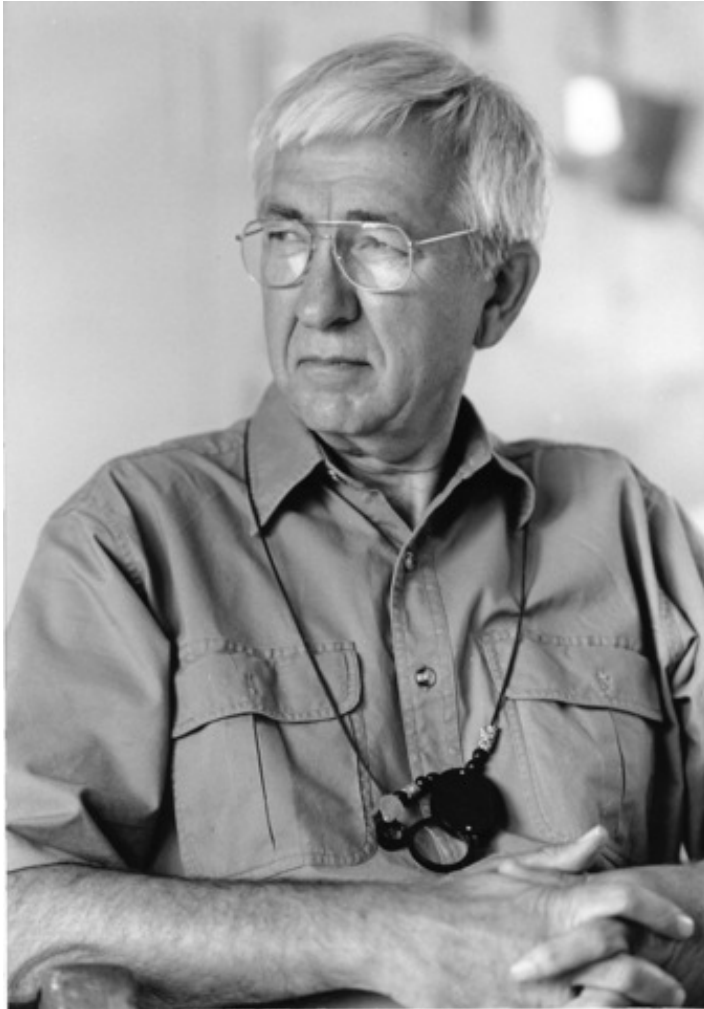


Resolution of Respect



Dick Root
1936–2013

Richard Bruce (Dick) Root, ecologist, mentor, and long-time contributor to the Ecological Society of America, passed away after a long illness on 22 January 2013, with his family around him. Dick had suffered with a degenerative disease for seven years, with grace and good humor, and with the support and comfort of his devoted wife Barbara Page and his children and grandchildren. Dick served the Ecological Society as its President in 1985–1986; and as an Editor of *Ecology* (1971–1973), *Ecological Monographs* (1970–1973), and *Ecological Applications* (1988–1992); and was honored with its Eminent Ecologist Award in 2003 and the Eugene P. Odum Award in 2004. He was a great ecologist, and the Ecological Society was one of his great loves. Dick was a prolific and profound contributor to the ecological literature, with many citation classics, including especially his thesis work, “[The niche exploitation pattern of the Blue-gray Gnatcatcher](#),” published in *Ecological Monographs* in 1967, and “[Organization of a plant–arthropod association in simple and diverse habitats: the fauna of collards \(*Brassica oleracea*\)](#),” also published in *Ecological Monographs* in 1973; both of these masterpieces have been cited well over 1000 times. The 1967 paper introduced the notion of the ecological guild, which has become such a foundational concept in ecology that few remember its origins. He was, as

few others, an exquisite blend of theoretician and experimentalist, testing core theories with beautifully designed experiments, all embedded within a matrix of unsurpassed knowledge of natural history. Dick also mentored several dozen graduate students, many of whom have become leaders in the field. He was a superb teacher and mentor, and indeed all three of us feel in many ways like his students. He was honored for his teaching and mentoring in 2003, with the Edgerton Career Teaching Award from the College of Agriculture and Life Sciences at Cornell, the same year he won the Eminent Ecologist award for his research. The very next year, he won the Eugene P. Odum Award for “outstanding work in ecology education.”

