

the book. I am not convinced. Carson was a very private person; she refused to have personal articles written about her or to have her battle with cancer revealed. There is much discussion of burning the letters as late as February 1964. Some letters were burned earlier, but Carson's will returned Dorothy's letters to her. In any case, we are the richer for the chance to read these selected but very largely unedited letters. Together they make a remarkable autobiographical narrative and reveal a woman who created important and lyrical works and who is responsible more than any one person for the return of the osprey and peregrine falcon, for which many of us are grateful.

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An Unlikely Naturalist

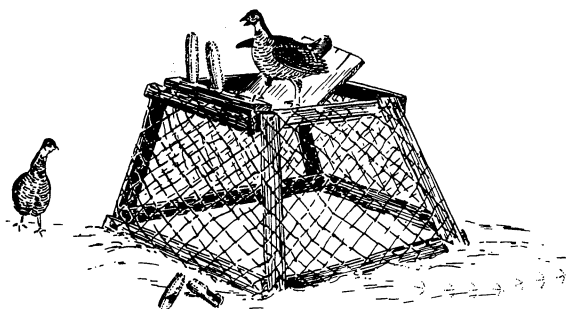
My Double Life. Memoirs of a Naturalist. FRANCES HAMERSTROM. Illustrations by Elva Hamerstrom Paulson. University of Wisconsin Press, Madison, 1994. xii, 316 pp., illus. \$35; paper, \$16.95. A North Coast Book.

This is a compelling book about an extraordinary scientist. Its subject matter—the life of a woman wildlife biologist in the mid-20th century—is not one that at first glance has much meaning for us technophiles of the '90s. The writing is disjointed and unpolished. Yet I read the memoirs of Frances Hamerstrom with fascination, as she described her childhood as the privileged daughter of sophisticated upper-class parents on an estate outside Boston, a life in sharp contrast to her later adventures with Frederick Hamerstrom, one of the foremost wildlife biologists of the middle of the century and a protege of renowned conservationist Aldo Leopold. Frances Hamerstrom was also a student of Leopold's and a recognized and capable scientist in her own right. She and her husband published hundreds of articles, mainly on prairie chickens but also on hawks and other raptorial birds. Much of the last part of the present book was previously published as "Strictly for the Chickens" and contains anecdotes of the couple's escapades in what was then wildest Wisconsin, attempting to both study the grouse-like game birds and develop a plan for their management.

But the book's major charm lies in the childhood memories of a naturalist growing up in a family that expected its daughter to learn to dance, draw, make lace, and walk with a book balanced on her head. It

did not expect her to dissect dead—and buried—blue jays with rusty razor blades, or to regularly leave the house to sleep under the stars and observe the birds at dawn, or to deliberately injure her gums with a sharpened pencil so as to be taken to the dentist and allowed to visit the Museum of Natural History in Boston as a consolatory treat. Frances did all of these things, and more, by the time she was 10 years old. I marveled at these stories, not only because they showed a degree of independence and determination that would have been incredible in someone twice her age, but because the passion for nature they portray seems to have sprung unbidden in a conventionally raised little girl. What made Frances want to find out what a jay's insides looked like? Her parents were not scientists, though her mother conveyed a love of plants and gardening that Frances kept for life. She was hardly taught, in or out of school, to explore the natural world, nor was she given books on natural history. She was not Hooked on Phonics. Instead, she read Darwin at age 11, surreptitiously, half convinced she was doing something wrong. Those of us committed to educating future scientists can only read about her exploits and wonder uneasily if the best we can do for our youth might not be to surround them with plants and animals and leave them alone.

"When I was a child I had two dreams: I wanted to live with wild animals, and I



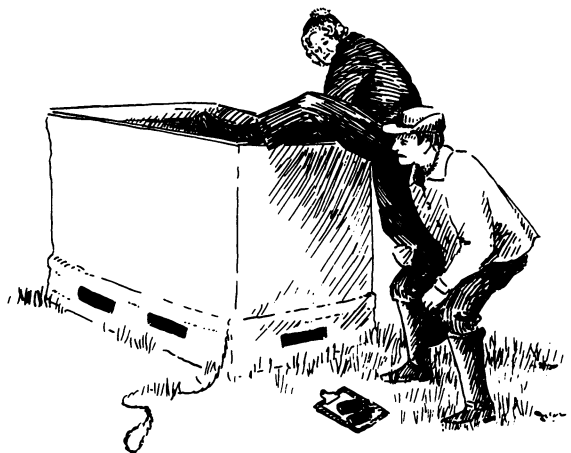
"Of course we had read the old books and articles . . . to learn how to trap chickens. The old-timers . . . often used a tip-top trap, set in a cornfield, and they had to empty it frequently. This sounded like an easy method for getting the winter's meat supply, and surely we could adapt it for banding. It was great fun to watch a prairie chicken land on top of the trap, prepared to eat ear corn, and watch him slide unwillingly down into the trap . . . In less than a minute he is inside and the counterweight has moved the top of the trap back up, ready for the next innocent bird. [From *My Double Life*]



