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HENRY NATHANIEL ANDREWS, JR.
1910–2002

A Biographical Memoir by
TOM L. PHILLIPS

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W. Andrews

HENRY NATHANIEL ANDREWS, JR.

June 15, 1910—March 3, 2002

BY TOM L. PHILLIPS

HENRY N. ANDREWS JR. WAS an outstanding pioneer in North American paleobotany during the twentieth century. His explorations of past plant life, especially in the structure, development, and reproductive biology of Devonian and Carboniferous plants, provided benchmark foundations for paleoecological and evolutionary studies. Andrews is noted in part for the discovery of determinate growth in lepidodendrid trees (1958), seminal interpretations of early seed structure and the evolutionary origin of the integument (1963), his advocacy of the significance of seed ferns in gymnosperm evolution toward flowering plants (1948, 1966), and the exploration and evolutionary studies of Devonian plants from the high Canadian Arctic, Maritime Canada, Maine, and West Virginia (1984).

Andrews (1951) recognized early the significance of coal-ball studies in North America. During his years at Washington University (1935-1964) and at the Missouri Botanical Garden (1947-1964) in St. Louis, Henry Andrews contributed, as did his many students, a sustained series of fossil plant studies generally entitled "Contributions to Our Knowledge of American Carboniferous Floras," published in the *Annals of the Missouri Botanical Garden*. The ana-

tomically based studies from coal-ball concretions encompassed every major group of vascular plants in the Pennsylvanian-age coal swamps, often presenting a first modern description and assessment of their significance (Gensel, 2002).

Andrews's (1947) *Ancient Plants and the World They Lived In* conveyed a broad agenda of research interest early in his career and his now classic paleobotanical text *Studies in Paleobotany* (1961) has inspired generations of students to follow in his footsteps. Andrews (1955, 1970) also compiled and published two volumes of the *Index to Generic Names of Fossil Plants* as part of his work with the U.S. Geological Survey. These herculean efforts were major contributions for all of paleobotany and, in turn, scholarly works that drew most of the early paleobotanical literature into Andrews's hands.

At the University of Connecticut at Storrs (1964-1975), Henry Andrews's research shifted to the Devonian, from West Virginia to Ellesmere Island, and along with his students and other colleagues, provided fundamental insight into the nature of early land plants. Each contribution is noted for the splendid reconstruction of plants. Andrews (1970) also prepared a comprehensive account on fossil ferns for the *Traité de Paleobotanique*. The pioneering Devonian studies with former student Patricia G. Gensel ultimately led after retirement to the benchmark contribution *Plant Life in the Devonian* (1984).

Henry Nathaniel Andrews Jr. was born in Melrose, Massachusetts, on June 15, 1910, the son of Henry N. Andrews, lawyer and trust officer with the First National Bank of Boston, and Florence M. Hollings Andrews, housewife. Reared as a New Englander, Andrews enjoyed a congenial and comfortable home environment with parents sympathetic to his early interests in natural history despite their lack of scien-

tific training. His father was a good practical gardener in his spare time and one of Andrews's earliest recollections was helping him with a small victory garden during World War I. Early on, Andrews began collecting plants (a small herbarium), studying them, and hiking in the White Mountains of New Hampshire. He always found it necessary to devote some time to working with his hands, mainly wood-working, which he ascribed to his Swedish paternal grandfather, a machinist and inventor of sorts, and his Yorkshire maternal grandfather, a cabinetmaker.

In high school Andrews built and victoriously raced a small pram, which exemplified masterful boat building (Mamay, 1975). His outdoorsmanship and athletic abilities translated into many activities with friends. His father is said to have reminisced that "Junior was always a leader, and without ever saying a word." A more apt characterization is not likely (Mamay, 1975, p. 4). Andrews graduated from Melrose High School in 1928, and in an attempt to get better prepared for college, spent a year at New Hampton School near the family farm in Laconia, New Hampshire, from which he graduated again in 1929. He then attended Northeastern University for a year. Andrews was searching for a field of interest, and at that time he decided that he did not want to be an engineer. He transferred to the Massachusetts Institute of Technology, majored in food technology, and received a B.S. in 1934.

At MIT Andrews was particularly influenced by Professor Bernard Proctor, a food technologist and his major advisor, and by Professor Hervey Shimer, the great authority on invertebrate index fossils. Proctor was much respected as a teacher, and kindly permitted Andrews to substitute a paleontology course for a "less desirable requirement." Andrews wrote: "This probably was the turning point in my

career. I loved the fossils and, like many others, I loved Shimer” (Andrews, 1975, p. 2).