Dick Root was born in 1936 in Dearborn, Michigan, and spent much time wandering in Nature, and enjoying the outdoors on the family farms of his grandparents. Even as a seven-year-old, he expressed interest in “how the woods worked,” but nobody really understood what he meant, and he was advised (later) to become a forest manager. When he discovered that there was a discipline called ecology, he was ecstatic, and knew that this would be his path in life. He entered university at the University of Michigan, where his insights, knowledge, and enthusiasm quickly made him welcome among the graduate students and faculty alike. Dick’s talents as a keen observer, naturalist, and equally, an enthusiastic and knowledgeable participant in most dimensions of ecology, were immediately recognized; and the prominent ecologist, Fred Smith, who became his advisor, turned over half of his own office to Dick to use in his work on triclad life tables.

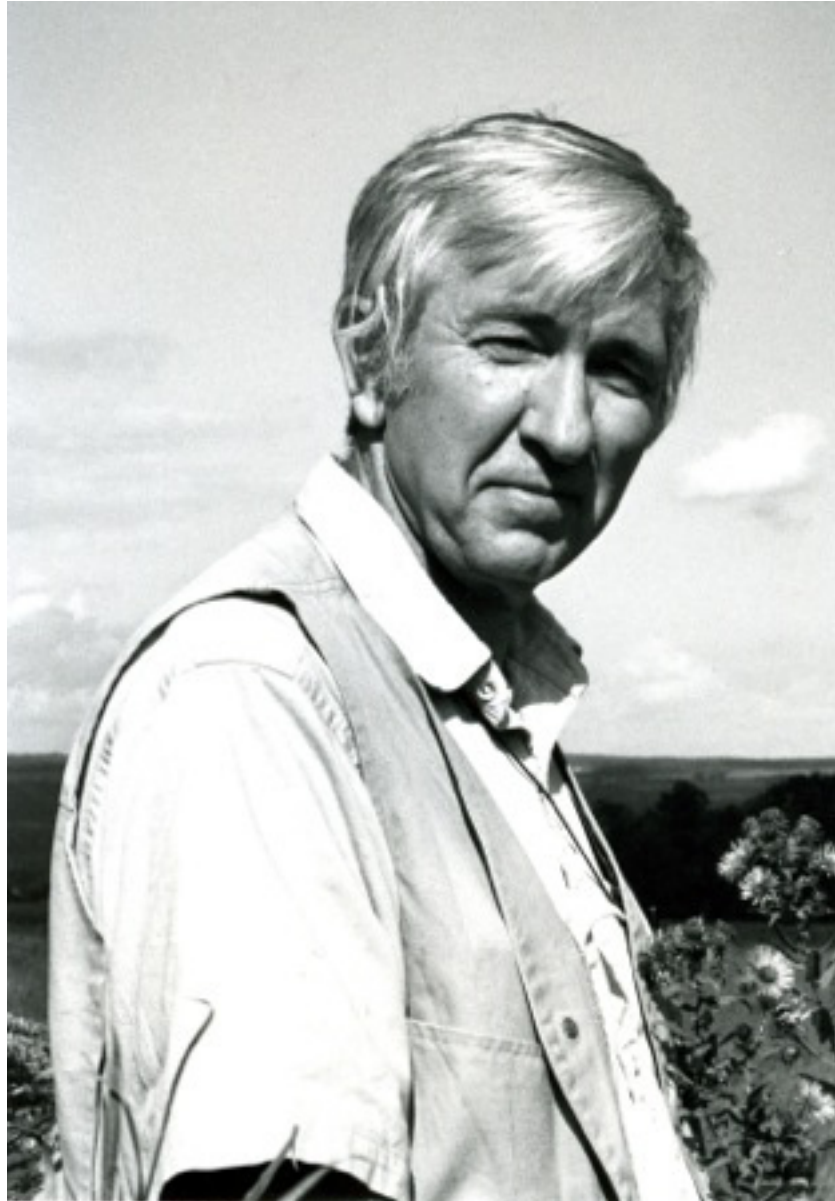
His early mentors, in addition to Smith, were the botanist Herb Wagner and the zoologist Francis Evans, both major figures in ecology. (Years later, Fran Evans’s son Ted became one of Dick’s Ph.D. students, a tribute in part no doubt to Fran’s admiration for Dick). Dick’s honors thesis, on flatworm demography, resulted in his first paper, fittingly published in *Ecology* in 1960. Dick’s involvement with the ESA had begun.

