placed in light, produces living algal taxa that grow and multiply; and 2) soil algae are structurally simple (unicells, colonies, coenobes) but have great diversity in cell form and reproduction, with complicated life cycles that can only be revealed through culturing and detailed microscopic study. Harold discovered that many features differentiate green soil algal taxa, such as cell size and shape, chloroplast number and shape, presence of a pyrenoid, the mode of cell division, the fate of daughter cells, the number of flagella, the presence of eye spots, and the type of meiosis and reproductive cell development. The foundation in this area that Harold laid down over more than three decades represents a major breakthrough in the field of phycology, remains essentially unchanged today, and appears well supported by modern molecular phylogenetic approaches.



Harold C. Bold

By Bruce C. Parker
and R. Malcolm Brown, Jr.

Harold Bold was born at home in the Bronx, the Borough of Manhattan, New York City, on June 16, 1909. At that time, unlike lower Manhattan, the Bronx was almost rural, with many families having vegetable gardens and some pasturing cows and goats. Harold was the great-grandson of the famous painter Severin Roesen. His grandparents were immigrants from Germany and Switzerland. Harold's German paternal grandfather was a skilled carpenter who designed and made ornamental boxes. His Swiss maternal grandfather was a Presbyterian minister operating a church at the corner of Madison and Montgomery Streets in lower Manhattan, a church attended by the Steinway piano family. Harold's parents were Edward Bold and Louisa Krusi Bold. Edward edited the

Brewer's Journal until Prohibition began and Louisa had to return to teaching first and second grade in the public schools.

Harold spent a number of childhood summers with an aunt in rural Pennsylvania, where he developed an early interest in plants. And he often went, as a boy, to the nearby New York Botanical Garden, where he visited the conservatories and viewed plant leaves and other botanical specimens in microscopes set up in glass cabinets. At age 12 he enrolled directly in Evander Childs High School. There, he was encouraged by his biology teacher, Mrs. Cora Pingrey, to collect frog's eggs from the Bronx River. These collections gave Harold his first glimpse of algae. After high school 16-year-old Harold applied to Columbia University, intending to major in mathematics. On his arrival there, however, a rather dogmatic advisor said, "You will take either chemistry or botany!" Harold chose botany.

Shermerhorn Hall, then Columbia's natural sciences center, was an old building in 1926, its labs equipped with brass microscopes, though with good optics. Botany had one autoclave, heated with Bunsen burners, and one typewriter. Compensating for the modest facilities was an inspiring staff of teachers and researchers. His teachers included Professors Robert A. Harper, Carlton C. Curtis, Tracey Hazen of the affiliated Barnard College, and the doctoral student E. B. Matzke. Matzke urged Harold to refine his skills through microscopic study of 6-8 blue-green algae. Subsequently Harold took his only phycology course, his classes and laboratories both taught by Tracey Hazen. Hazen made special efforts to collect living algae to supplement the department's formaldehyde-fixed specimens during an era when the only alga commonly in culture was *Chlorella*. Hazen did, however, have a culture of *Chlamydomonas* growing in an old whiskey bottle. In three years Harold achieved his B.S. and became a Phi Beta Kappa.

With the encouragement of R. A. Harper, who had been trained by the eminent Professor Eduard Strasburger in Bonn, Harold took a position offered by the University of Vermont. Harold was an instructor in botany half time (21 hours per week in class) and assistant botanist at the Vermont Agricultural Experiment Station, helping with research on the complexities of the genus *Viola*. Harold earned a salary of \$1600 for 11 months and in two years completed his M.S. degree by doing his thesis on a culture of the coccoid green soil alga *Chlorococcum*, which he published in the *Bulletin of the Torrey Botanical Club* (1931). He returned to Columbia as Harper's last doctoral student and completed his Ph.D. in the summer of 1932, doing his dissertation on cultures of the soil alga *Protosiphon*, a work that he also published in the *Bulletin of the Torrey Botanical*

Club (1933). Drs. Matzke and Jack Karling were instructors with whom Harold became lifelong friends. Already as a student Harold had developed a strong work ethic, which involved an early morning start, a characteristic he later passed along to many of his students.

With the Depression in full force in 1932, Harold sent out 102 inquiries seeking a job. He received just two offers: as a gardener at the University of Oklahoma for \$1600 and as an instructor in biology at Vanderbilt for \$2000.