Upon graduation from MIT in the days of the Great Depression, Andrews asked his father for partial support to spend a year at the University of Massachusetts to study with Professor Ray E. Torrey, “one of the great botanical teachers of his time” (1980, p. 229). Andrews wrote the author of this memoir, “I wanted to study fossil plants but I knew that I must have a much better background in my knowledge of living plants. The year at the University of Massachusetts was a great one and toward the end of it I met Professor Edgar Anderson of the Missouri Botanical Garden in St. Louis, who offered me a teaching assistantship at Washington University. I accepted and, officially, became the student of Professor Robert E. Woodson from whom I learned a great deal about living plants.”

Andrews enjoyed hiking and mountain climbing, at least on a modest scale. He spent most of the winter vacation time when at MIT hiking in snow shoes in the White Mountains. This led to some climbing in the Rockies in the summers of 1932 and 1934, when he made general fossil collections, including some coniferous woods that he later studied under Torrey’s direction. A colleague, Cortland Pearsall, shared the exploration of the Grand Tetons of Wyoming with Andrews, who attributed the fossil wood discoveries to his classmate. Andrews greatly valued the ability of colleagues to locate fossils in the field: real fossil hunters! His top three in such abilities were Pearsall; William H. Forbes, a geologist at the University of Maine; and Andrew E. Kasper Jr., a former student and paleobotanist at Rutgers University.

The 1935 move to St. Louis for graduate studies was the beginning of a 30-year Missouri home base for Henry Andrews, during which he would complete his M.S. in 1937

and his Ph.D. in 1939. In 1939 he married Elizabeth (“Lib”) Claude Ham, a Missourian whom he had met and courted as a student at Washington University. Their home in Webster Groves, Missouri, was literally a Little New England and was celebrated for their memorable hospitality. This was home to the three Andrews children—Hollings, Henry III, and Nancy—except in the summers when the family returned to the paternal home farm near Laconia, New Hampshire, to be joined by Henry when his field excursions or other travels were completed.

Andrews’s doctoral studies were initiated in England in 1937 when his advisor at Washington University shipped him off to Cambridge University to study under H. Hamshaw Thomas at Downing College, which was noted for its many leaders in paleobotany. When Andrews’s arrival at Cambridge coincided with the departure of Dr. and Mrs. Thomas to the continent for a vacation, he was directed to the Natural History Museum in London for his research project on seed-fern wood anatomy. It was at the British Museum (Natural History) where Andrews received mentor-level guidance from F. Maurice Wonnacott, which was considered “the closest thing to a formal course in paleobotany that I have received” (1980, p. 150). The two became lifelong friends and enjoyed much field collecting then and later (Andrews, 1990). At Cambridge, Andrews was influenced by Thomas’s tutorial style of asking questions and was aided by him in securing suitable research material. Perhaps because of the primitive lab equipment available, Andrews became aware of what was needed and later fabricated it in his own lab in Rebstock Hall on the Washington University campus. For Andrews the time at Cambridge and the associated museum visits proved memorable experiences, which inspired him both in his research goals and as a mentor in the coming years.

As a faculty member at Washington University, beginning in 1940, Andrews established a dynamic and productive research program and he also became a paleobotanist at the Missouri Botanical Garden (1947-1964). With the beginning of World War II his earliest graduate students went into military service; the next group of students, mainly veterans, was close to his own age. In between graduate student generations Andrews taught mathematics to service members and maintained his paleobotanical interests by writing his first book, *Ancient Plants and the World They Lived In* (1947). His interests in paleobotany were quite broad and, through his entertaining presentations, lent themselves to a broad audience. The chapter titles were, in part, agendas for future exploration and writing, including "Past Epochs of the Arctic" and "The Fossil Hunters." Regarding climate change and floristic distribution Andrews (1947, p. 249) wrote, "The great Carboniferous flora of North America is so similar to that of Europe that it is hardly conceivable to think of its origin as other than a continuous unit forest." About Alfred Wegener's "great unit land mass" Andrews shared, "On first thought this theory of continents drifting about may seem a bit fantastic, but there is a great mass of physical, geological, and biological evidence to support it" (1947, p. 250). From a practical standpoint the book conveyed how fieldwork was done mostly on foot, horseback, or with rides by the U.S. Mail Service, especially in the western United States. Andrews experienced the shift in technology to 2½ ton trucks, bulldozers, helicopters, DeHaviland Otters with oversized tires, and Lockheed Hercules transports.