At Michigan, Dick struck up a friendship with one of us (Paine), who was a graduate student with Fred Smith. Paine not only was able to marvel at the development of this budding star, but also was an immediate beneficiary of Dick’s deep understanding, even in these early days of much of ecology. His skills as a tutor, even as a college junior, foreshadowed his brilliance as a graduate student mentor. Michigan was one of the most exciting places for ecology in the world; three of the reasons were the ecologists Nelson Hairston, Sr., Fred Smith, and Larry Slobodkin, who in their own interactions combined the best of experimental work and theory. The Hairston–Smith–Slobodkin triumvirate specifically invited Dick to participate in their graduate discussion group, and the influence on him was evident throughout his career. Their 1960 *American Naturalist* note, “Community structure, population control and competition,” had a deep impression on him. The paper is often referred to as “Why the World is Green,” but Dick simply referred to it as “The Etude,” and made it a central part of his teaching. He was an avid participant in fieldwork of all kinds, watching hawk migrations in Ohio, spelunking in Indiana and Kentucky, and even collecting Paleozoic fossils. It was during these days that Dick met his first wife, Elizabeth (Betsy) Eichstedt, who was working with Wagner, and with whom Dick shared an interest in ferns and natural history. Dick could not be just a zoologist or just a botanist, and his broad interests provided early signs of his career-long commitment to uniting in one fabric terrestrial plant and animal relationships.

Dick and Betsy left Ann Arbor for Berkeley in 1958, to begin graduate work with Frank Pitelka, and to carry out his landmark work on the gnatcatcher at the Hastings Reservation. In 1962, while still a graduate student, he won the A. Brazier Howell Award of the Cooper Ornithological Society. In 1964, Dick received his Ph.D., and left Berkeley to begin an Assistant Professorship in Entomology (demonstrating the breadth of his ecological prowess) at Cornell. Yet his friendship with Paine only grew, and lasted his lifetime; indeed, it was through this friendship that Dick introduced Levin and Paine to each other, which also led to a lifelong collaboration and friendship. Root and Paine carried on an extensive correspondence from 1959 to 1967 that exposes much about Dick's mood, and identifies both a characteristic introspection sometimes approaching pessimism, and all the worries and travails of moving to a new town (Ithaca) and starting as an Assistant Professor in the Department of Entomology. Cornell strengthened his resolve that ecology required adequate field data; his teaching at this time in entomology grew his appreciation for the applied literature with a focus on field sampling techniques and proper taxonomy. His wry sense of humor was often expressed: "After all, we cannot tolerate people who merely gather data and then write papers everyone can understand" (1964). By 1967 Dick was "having some fun with my cabbage insects," recognizing the potential of his new system for carrying out experimental ecology.

This correspondence reveals early hallmarks characteristic of the mature and inspiring ecologist he became. The letters are filled with encouragements, admonitions to gather data in the field, to understand as a naturalist the workings and challenges of nature, a phenomenal command of the literature, and a primary commitment to his teaching. The basic message was to follow one's instincts as a naturalist, to identify more interesting yet tractable questions, to gather adequate data, and to structure both observations and experiments appropriately. These views, learned from Dick, have served all three of us well, and were an early influence on Paine. They were the template for his extraordinary success as a mentor and researcher.