He accepted the Vanderbilt position, which, on his arrival, was reduced to \$1800. At Vanderbilt Harold, who had a keen interest in music and played both piano and organ, met Mary Douthit, a student and later instructor of concert piano, who would eventually become his wife.

Harold returned to Columbia as a lecturer (1939-40) and assistant professor (1941-42) to replace Hazen, who was retiring. In 1942 Harold joined the U.S. Naval Reserve and served in various administrative positions, one being as an aide to Admiral J. M. Reeves, Jr., in the Navy Department. Harold mustered out as a lieutenant commander, returning to Vanderbilt to be an associate professor (1946-49) and then professor of biology (1949-57). Also in 1949 he took charge of the Division of Botany. On his return to Vanderbilt in 1946 Harold had begun isolating numerous soil algae into culture, which years later were often referred to as “little round green things.” Many of these cultures were maintained in modified Bristol’s solution with added soil extract and later relocated into culture collections. In 1957 Harold moved to the University of Texas at Austin as Professor of Botany. He remained at Texas for the next 21 years, retiring in 1978 but continuing to work in his office and home until his death on December 18, 1987.

Harold’s scientific experiences involved much more than just his impressive academic positions. In 1930, before completing and publishing his master’s thesis, he was invited, on short notice, to assist in a fresh-water and marine algae course at the Marine Biological Laboratory (MBL), in Woods Hole, Massachusetts. William Randolph Taylor was in charge. Harold recalled that Taylor “...was very forbearing, enduring my inexperience, both as a teacher and as a marine phycologist.” Harold returned to teach

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phycology at MBL during the summer of 1948 and as head of the course from 1954 to 1958.

Vanderbilt had no summer school and salaries were paid in nine installments, making summer employment important. Harold taught algae during the 1934-37 summers at Chesapeake Biological Laboratory, in Solomons, Maryland. There he became well acquainted with Paul and Edith Conger. Paul was an outstanding diatomist. Then, Harold taught during the summers of 1938 and 1939 at the University of Tennessee at Knoxville, where he met Professors Hesler (mycology) and A. J. "Jack" Sharp (bryology). After the 1938 summer, Jack Sharp and Harold broadened their botanical connections with travel. They visited Ralph Wetmore at Harvard; E. N. Transeau at Ohio State, noting his long manuscript on Zygnemataceae; the plant morphologist/anatomist A. J. Eames at Cornell; Charles J. Chamberlain and his cycad collection at Chicago; and the phycologist L. H. Tiffany at Northwestern.

In the summer of 1956, Gilbert Morgan Smith and Harold taught at a National Science Institute for Biology Teachers at Cornell. Harold was a frequent correspondent with E. G. Pringsheim, so in 1950-51 he recommended that his graduate student, Richard Starr, spend a year as a Predoctoral Fulbright Fellow with Pringsheim at Cambridge University, England. Pringsheim had founded the Cambridge Culture Collection of Algae, and this stimulated Starr ultimately to establish the Indiana Culture Collection, which would later become the Texas Culture Collection-Pringsheim in turn lectured for two weeks at Vanderbilt in 1956. At an International Seaweed Symposium in Spain in 1968 Harold met Hans von Stosch, from Marburg, Germany; Peter Kornmann, from the biological station at Helgoland, a German island in the North Sea; Lothar Geitler, from the University of Vienna; and many other eminent phycologists. Besides international meetings, Harold and Mary Bold were extensive travelers, preferring trains or ships to airplanes. They sailed to England three times in six years on the Queen Elizabeth II.

Over the course of his career Harold was a graduate advisor for 10 master's students (2 at Vanderbilt, 8 at Texas) and 43 Ph.D. students (1 at Columbia, 1 at Fordham, 10 at Vanderbilt, 31 at Texas). He also collaborated with several postdoctoral students or research associates. Many whom he taught went into faculty positions themselves. While most of these students did their research on algae, several worked in other botanical areas. Among these other fields were the life history of the pine, the morphology and reproduction of *Selaginella*, and the study of various liverworts and mosses. In fact, the breadth of Harold's knowledge of plants and his astute powers of observation are borne

out by his proving that chloroplasts occurred in the sporophytes of liverworts (1938) and mosses, which except for *Anthoceros*, were previously thought to be completely parasitic on the gametophytes (Starr, 1996). Because many liverworts and mosses grow on soil, Harold and his graduate students often crawled on their hands and knees during field collecting trips searching for these elusive lower plants.