By 1951, with an influx of veterans, the graduate training program in coal-ball studies had expanded, each specializing in different plant groups: Robert W. Baxter (pteridosperms), Sergius H. Mamay (ferns), Charles J. Felix

(lepidodendrids), and Burton R. Anderson (calamites). Andrews set an admirable tradition by requiring that students publish their own theses. His own research included plants from every major group and in his review of American coal-ball floras Andrews (1951, p. 464) stated that such research “should ultimately be able to work out a very interesting picture of the sequence of Upper Carboniferous floras and contribute notably to an understanding of the evolution of certain pteridophytic groups and early seed plants”.

Funding for coal-ball studies was almost nonexistent until the National Science Foundation was established in 1950. In turn, field trips to coal-ball localities became feasible, and the author shared some rather adventurous field trips with Andrews and his students (see Phillips et al., 1973; Phillips and Cross, 1995; Phillips and Gensel, 1995).

From the late 1930s Henry Andrews and James M. Schopf at the Illinois State Geological Survey—and still later at the U.S. Geological Survey Coal Geology Laboratory in Columbus, Ohio—were great friends and colleagues. Jim on numerous occasions passed along coal-ball specimens and locality data to Henry, asserting that he had more than his share of research projects. Both were ardent field trippers. Henry, his students, and their students were recipients of much assistance, and encouragement from Jim Schopf across the years. Another longtime friend and champion of Henry’s research was Harold C. Bold, the distinguished phycologist. The first time I met Henry Andrews (on a field trip to clay pits in western Tennessee) Harold Bold with his class had driven out from Vanderbilt University to meet with Henry and his class. Bold, later at the University of Texas, visited Henry at Washington University several times and maintained that the needed plant evolutionary answers had to come from paleobotany.

Throughout most of Henry's academic employment he also served as an administrator. Early in his service at the Missouri Botanical Garden, Henry was an assistant to the director for about five years. At Washington University from the early 1950s to 1964 he was "the dean," an administrative title that uniquely marked the head of the Botany Department. At the University of Connecticut he was department head, first of Botany (1964-1967) and then the Systematics and Environmental Section (Biological Sciences Group) (1967-1970). When asked why he had served so many years in administration, Henry told me that the responsibility actually permitted better control of his own schedules and projected plans. Indeed, Henry was a notably successful leader of his faculty colleagues as well as a prized advocate for all the graduate students.

Henry developed the ability to swiftly move from departmental affairs to his teaching, research, and writing, with deliberate focus on each in their turn. His nonacademic activities were similarly welcomed, and these included a quiet early morning hour laying a brick walkway or tending to his garden before going to school. He made time for almost everything and everybody and usually seemed unhurried as he shifted focus from one activity to another. He was noted for his enthusiasm and self-discipline, but most of his colleagues and friends could not distinguish where one left off and the other began. Nevertheless, most of his co-researchers could sense about when Henry's focus on a research project, usually at manuscript stage, was about to shift to another research task.

A few years before Henry moved to the University of Connecticut his growing interests in Devonian land plants and wanderlust for the high Arctic were solidified by an exploratory grant from the Guggenheim Foundation. In his chapter on "Past Epochs of the Arctic" (1947, p. 239) this is

the opening sentence: "If any single phase of man's activity through the past four or five thousand years is most indicative of his desire to break into the dark recesses of the unknown, to pit himself against Nature's most formidable forces, his adventures beyond the Arctic Circle must be considered as a likely candidate for first place."

During the summer field seasons of 1962 and 1963 Henry and I shared camp sites on Ellesmere Island in the Northwest Territories of Canada, exploring for such fossil plants as *Archaeopteris* (Andrews et al., 1965) and observing the Arctic tundra from glaciers to fiords. Andrews (1980, p. 271) later wrote, "I think one loves the Arctic very much or not at all," and he indeed did. The first trip yielded the *Archaeopteris* and taught us much about logistical needs. Henry's cooking and Lib's food planning more than met our needs. The second trip permitted further exploration but emphasized the needs for mechanical transport. Perhaps the highlight of the last trip was a diverted Royal Canadian Air Force Lockheed Hercules transport flight from Alert (northernmost station in North America) to Thule Air Force base in Greenland for an emergency landing. While there were many attendant uncertainties, Andrews was delighted to see Greenland's great continental ice sheet if only for 24 hours.