Moving into the Entomology department at Cornell meant switching his research focus from birds to insects, but Dick never missed a beat. He recognized and developed the extraordinary potential of these systems for elucidating ecological principles, and focused on insect-plant interactions for the duration of his long and productive career, wondering primarily about how ecological communities were organized in space and time. His questions influenced early ruminations about the problem of pattern and scale, and Dick was always eager to bat around deep concepts late into the night. Although based in Entomology, Dick also became affiliated with the then-new Section of Ecology and Systematics (E and S) in the Division of Biological Sciences, which was founded at Cornell almost simultaneously with his arrival. Together with Paul Feeny, also in Entomology, Dick taught the core ecology course that was a cornerstone of the program in E and S, and so it became natural a decade later that he and Feeny would move their core appointments into E and S. Even when just a Joint Appointee in E and S, with a base in Entomology, Dick Root was one of the most important influences on shaping the direction of that department, and he was one of the most visible icons of E and S to those both inside and outside of Cornell. It would have been impossible then to think of E and S at Cornell without Dick Root, and it is not much easier now.



Dick spent the first years at Cornell studying insect pests of food plants, especially domesticated crucifers. He then took up goldenrods (genus *Solidago*) and their insect fauna and continued to work on different aspects of this native system, so common throughout upstate New York, until he retired. Themes that ran through his work include the use of powerful field experiments to elucidate underlying factors and relationships, the emergence of important conceptual advances in the resulting publications (component and compound communities, resource concentration hypothesis), studies of unusual duration, and extensive, well-conceived field work with its attendant dedication to natural history observations and copious field notes. Two hallmark studies of the goldenrod work were the mowed grid, in which the experimental removal of insect herbivores from the dominant meadow goldenrods caused a dramatic

shift in plant species relationships, and the Cayuga Survey, in which standard sampling of the goldenrod insect fauna from the same 16 sites over many years allowed a nuanced assessment of the degree of organization of a complex, native community and how it varied over space and time. He also gave his research an international dimension, spending a study year with his family in Cali, Colombia, under the sponsorship of the Rockefeller Foundation, studying milkweeds and their associated fauna.

Early in his career at Cornell Dick began a relationship with Archbold Biological Station in Florida that flourished for decades, to their mutual benefit. Dick developed a graduate field course at Archbold where students honed field skills and did research projects, and left with fond memories of Dick, Archbold, and their class experiences. Dick also conducted research projects there and was on its Scientific Advisory Board (member, chair) and its Board of Trustees, helping bring science into its decision-making. Dick loved Archbold—the species and habitats, the scientific staff, and the institution—and he thrived on playing a role in keeping it a healthy, vibrant institution.

In 1969, one of us (Levin), a mathematician who had wandered into biology, discovered the course that Root was teaching with Feeny (it was Root's turn to have primary responsibility), and made the wise decision to audit it. The course was superb, but Dick supplemented it by inviting all students to join him for coffee after class. Fortunately, few students came, and this gave Simon, his wife Carole, and Dick the opportunity to discuss ecological concepts, and to begin a life-long friendship. Dick took the initiative of bringing Levin into the halls of E and S, beginning by insisting that Simon must meet Robert Whittaker, who was leading the effort to bring theoretical ecology into E and S. Dick's willingness to discuss ideas, to read early versions of manuscripts, and to foster introductions to others, in short order led to Levin's decision to switch fields and departments full time. Without Root's mentorship, encouragement, and collegiality, Levin's career would have proceeded in very different directions. The friendship led to collaborations, the most productive of which was the co-mentorship of Peter Kareiva; but the intangibles were of inestimable importance, and were emblematic of Dick's mentoring style. He never tried to reshape others in his own mold, recognized and benefited from others' complementary strengths, and simply encouraged and guided.

