

components may seem somewhat superfluous, but they make the book much more accessible and useful to less experienced students without hindering or boring more seasoned readers.

It would be impossible for any textbook on insect ecology to be "perfect" as everyone has their own favorite topics, study organisms, and preferred methods of learning. However, we identified three particular areas we thought could have been improved. First, even though we found each individual chapter extremely useful, we were somewhat confused by the overall structure of the book. The chapters roughly follow the common bottom-up approach used in many ecology textbooks (populations, communities, ecosystems), but there were plenty of exceptions that hindered the book's flow and kept us from feeling like we were always building on information and ideas from one chapter to another. Second, there were more inconsistencies in the style, structure, and size from chapter to chapter than we would have liked. Some chapters were extremely useful in emphasizing general ecological theory, explaining empirical considerations, and being especially accessible; it was therefore that much more disappointing when other chapters were fairly weak in one of those areas. Last, we felt that the use and explanation of mathematical theory was particularly lacking when compared to the excellence exhibited in almost all other areas. Theoretical ecology has played an important role in advancing basic and applied topics in insect ecology, and we are glad it is included in this book. However,

we believe that a good deal of the text's intended audience is not likely to be particularly adept with theory's syntax, structure, or ideas. Therefore, some extra attention could be given to making the mathematical theory as accessible, useful, and current as the other areas of the text.

Whatever minor shortcomings it may have, *Insect ecology* is first and foremost an extremely useful book. By making an enormous amount of material accessible and interesting it can serve as a tremendous textbook for many potential classes and be a terrific reference book for those who continue work in related areas. No matter the aspect of insect ecology, this book has a clear and straightforward overview of the subject along with abundant examples and references that will stimulate ideas for research and teaching.

JASON P. HARMON AND REBECCA WHALEN

North Dakota State University
Department of Entomology
NDSU Department 7650; P.O. Box 6050
Fargo, North Dakota 58108 USA

E-mail: jason.harmon@ndsu.edu

Ecology, 93(6), 2012, pp. 1495–1497
© 2012 by the Ecological Society of America

Homage to Hutchinson

Skelly, David K., David M. Post, and Melinda D. Smith, editors. 2010. **The art of ecology: writings of G. Evelyn Hutchinson**. Yale University Press, New Haven, Connecticut. xii + 356 p. \$22.00, ISBN: 978-0-300-15449-8 (alk. paper).

Slack, Nancy G. 2010. **G. Evelyn Hutchinson and the invention of modern ecology**. Yale University Press, New Haven, Connecticut. xviii + 457 p. \$40.00, ISBN: 978-0-300-16138-0 (alk. paper).

Key words: biography; ecology; history; Hutchinson, G. Evelyn; limnology; natural history.

The strength of ecology as an integrative, holistic discipline springs from its intellectual breadth. Its theoretical structures are drawn from mathematics, economics, game theory, and physics. Its empirical data come from sources as disparate as urban vacant lots, isolated mountain peaks, and the oceanic depths, and can be made equally by proficient specialists and amateur natural historians. Its statistical methods flow from frequentist, likelihood, and Bayesian streams, and yield more robust inferences than any one of them alone. Few ecologists, however, simultaneously are equally comfortable in more than one theoretical structure, are equally at home in a variety of field sites, can converse readily with specialists and amateurs, and float above the statistical waters roiled by philosophers of different stripes. Perhaps the only ecologist who could truly be said to transcend all these groups is Evelyn Hutchinson, whose career spanned the better part of the 20th century, and whose

work, which encompassed natural history, astute observations, thoughtful experiments, and development and application of new theories, created entire subfields of ecology and undergirds virtually all aspects of modern ecological thought.

Two new books introduce 21st-century ecologists to Hutchinson the man and the broad reach of Hutchinsonian thought. Nancy Slack's biography of Hutchinson brings to fruition a 20-year project of archival research and in-depth interviews with his friends, family, and colleagues. The result is a rich trove of historical information that will serve as a springboard for future research and analysis of Hutchinson's work and his impact on the development of ecology as a scientific discipline. Skelly et al.'s edited collection of writings lets Hutchinson speak for himself, and the result is a rich survey of his life and intellectual development. In the end, Hutchinson's own words in *The art of ecology* provides a more powerful and satisfying biography than does the detailed life history of *Hutchinson and the invention of modern ecology*.