During these travels and field work Andrews was a superb leader, wise planner, congenial companion, and a very creative cook. He was an explorer-naturalist in his special milieu. Andrews (1980, pp. 271-272) did not return to the Arctic because "in the summer of 1964 I became involved in diggings in northern Maine and later in southeastern Canada, and these areas proved so highly productive that they occupied my time for the next ten years—and there is still much to be done there."

Productive field trips to the Upper Devonian in West Virginia also ensued for a decade (1965-1975) following James M. Schopf's discovery of *Archaeopteris* beds and his guidance of Andrews and Phillips to the Valley Head site. This resulted in reconstructional studies of *Rhacophyton* (1968; Cornet et al., 1976) and *Archaeopteris* (1972).

As an experienced outdoorsman Henry knew the risks of his sustained explorations; however, he was quite brave, self-reliant, and usually wise in judgment. These traits along with stamina were dearly tested in the exploration of the Long Range Mountains of Newfoundland (Andrews et al., 1968a) when Henry, Francis M. Hueber, and Andrew E. Kasper found themselves in a misadventure. One mistake—leaving behind the main food supply box—led to others as the three became stranded for five days with few rations in the secluded krummholz amidst fog and pouring rain, which hampered searches from the air. Henry faulted his judgment in abandoning the base camp and attempting to walk out. Those who read their account may draw other lessons about his determination.

Henry's international travels, particularly in the company of his wife, Lib, had exceptionally positive influences among their new friends and guests—often occasioned by the cooking of Lib as well as by Henry. Andrews (1980, p. 167) wrote, "I believe my wife contributed much with her culinary talents as she has done in several other countries. Good food helps considerably in establishing good international relations."

Henry had many personality traits that endeared him to his family, students, and colleagues as well as some total strangers. He was a good listener and there was an alertness of concentration that conveyed to the source an appreciative reception of information, whether it was directions to a fossil plant locality, advice on academic matters, or expla-

nations for some minor fiasco about his cat and squirrels. His generosity of time and companionship indicated to me that he regarded the best way to share experiences with his students and colleagues was to be with them and learn with them.

At Storrs, Connecticut, from 1964 to 1975 Henry and his family were an integral part of the community, and there was more than a decade of happy productive challenges. It was not until 1964 that he devoted research efforts entirely to Devonian plants. This developed, in part, by his being invited by James M. Schopf to assist Ely Mencher in a paleobotanical-stratigraphical investigation in northern Maine, with a great deal of assistance by University of Maine geologist William Forbes. This was the beginning of more than a decade of extensive fieldwork by Henry and his graduate students, with the aid of William Forbes.

The summers were spent exploring the Lower to Middle Devonian of Baxter Park, Maine, and later digging along the northern New Brunswick coast and the Gaspé Bay. Out of these repeated collecting trips came outstanding specimens and a flood of reconstructional and evolutionary studies on trimerophytes, such as *Psilophyton* (Andrews et al., 1968b; Kasper et al., 1974); *Pertica* (Kasper and Andrews, 1972; Granoff et al., 1976; Doran et al., 1978); lycopsid-like plants, such as *Kaulangiophyton* (Gensel et al., 1969); plants of uncertain affinity, including *Chaleuria* (1974) with incipient heterospory; *Oocampsa* (Andrews et al., 1975); and the enigmatic *Renalia* (Gensel, 1976). A major review of the Early Devonian flora in Maine was published after Andrews's retirement (1977). This series of studies ultimately led Gensel and Andrews (1984) to develop their *Plant Life in the Devonian*, a benchmark synthesis and summation.

In 1975 Henry and Lib moved from Storrs back to the family farm in New Hampshire. There—among house reno-

vation, hobbies in picture framing, gathering photographs of paleobotanists, carpentry, and gardening—Henry set about his most enjoyable project upon retirement: “to reveal the fossil hunters of the past three centuries in their best light” (1980, p. 396). As a student of paleobotany for more than 40 years, Henry had fully embraced the breadth of geologic time and paleobotanical topics from the Precambrian origins of life through angiosperm radiations, as well as the myriad of paleobotanists he knew or had known personally or had corresponded with or discovered in his research, readings, or travel. Indeed, Henry’s travels and courteous correspondence with paleobotanists around the world were born of a shared kindred spirit with paleobotanists of the present as well as the past.