Dick experienced a gradual decline in mental and physical abilities during the last decade of his life. Although sad to witness and often frustrating to Dick, the decline, especially in the early years, progressed slowly so that Dick continued to enjoy life. Hobbies and interests included art, running, travel, spending time at a piece of land he owned in the region, nature walks, meditation, and seeing family. Dick's entire family lived nearby, making it easy to spend time with them during these years. While Dick's life became simpler and slower in his last years, he insisted on remaining active, and Barbara supported and comforted him, while ever enjoying his company. He continued to go to Cornell regularly, stayed interested in science, and travelled while he could. One of us (Marks), having the good luck of being at Cornell with Dick, spent time regularly with him, especially in the last 6–7 years, and marveled at how committed he remained under difficult circumstances. For example, during weekly lunch meetings at Cornell, Dick would comment on an interesting paper he had read in one of his journals and proceed to summarize its findings. Or he would describe a lecture or a colleague's lab meeting he had attended, and here too he could recount the main points. On a trip to Pennsylvania with Marks, Dick had a grand time

visiting several field sites with local expert and former student Carol Loeffler, and then enjoyed touring the Gettysburg battle sites. On trips like this, Dick would occasionally get confused or need help doing things; but for the most part he enjoyed himself and was a good travel companion. Dick had a wonderful sense of humor and this remained, in somewhat muted form, to the end. This served him well in the last years when he sometimes enjoyed a good laugh at himself after realizing that something he had just said made no sense. Also to his credit, Dick was never bitter or angry about his condition during the years of decline.

Dick taught by example. At Archbold, during the graduate field course that they taught together, Marks observed Dick, the superb field naturalist, in action and learned from his attention to detail and quality. For instance, he noticed that Dick marked some plots he had with aluminum angle iron driven deeply into the sandy soil. Plot numbers were stamped into the angle iron. Peter thought this was excessive until his first round of plot markers melted in a fire, whereas Dick's were still fine and readable post-fire. This may seem a small thing, but it lodged with Marks in a big way: Take the time to get it right at the outset. Peter also learned an enjoyable way to see new patterns in the field when Dick introduced him to "solo day." This was the first full day at Archbold, when students were told to spend the day individually in the field indulging their interests in natural history. No agenda. No one would ask at the end of the day what he or she had done or seen. It was a day to unwind, wander, and stumble onto something. Peter decided to try solo day and was amazed: at how much there was to see, especially when he tried to see species beyond the ones he studied; at how many interesting potential projects he encountered; at how much time he was spending writing field notes, and at how little distance he had walked over a day because interesting species and patterns were everywhere once he was able to see them. A couple of these observations led to projects that Marks subsequently completed. More generally, this was part of a core tenet of Dick's that Marks embraced: the more time spent making observations in nature, the better. Dick also taught Marks about writing field notes. In the early years at Archbold, Peter used to marvel at how Dick, when we would return from the field, would sit and write field notes for an hour or two. He let Peter read his notes; they were models of clarity and included the conceptual framework as well as his detailed observations and thoughts. And today, as Marks helps usher Dick's papers into the university archives, he still marvels at his field notes, spread among dozens of bound volumes, all hand-written in beautiful penmanship. More than once Peter started reading at arbitrary places in several volumes and was struck by how quickly he knew where Dick had been, what the study was, and what he was observing. Finally it was difficult not to notice Dick's wonderful sense of style, evident in the clothes he wore, in the way he organized his offices at Cornell and home, in the gear he packed for a trip or a field outing, and even in his field notes (both appearance and content). He was special.

Dick Root is survived by his loving wife, Barbara Page, two children, two stepchildren through his marriage to Barbara, eight grandchildren and step-grandchildren, and three great-grandchildren. He will be missed by friends, family, and colleagues alike.

Written by Simon A. Levin, Princeton University; Peter L. Marks, Cornell University; and Robert T. Paine, University of Washington