Slack's biography is both thorough and long. The first chapter ("A man so various") summarizes Hutchinson's entire life in 14 pages (Slack rewrote this chapter for the Introduction to the second section of *The art of ecology*, but covers no new ground therein). The remaining 17 chapters present a straightforward chronology of Hutchinson's life, loves, and career; no detail, no matter how irrelevant, is omitted. My own favorite detail came in the midst of a lengthy chapter on Hutchinson's decades-long correspondence with the English novelist and critic, Rebecca West (Hutchinson was her literary executor). Following an excerpt from a 1963 letter from Hutchinson to West, in which he laments the move of S. Dillon Ripley from Yale (where he was a Professor and Director of the Peabody Museum) to the Smithsonian Institution (where for the next 20

years he served as its Secretary, perhaps the most influential in the history of the museum), Slack writes, "S. Dillon Ripley's grandfather, Sidney Ripley, had been president of the Union Pacific Railway." The importance of this—should we care about the relationship or the railroad—is nowhere explicated, but does illustrate the point that no detail once found, and no matter how trivial, should suffer the pen of an editor.

Slack devotes a great deal of attention to Hutchinson's support of his students and post-docs and especially his intellectual support for female graduate students and colleagues (including his first wife, Grace Pickford, who spent her entire professional career at Yale). Until the late 20th century, women were poorly represented in ecology (and elsewhere in the sciences), and the importance of Hutchinson's commitment to scientific excellence from everyone, not just from male academicians, is laudatory. It would, however, have been helpful to have had a complete listing of his graduate students (and their dissertation topics) as an appendix to this bibliography. The well-known Hutchinsonian family tree of intellectual descendants (originally published in a 1971 issue of *Limnology and Oceanography* dedicated to Hutchinson and his work) is reproduced in Chapter 1, but it is difficult to read (the reproduction is not sharp) and does not include those graduate students who were still working with Hutchinson when he formally retired in 1971.

Slack also delves deeply into Hutchinson's personal life, his three wives (he outlived all of them, but the reason he divorced Pickford remains a mystery), his foster daughter, and his conflicts—both intellectual and personal—with his colleagues at Yale as it evolved from a classical zoology department to a "modern" molecular- and cellular-focused department in the 1970s and 1980s. Here, however, the value of Hutchinson's own writings in *The art of ecology* really emerge. The concluding chapter of *Hutchinson and the invention of modern ecology*, self-consciously entitled "Concluding remarks," includes a section on Hutchinson's generally enthusiastic and kind support for his students. This section segues into a discussion of "the molecular wars at Yale" by excerpting Hutchinson's "negative view" of the long-time chair of Yale's Zoology Department, John Nicholas: "[he] later in life became too much engrossed with worldly power to continue as an effective scientist." The quote itself is from Hutchinson's autobiography *The kindly fruits of the Earth: reflections of an embryo ecologist* (Yale University Press, 1979), but in fact it does not end as quoted by Slack. Rather, it concludes, "... scientist, which distressed all who knew him at all well." Is this really a negative view of his former chair, or is it a more nuanced, understanding view of a bench scientist and colleague-turned-administrator? In general, Slack's presentation of Hutchinson's interactions with colleagues at Yale is much harsher than that conveyed by Hutchinson himself in his autobiography (excerpts of which are reprinted in *The art of ecology*) and more likely reflect the time at which she began to work on this biography, the late 1980s, when ecology at Yale was indeed moribund.