Harold maintained close ties with his graduate students and in most instances followed their progress after graduation. When they were presenting their research at meetings, they were often treated to the sight of Harold in the front row, smiling and nodding encouragement. His humility as a professor and mentor for his doctoral students is aptly illustrated by his insistence that new Ph.D.s begin calling him Harold instead of Professor or Doctor Bold. He would say, "We are now equal in rank!" Also, it was common practice for Harold to present each of his students with a gift on his or her graduation. Those who came to know Harold as a friend learned that blue was his favorite color and that he loved polka dot neckties, while he hated the sight of blood and the touch of butter.

Harold was proud of his botanical lineage and taught his graduate students to be equally proud. As students and later as professionals we considered Harold our botanical father, Robert Harper our botanical grandfather, and Eduard Strasburger our botanical great-grandfather. Although we had never met Harper or Strasburger, we felt that we knew them through Harold's stories. One such story was of Harper as a student in Strasburger's laboratory. Strasburger's graduate students began work early. He often arrived at 9 or 10 a.m. and would say, in German, "And what have you found today?" One day Harper said he had found something exciting under his microscope. Strasburger went to Harper's microscope, took a look, and said "Ach! Eine Luftblase!"—an air bubble. We could all identify with that embarrassment, because air bubbles often look like cells to an inexperienced microscopist.

Phycology as the mainstream of research during Harold's career is illustrated in the controversy created by the German phycologist Franz Moewus (1933). The interest in the sexuality and genetics of *Chlamydomonas* induced by Moewus' findings, and his refusal to share his cultures for others to repeat his experiments, stimulated the isolation of heterothallic strains of *C. reinhardtii* by G. M. Smith, *C. moewusii* by Luigi Provasoli, and *C. clamydogama* by Harold. Eventually one of Moewus's students defected with cultures of Moewus' *C. eugametos*, and other researchers were unable to confirm the original experimental results. Moewus died in 1959. In 1963, one of us talked with Moewus's



Harold in Breckenridge Park, Austin, Texas, circa 1959.

widow and learned that he designed all his experiments, predicting the outcomes, and that the outcomes were always what he had predicted. The *Moewus* controversy did much to initiate the field of molecular genetics in algae.

Harold Bold was a humanitarian, and his students were his most important focus. Because he was known as a true scholar and gentleman, Harold's courses, which included phycology and general botany, were taken by thousands of undergraduates. He made his classes interesting through anecdotes used to bring the

history of science into perspective. For example, when lecturing on the slime mold *Physarum polycephalum*, Harold told a story about eating his lunch in a New York City park during which time a yellow slime mold crawled up the wooden bench beside him. Such anecdotes persisted in students' minds. Through his artistry with chalk, Harold often filled the entire blackboard with the life history of an alga or other plant. And as the book *Contributions in Phycology* notes, Harold, when confronted with a taxonomic dilemma, often quoted Harper or even Strasburger: "Nature mocks at human categories."

During lectures on sexual reproduction in plants, students frequently heard Harold say, "Of those that run in the race, only one receiveth the prize!" or "Many are called, but few are chosen!" These quotes and others derived from biblical texts that reflected Harold's strong religious faith. Many mornings, after starting his laboratory and classes in botany at Texas, he went to Seton Hospital, where he was an Extraordinary Minister of the Eucharist, helping the Roman Catholic priest serve Holy Communion to patients. Most students were unaware of this aspect of Harold's life. However, one of his graduate students handed in an exam having written at the top, "I'm trying for 100." Harold returned the exam a day later on which he had written, "God is perfect. He gets 100. You get 99!" Another manifestation of Harold's religious bias was the omission of any mention of evolution in his lectures.

