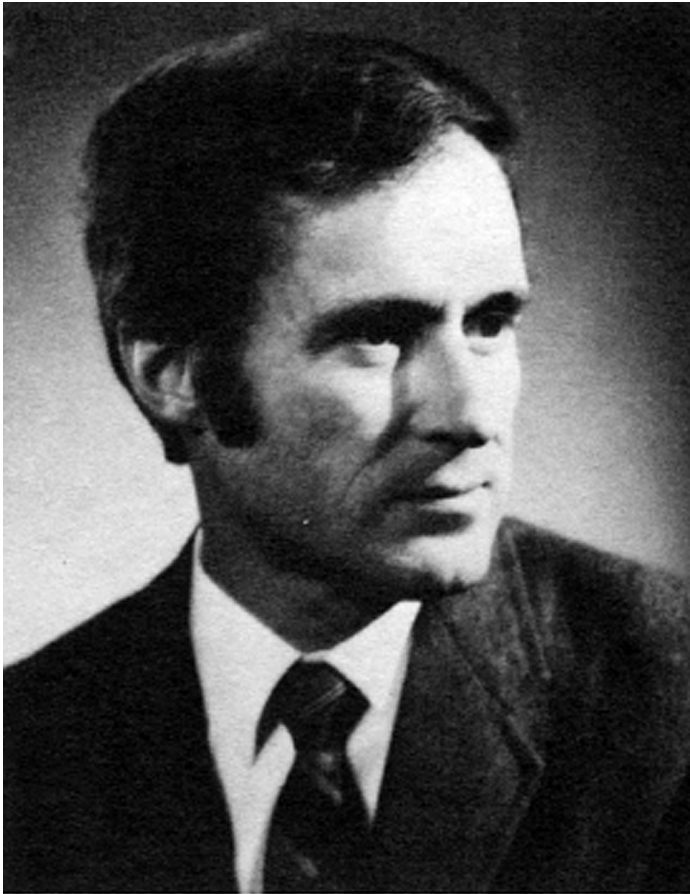


Resolution of Respect



Frederick Edward Smith
1920–2012

Frederick Edward Smith was both brilliant and tinged with an independence that is unusual in today's academia. He made seminal contributions, but he abandoned science without remorse in 1982, at the age of 62, to explore another lifestyle with his characteristic curiosity and energy. He left a fragmentary paper trail, whether by design or inattention is difficult to decipher. For instance, his ESA presidential papers were never delivered to the society's archives and have not been found, nor is there a surviving CV.

Fred died 18 April 2012, age 91, at Woods Hole, Massachusetts. He was the middle author of the justifiably famous 1960 Hairston, Smith and Slobodkin "green world" paper (HSS). He was also the least well known of that University of Michigan troika, despite a truly amazing range of contributions to ecology. Nonetheless, I've managed to reconstruct some of his life from student memories (myself, Don Hall, Rob Eisenberg, Jane Lubchenco) along with information from college registrars, Cape Cod research librarians, and the son of one of his coauthors, Nelson Hairston, Jr. (who has an autobiography written by his father for his family).

Fred was born 23 July 1920 at Springfield, Massachusetts, and graduated from the University of Massachusetts-Amherst in 1941 with a Bachelor of Science degree in Physical and Biological Sciences, *magna cum laude*, with a specialization in entomology. He married Marguerite Anderson (Peggy) in March 1945. She predeceased him by two months. He received his Ph.D. from Yale in 1950, working with G. Evelyn Hutchinson, and was hired that same year by the University of Michigan as an Instructor in the Department of Zoology (at a university year salary of \$3500). He advanced through the ranks there and in 1967 was appointed Chair of the Department of Wildlife and Fisheries in the School of Natural Resources. In 1969 he joined the Graduate School of Design at Harvard University and from 1981 to 1982 served as Acting Chair of Landscape Architecture. Fred retired from academia in 1982, moving first to Falmouth and then Woods Hole on Cape Cod. As his friend and ex-colleague Nelson Hairston, Sr. put it, “Fred went to heaven and died.”

For graduate students Fred exuded interest and supported independence. For me, he thought it inappropriate yet hilarious that I received a small grant to prove that a species wasn't present in the Bahamas. Jane Lubchenco wrote that “I loved meetings with him (at Harvard). Each meeting challenged me in new ways—made me think about my assumptions, conclusions, ways of framing an issue. Not once did he visit any of my research sites. However, he was keenly interested in the ideas, but trusted me to know my system.” At Michigan he taught in an introductory zoology sequence, initially with Nelson Hairston, Sr., but also a popular course on nonparametric statistics. A two-quarter course on parametric statistics was developed later. The course I remember best was on the Natural History of Freshwater Invertebrates, but not for the usual reasons. I think Fred was bored by the topic, so one 1957 spring day he assembled the class and asked why a tree in the building's courtyard was green. Both my classmate Dick Root and I suspect this may have been the first public vetting of the green world hypothesis, one most likely that had been developed in conversations with Nelson Hairston, Sr. and Larry Slobodkin.