Fortunately, ecology has undergone a renaissance at Yale in the last 15 years, where there is now a full-fledged Department of Ecology and Evolutionary Biology. Two of the editors of *The art of ecology*—Post and Smith—are faculty members in that department, and the third—Skelly—teaches up the hill from EEB in Yale's ecological redoubt during the Molecular Wars of the 1970s and 1980s, the School of Forestry and Environmental Studies. Ecology at Yale owes a great debt to Hutchinson's perseverance there; in 1948, after he had introduced biogeochemistry into ecology, he was offered a research position with the U.S. Geological Survey; he declined, citing his commitment to present and future graduate students. The publication of *The art of ecology* begins to repay this debt.

Unlike Slack's chronological biography, *The art of ecology* is an intellectual (auto)biography organized thematically: "Intro-

duction" (overview, early years); "Biography" (mercifully brief, but including Hutchinson's first publication, a one-paragraph description of a swimming grasshopper and a request for help identifying it, published in *Entomologist's Record and Journal of Variation* 30:138 [1918]); "Limnology"; "Theory"; and "Museums" (including both natural history and art history). Each of these five sections opens with a short introduction to the topic by one of the editors or an outside contributor, and within each section is reproduced a set of Hutchinson's writings—original papers, excerpts from books—ordered chronologically. The result is akin to a fugue, where themes and variations appear and disappear, overlap in time and tempo, and reappear in different sections; the end result is a harmonious and coherent picture of Hutchinson's intellectual evolution.

The majority of the papers and excerpts reprinted in *The art of ecology* likely will be unfamiliar to ecologists, even those of us who were in college or graduate school while Hutchinson was still actively working and writing. Although "Theory" includes familiar classics ("Homage to Santa Rosalia," "Concluding remarks," and "The paradox of the plankton"), it is the others in that section and in the other four sections that are by turns entertaining, enchanting, and intellectually illuminating. Lengthy excerpts from Hutchinson's own autobiography (in "Introduction," "Biography," and "Museums") further reveal the personal context of his developing ideas.

The papers in "Limnology" include an early work from *Nature* ("Limnological studies at high altitudes in Ladak [sic]," 132:136 [1933]), which in a single page covers stratification of lakes in North India, usefully compares their physico-chemical properties with those in North America and Central Europe, and discusses their biota; the writing is a model of concision rarely seen anymore. "Limnology" also includes his 1941 paper from *Ecological Monographs* (Limnological studies in Connecticut, IV. The mechanisms of intermediary metabolism in stratified lakes, 11:21–60) that focuses on the role of lake sediments as the source of alkalinity to the hypolimnion and then expands on the phosphorus cycle and depletion of phosphorus in midsummer. This site-based yet broadly synthetic paper opens with a consideration of the mathematics of turbulence, moves into biogeochemical processes, resolves conflicting hypotheses in the literature, and concludes with discussions of nutrients and what we now call stoichiometry as limiting factors in lake productivity. This paper would be as much at home in *Ecological Monographs* today as it was over 70 years ago. There follows a short paper in which Hutchinson and his graduate student Vaughan Bowen describe having spiked Linsley Pond with ^{32}P and then, through serial sampling, quantified the basics of the lake's phosphorus cycle (1947. A direct demonstration of the phosphorus cycle in a small lake. *Proceedings of the National Academy of Sciences* 33:148–153). Virtually all of what we now think of as isotope-based biogeochemistry springs from this paper.

The concluding section, "Museums," is also the longest. As Michael Donoghue and Jane Pickering write in their introduction to this section, Hutchinson's writings on the importance of natural history and the emotions sparked by museums are "central to understanding how Hutchinson attained the scientific perspective that we so admire, especially his ability to seamlessly integrate ecological and evolutionary thinking." A real gem among the seven selections in this section is "A note on the functions of a university" (from his 1953 collection, *The itinerant ivory tower*. Yale University Press, New Haven, Connecticut), which provides a useful antidote to the seemingly inexorable evolution of the university as service industry and its faculty as service providers. Hutchinson concludes, "[i]n a general sense it is the basic function of the university to emphasize, as vigorously as possible, that intellectual activity is one of the great pleasures of life, for in so doing the university performs the fundamental duty of encouraging us to know

enough to set our house in order." In the same vein, his essay "The uses of beetles" (originally presented at a symposium on "The role of the museum in teaching and research at Yale" and reprinted in his 1962 collection *The enchanted voyage and other studies*, Yale University Press, New Haven, Connecticut) skewers current attempts to reconcile science and religion. In addition to surveying the history of natural history and natural history museums from the 12th century onwards, Hutchinson reminds us "it became evident [following Darwin's explication of the theory of evolution by natural selection] that ... the religious meaning for the study of natural history, with much of its wonder and glory, officially disappeared." But at the same time, "... a love of the created world, a sort of natural piety, exists in the minds of nearly all naturalists."