Harold was a charter member of the Phycological Society of America, founded in 1946 with membership beginning in 1947. He served as the society's vice-president (1954-55)

and president (1955-56). He was editor-in-chief of the *American Journal of Botany* (1958-65) and vice-president (1965) and president (1966) of the Botanical Society of America. He served as chairman of the Botany Department at Texas from 1962 to 1967, during which time it became the top botany department in the nation and remained so until its dissolution in 1999. From 1967 to 1978 he was chairman of the Division of Biological Science. He became the C. L. Lundell Professor of Systematic Botany in 1975 and on retirement in 1978 the Emeritus Lundell Professor of Systematic Botany. Among the numerous awards and honors Harold received, he was made a member of the U.S. National Academy of Sciences (1973) and a fellow of the American Academy of Arts and Sciences (1974), and he received the Distinguished Service Award of the University of Vermont

(1979), the Presidential Citation of the University of Texas (1983), and the Botanical Society of America's highest Award of Merit (1965).

Harold's *Morphology of Plants* (1957) became so popular that it was published in many languages and went through five editions. His *The Plant Kingdom* came out in 1961 and also went through five editions. *Introduction to the Algae* (1978), which he coauthored with Michael Wynne, was another popular book, warranting a second edition in 1985. Harold's research productivity amounted to 80 scientific papers, and he developed much of the classification and systematics used in them. In these papers he and his students described about 75 new species of soil algae. Twelve of the papers appeared in the University of Texas Publications *Phycological Studies* (1960-74).

Harold was well aware of his educational strengths and weaknesses. He considered a major weakness of his to be what he termed molecular biology. Thus, he was quite willing to ask for help from his students or others. For example, in upgrading his text



Harold in his office, 1979.

on algae, he often sought input on such subjects as algal cell-wall biochemistry, photosynthesis, or respiration. In making culture media Harold used simple balances to weigh major salts. When he noted his students watching his weighing technique, he sometimes referred to himself as “Qualitative Bold.” Or he would add a small spatula scoop of the salt to his weighing dish and say, “The algae don’t care.”

Harold and Mary Bold were social creatures. They sometimes gave receptions for botany faculty and graduate students in their home. On a few occasions guests were treated to duets the Bolds played together on their two Steinway grand pianos. In fact, they maintained contact through correspondence with the Steinway brothers in New York City. By themselves, Harold and Mary often played the pianos or read books. Among Harold’s favorite authors were Charles Dickens and other Victorian writers. In 1959-60, on receiving his first bonus of \$1,000 from the Botanical Society of America for his work as editor-in-chief of the *American Journal of Botany*, Harold purchased one of his lifelong dreams, an organ kit, and hired a UT physics student to assemble it. Thereafter, he spent many pleasurable hours playing hymns and classical pieces on the organ.

Harold gave generously to the university. Upon Mary’s death in 1986, Harold provided funds to establish the Mary D. Bold Regents Professorship of Music in her memory. In addition, he gave resources to establish the Mary D. Bold Scholarship Fund in the university’s College of Fine Arts.



Harold and Mary.

It is only natural that the deep respect and love Harold's former students felt for him be manifested in some form. One of these students discovered and named a fresh-water red alga *Boldia erythrosiphon* (1964). Harold and Mary had no children, and Harold's mother died at age 90 during the 1967 Texas A & M meeting of the Phycological Society of America. When Harold returned from his mother's funeral to the meeting understandably depressed, he was cheered to hear that a baby boy had just been born to one of his former students and given Harold's name. For the rest of his life Harold remembered that date and sent the boy a birthday card and gift.

A 1973 banquet attended by 26 of Harold's former students in Amherst, Massachusetts, was the occasion to announce that the book *Contributions in Phycology* (1971), containing papers by 17 of his students, had netted enough profit, along with contributions, to establish the Bold Award for the best student paper at the Phycological Society of America's annual meeting. The first Bold Award, in 1974, was also the Society's first award and the impetus to start a PSA endowment, which today exceeds one million dollars. Finally, on August 6, 1987, Harold's former students organized a Harold Bold Reunion for him in Austin. At the celebration in the Faculty Center each student gave a brief presentation on his or her memorable experiences with Harold. In return, Harold "roasted" each student, recalling in vivid detail one or more things from that student's past. The next day, Harold treated them all to lunch.

We have seen that Harold Bold's research laid the foundation for classification and systematics of green soil algae. In addition, few educators have devoted more kindness, patience, time, and effort to their students. During much of their career development, Harold was available when needed. He was consistently thoughtful and encouraging, a true gentleman and scholar who put his students first as often as possible. Harold was renowned as a great teacher and extraordinary character. As two of his former students who became his lifelong friends, we are grateful to have known this great educator, man, and friend.

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