Fred's credentials as a naturalist were hard to detect but were clearly extensive. His boyhood observations on gypsy moth caterpillar behavior probably generated a substantive caveat in HSS. He enjoyed field work. Rob Eisenberg described Fred helping him with his dissertation research on pond snail demographics. “I had my hip boots and he had none, so he took off his pants and waded in wearing a pair of bright print boxers. He said something to the effect that no one passing would see anything out of the ordinary. Typical Fred.” At some point while at the University of Michigan he simply gave an extensive data set on beach and sugar maple subcanopy survival to Bob Whittaker and Simon Levin (*Theoretical Population Biology* 12:117–139, 1977), a data set that challenged a mono-dominant view of plant succession.

Fred's footprint on our field is huge, minimally appreciated, and extends well beyond the enduring stimulation of HSS. He chose to forget his thesis (1950), which had involved lots of sampling at sea. Fred was dreadfully seasick much of the time. Just looking at the dissertation and the accompanying samples brought back unpleasant memories. All the data were lost during the move from New Haven to Ann Arbor; none were ever published. One can also easily forget the *General Zoology* textbook (1963) which he coauthored “only to pay off the mortgage on his house.” Or his ESA Presidential address (1975), by which time he'd lost interest in small ecology. Prior to these, as evidenced by his first paper (1952), was an enduring interest in models of population growth, which resurfaced in an oft-reprinted relationship between population growth rate, generation time, and litter size (1954). Derived offshoots were a clear

challenge to population regulation of Australian thrips (1961), and his experimental development of a novel model of *Daphnia* population growth based on mass rather than numbers. He had no fear of numbers and enjoyed mathematics. Interspersed through the early phase of his academic career was a fascination with polarized light and how it might direct cladoceran foraging.

About the time he moved from zoology to the Michigan School of Natural Resources (1967), his research interests switched from population biology to ecosystems. He spent some time at the National Science Foundation. Golley (*A History of the Ecosystem Concept*, 1993:207) refers to Fred as “director of the U.S. IBP program.” Smith’s 1968 PNAS paper provides a clear statement that ecosystem analysis should be at the forefront of ecological endeavor rather than simply providing the background for population interactions. High-speed computers would be the essential tool to examine natural complexity. A 1969 paper, in the proceedings of a symposium on eutrophication, advocates again for models. Fred had been considering how an increasing gradient of an essential nutrient might influence trophic structure in imaginary assemblages with three or four trophic levels, concluding that it could in surprising ways, “having spent the last year doing field research with an IBM 7090.” One of the surprises was that “the concept that food-web stability is derived from diversity cannot be supported by models” (Smith 1969:632). The foundation for his 1972 paper was laid here. Finally, the 1970 paper continued the models and ecosystems theme, but this time focusing on material transfer rates between the components. There also was a perceptive discussion of ecosystem boundaries, a challenge yet to be resolved in spatially extensive, open systems. His last substantive paper (1972) was his contribution to a festschrift honoring Evelyn Hutchinson. Fred enigmatically described it to me as “a peace offering,” but in it he returned to the stability–trophic structure relationships of earlier papers and concluded that spatial patterning could provide the answer. In a creative gem buried as an appendix, Fred describes “The predation game, or how to lose your marbles,” an exercise showing how environmental heterogeneity influences a predator’s foraging effectiveness. It is readily adapted to teaching ecological principles in the field.

I have avoided speculating on two conspicuous gaps in this chronology. First, what did he do during the interval between his B.S. degree (1941) and his marriage (1945) to Peggy, and second, what did he do during the Harvard years? After graduation, he apparently went to medical school. Peggy told me why Fred quit medical training. In his first hands-on operation, the patient’s appendix was on the wrong side. Fred wondered what the implications of this anomaly were, convincing himself that there was little room for curiosity in medicine, so he resigned. Peggy said he was at the top of his class. Nelson Hairston, Sr. actually met Fred at the Walter Reed Army Medical Center during World War II, well before their Michigan days. With regard to Harvard, why he resigned and “died” is unrecorded. He moved from Michigan in 1969, fully committed to the Graduate School of Design (GSD). It was a time at Harvard that E. O. Wilson (*Naturalist* 1994) has described as “The Molecular Wars.” Fred did not want a joint appointment; he wanted to make a difference by infusing some ecological understanding to future urban designers and landscape architects. He and Peggy departed for Cape Cod in 1982.

This decision embarked Fred and Peggy on a vastly different trajectory. At the age of 62 Fred took up wind-surfing, and both were involved in the Falmouth Artists’ guild (where Peggy served as President). They were active in the Falmouth Democratic Town Committee and “hosted classical concerts in their home to benefit the Woods Hole library” (*Falmouth Enterprise*, 8 March 2005). On the occasion of

their 60th wedding anniversary, they composed a “pre-obituary,” the source of the above detail. In all venues, Fred was thoughtful, generous, and very creative. He took great pleasure in thinking about scientific challenges small and large, like how polarized light influenced arthropod behavior, how to address the issue of ecosystem complexity, and even whether photons got “tired” after traveling many billions of years. His imprint on ecology today remains hidden but impressive. Reading most papers in his bibliography, many sprinkled with his thought-provoking insight, only supports this totally partisan opinion.

Robert T. Paine

Selected publications, but only because I’ve been unable to locate a CV, and Fred Smith seldom cited his own papers.

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