Hutchinson synthesized his life's empirical work in his four volume *A treatise on limnology* (Wiley and Sons, 1957–1993), but he synthesized his life's theoretical work in his much briefer textbook, *An introduction to population ecology* (1978, Yale University Press, New Haven Connecticut). The former is widely known, but the latter, with its unfamiliar style (to contemporary scientists) of lengthy footnotes, historical digressions, and hand-lettered figures, never achieved the prominence in our courses that it rightly deserves. In his review of *An introduction to population ecology* (published in the May 17, 1979, issue of *The New York Review of Books*), the late Stephen Jay Gould wrote, "unlike most examples of the genre, it is accessible, intelligent, and enjoyable to read as literature." This is perhaps why it remains the only example of a science textbook ever reviewed in *The New York Review of Books*, which only rarely even reviews textbooks in the humanities, and whose articles generally disdain material found in textbooks. (The best example of this erstwhile periodical's attitude towards textbooks can be found in a July 9, 1964, review by Robert M. Adams of James T. Farrell's fictional saga *What time collects*: "There's little or no love connected with this topic, just sex, turgid, mechanical, and explicit as a textbook of botany.") Gould goes on to highlight Hutchinson's interdisciplinarity and rejection of the use of simple statistical null hypotheses: "[a]n experimentalist, using technological machinery under a strict and repeated protocol, might get by in ignorance of the history

and implications of his field. Those who work directly with nature's multifarious complexity cannot afford such narrowness." As Hutchinson himself wrote, in the concluding pages of *An introduction to population ecology*, "[i]n a satisfactory case in which we have fairly good prior reason to think that a certain hypothesis may be true, we may find either that we are wrong, the hypothesis becoming too improbable to worry about, or that we are right, meaning that the hypothesis is a bit more probable that we previously had thought."

The papers in *The art of ecology*, and in fact all of Hutchinson's work, bear frequent reading and re-reading (*The art of ecology* includes a useful Appendix with a complete listing of all of Hutchinson's publications). At first glance, the more obscure papers, including reflections on art history and English desserts, may seem to be only a window into a time past of a Cambridge dilettante's doings in science. In fact, these papers present an almost-forgotten model for how to think about and communicate science. As Skelly, Post, and Smith have begun to repay the debt that ecology at Yale owes to Hutchinson, we are now in their debt for reminding us of the value of Hutchinson's work for ourselves, for our students, and to use in our quest to protect and conserve the world around us. We can repay this debt, at least in part, by continually recalling Hutchinson's own words as we continue to study and work in our own obscure corners of the ecological world: "... experience shows that the most unpromising knowledge is always proving useful and that some of us have a duty to foster and make it available We also need all the wondrous things under heaven."

AARON M. ELLISON

Harvard University
Harvard Forest
324 North Main Street
Petersham, Massachusetts 01366 USA

E-mail: aellison@fas.harvard.edu

Submit books and monographs for review to the Book Review Editor, Janet Lanza, Biology Department, University of Arkansas at Little Rock, Little Rock, Arkansas 72204 USA [telephone (501) 569-3500; e-mail, jxlanza@ualr.edu].

We welcome offers to review books for *Ecology*, but we cannot accept an offer to review a *specific* book. Anyone who wishes to review books for *Ecology* should send a current *curriculum vitae*, a description of competencies, and a statement of reviewing interests to the Book Review Editor. Authors of reviews must verify they they have no conflict of interest that might interfere with their objectivity, and that they have not offered (and will not offer) a review of the same book to another journal.