Henry Andrews was elected to the National Academy of Sciences in 1975. By this time Andrews had received many awards for his contributions in paleobotanical research and service. Andrews was a member of Sigma Xi and Phi Beta Kappa, serving as chapter president both at Washington University and the University of Connecticut. He was a fellow of the Geological Society of America and the American Association for the Advancement of Science. He was twice a John Simon Guggenheim Memorial Foundation fellow (1950-1951, 1958-1959). On the second fellowship he worked two months in Belgium with Suzanne Leclercq at Liege, and then continued his research at Oslo, Stockholm, Moscow, and Leningrad. Andrews also received a special grant for 1960-1965 from the Guggenheim Foundation for exploratory research, such as his Arctic expeditions.

He was a Fulbright lecturer at Poona University, India (1960-1961), and was selected for the Sir Albert Charles Seward Memorial Lecture at the Birbal Sahni Institute of Palaeobotany in Lucknow, India (Andrews, 1961). He was

also a special lecturer for Oklahoma State University in Ethiopia (May 1961), and a National Science Foundation postdoctoral fellow in Sweden (1964-1965), working at the Natural History Museum in Stockholm.

Henry was a member of the Botanical Society of America and recipient of the Merit Award in 1966 for his pioneering studies of late Paleozoic land plants. In 1977 he received an award from the Paleobotanical Section of the Botanical Society of America for his "Distinguished Service to the Paleobotanical Section and Outstanding Contributions to American Paleobotany." He was a member of the International Organization of Palaeobotany and served as secretary and vice-president. He was also an honorary member of the Palaeobotanical Society of India and a charter member of the Connecticut Academy of Science and Engineering (Gensel, 2002).

Upon retirement Andrews taught for one semester in 1976 at the University of Aarhus in Denmark. In his community he was very active in volunteer work and received numerous awards and special recognition for conservation work with the Lakes Region Conservation Trust, in Merrimack County, and at a long-term reconstruction project of the Canterbury Shaker Village. Henry had many longtime friends who shared in these projects, and he often mentioned them in his correspondence.

Henry N. Andrews was a twentieth-century naturalist, explorer, educator, administrator, historian, and a consummate fossil hunter and writer. His original research along with that of several generations of his students helped define the priorities of research in the late Paleozoic and provided the stepping stones to synthesis and summaries found in his books. Henry Andrews was one of the most positive and inspirational influences in paleobotany in the twentieth century and hopefully in the present with his le-

gions of articles sharing the adventures of fossil hunting and celebrating the accomplishments of his colleagues of the past and present. He was a generous scholar in all aspects of his profession.

Graduate students who were mentored by Andrews were Eloise Pannell, Lee W. Lenz, Robert W. Baxter, Sergius H. Mamay, Burton R. Anderson, Charles J. Felix, Karen Alt Grant, William H. Murdy, R. Bradley Ewart, Tom L. Phillips, Shripad N. Agashe, Kuldeep Rao, Andrew E. Kasper Jr., Judith E. Skog, Bruce Cornet, Jeffry Doran, Jeffrey Granoff, and Patricia G. Gensel.

Henry N. Andrews Jr., Professor Emeritus at the University of Connecticut died on March 3, 2002, in Concord, New Hampshire, at the age of 91. He had moved from his farm to the Peabody Home in Franklin, New Hampshire, about a year and a half before his death.

The first biography of Henry N. Andrews Jr. was provided by Sergius H. Mamay, anonymously at his request, for a special issue of the *Review of Palaeobotany and Palynology* in 1975 upon the occasion of Henry's retirement. The second biography (Phillips and Gensel, 1995) drew upon Henry's middle and last groups of graduate students who spent much field time with him. The third "biography" is intercalated in Henry's outstanding history of paleobotany and paleobotanists as seen in their best light, entitled *The Fossil Hunters*. His book says more about Henry's view of the field of paleobotany, his colleagues of all centuries, his philosophy of science, his opinions on many aspects of nature and those who share interests in nature's research and enjoyment than can be shared herein. When Henry submitted his manuscript on *The Fossil Hunters* to Cornell University Press, a chief response was that there ought to be an epilogue, which he provided, emphasizing human value. I suspect that Henry viewed each chapter of his book as epi-

logue in design. I have drawn heavily on these resources as well as 40 years of correspondence with him.

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The photograph of Henry Andrews in 1973 is courtesy of his son Hollings T. Andrews. The photograph was originally published in the *Review of Paleobotany and Palynology*, Volume 20, Henry N. Andrews Jr.: A biographical sketch, pp. 3-11, copyright 1975, used with permission of Elsevier.

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