Frances Hamerstrom and brother with nursemaid, "Anna, who pinched us." [From *My Double Life*]

wanted to marry a tall, dark man. I did both" (p. 107). Under some duress Frances eventually took a place in society, though she frequented dancehalls and night clubs with boys of dubious social reputation. She met her husband—"a college boy who scarcely had a penny to his name, but whose formal evening wear was impeccably tailored" (p. 109)—at a football game; they became engaged on their third date. After their marriage, the Hamerstoms embarked on a career of wildlife study, making landmark observations of prairie-chicken breeding biology that enlisted the aid of field assistants from all over the United States. The helpers ranged from Boy Scouts to business executives, and they all came to stand in a canvas blind before dawn in the freezing cold and watch the "booming" display of the male prairie chickens. Frances worked with Frederick, checking field notes, cooking breakfast for the crews of assistants, setting traps, and banding hundreds of birds each year.

Like most women scientists of her day, Frances recognized that prejudice against women existed, but she didn't spend much time dwelling on it. She



Amateur bird observers preparing to spend the day in a blind that they are not aware has been turned upside down by the wind. [From *My Double Life*]

matter-of-factly notes that she and Frederick "wanted to work together, but most administrators were afraid to hire a female biologist" (p. 190). She laughed at the people who gloomily predicted the curtain-

ment of her career when she became pregnant. She was instrumental in shaping the conservation ethic of the 20th century, and she did it using the Hamerstrom "rule of thirds" she and her husband developed when they took their first "pay job" at the University of Michigan:

Spend one-third of your time on the mostly worthless red tape required by the administration. Spend one-third of your time doing what is wanted of you, and what you want too. Spend one-third of your time doing exactly what you please.

Frances Hamerstrom, still traveling the world and observing wildlife well into her 80s, lived up to the rule admirably.

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Life from the Beginning

Early Life on Earth. STEFAN BENGTON, Ed. Columbia University Press, New York, 1994. x, 630 pp., illus. \$45 or £34. Nobel Symposium no. 84. Based on a symposium, Björkborn, Karlskoga, Sweden, May 1992.

I hope that in retirement I can look back to my pre-emeritus years as my "early life." This thick volume of 43 chapters does that on behalf of Earth, examining nearly 90 percent of life's history to date—through its birth, childhood, and finally maturation into the immense diversity of organisms that has inhabited Earth for the last half billion years. The book derives from a symposium attended by biochemists, molecular biologists, geologists, paleontologists and paleobotanists, invertebrate and developmental biologists, and geochemists, who completed their manuscripts for the volume in October 1993. The common thread is observations and ideas about what molecules, cells, fossils, and rocks tell us about the events and processes that led up to the late advent of complex animal life. As Bengtson explains in his preface, the purpose of the volume was not to hammer out a consensus but to share the various, and sometimes dispar-

ate, understandings and observations of scientists (mostly Western) actively researching questions about how life and ecosystems originated and evolved in their simpler forms.

The chapters are mostly short essays of 8 to 17 pages, organized around three themes: the chemistry and environments

of life's origin; the geological and biological records of life's middle period (2.5 to 0.6 billion years ago); and the records of the explosion of complex animal life 600 to 530 million years ago. What is perhaps most interesting in this book is the cacophony of voices heard around these themes, particularly in the first and third sections. This is indicative of only nascent understanding of many problems and therefore fertile grounds for research and discovery. Indeed, as Vidal (p. 311) writes regarding life's middle period, "the situation . . . is that one single fossil find could substantially alter our understanding of the level of complexity attained by biotic evolution at a given point."

The same is even more true with respect to the chemistry of life's origin, which eons of biotic evolution and geological recycling have obscured. The 10 chapters on this topic reflect two fundamental problems. First, the organismal definition of life is simple, but the chemistry that underlies it is not. Life is membrane-enclosed organic factories capable of metabolism, of exchange of matter and energy with the external environment, and of reproduction, all controlled by a molecular blueprint (Lazcano). Below this, however, is an extraordinarily complex chemistry involving high-weight organic compounds whose functions and syntheses are incompletely understood. The origins of some of these compounds are discussed in chapters by Oró, Lazcano, Baltscheffsky and Baltscheffsky, Gedulin and Arrhenius, and Deamer and others. One of the few points of consensus is that RNA was an essential early molecule for governing prebiotic metabolism by memory and by enzymatic activity (although Wächterhäuser provides his interesting dissenting view). Another consensus is that life did not begin as heterotrophs in Darwin's "warm little pond" but as autotrophs in hot, chemically active micro-environments.

This consensus comes from molecular studies of phylogenetic relationships among living primitive organisms, which are autotrophic and thermophilic (Stetter). But herein lies the second fundamental problem. The oldest divisions of extant life—the Eubacteria and Archae-



"Subtidal stromatolites at Carbla Point, Hamelin Pool, Shark Bay, Western Australia, showing fish and attached macroscopic algae. Exposed portion of vertically oriented spirit level is about 50 cm high." [From Walter's chapter in *Early Life on Earth*]