

## BOOK REVIEWS

MARCY F. LAWTON, EDITOR

**Habitat selection in birds.**—Martin L. Cody [ed.]. 1985. Academic Press, Orlando, FL. xvi + 558 p. \$69.50.

In 1933 David Lack published a pathbreaking paper entitled *Habitat selection in birds* which disputed the reigning notion that birds chose habitats solely on the basis of climate, food, or nest sites. Equally important in Lack's view was the "psychological factor." Every decade or two since then, a major contribution has appeared dealing with the same topic: Svårdson in 1949, Hildén in 1965, Partridge in 1978, and, most recently, this collection of papers whose title recalls Lack.

The collection is made up of 18 chapters contributed by 22 authors from seven countries. Many of the papers represent long-term studies (for example, Sherry and Holmes at Hubbard Brook, Terborgh in Peru). All of the authors are recognized authorities in their field. The papers are grouped somewhat arbitrarily into four sections: an introductory section by Cody, a section called "Habitat selection in specific bird taxa," a section called "Habitat selection in specific habitat types," and a catch-all section called "A variety of approaches to habitat selection in birds." The title of nearly every paper contains the phrase "habitat selection" ("... in island versus mainland birds," "... in raptorial birds," "... in Amazonian birds," etc.) which raises the hope that the book comprises an integrated series of comprehensive essays on the subject. The book falls short of achieving such a synthesis because of the diversity of authors, viewpoints, and methodologies, not to mention the sheer enormity of the problem of habitat selection in birds. It also could have profited by including a concluding chapter taking stock of how far we have progressed since Lack and by having abstracts or summaries of individual papers. These are minor quibbles, however, in view of the fact that this is unquestionably the best collective work to be published on the topic of habitat selection in birds.

The importance of considering scale and the level of resolution in habitat selection is stressed repeatedly throughout the volume. In Klopfer's long-term view, this is one of three critical insights of the last 20 years (the other two being the recognition of the importance of sensory physiology and the interaction of experience and innate preferences in habitat choice by birds). Wiens, who emphasized the problem in earlier papers with Rotenberry, is joined here by Sherry and Holmes, Burger, and Hutto. Yet each author develops a slightly different interpretation of the usefulness of considering scale. In a paper notable for its clarity, statistical rigor, and originality, Sherry and Holmes demonstrate that the dispersion of passerine territories at Hubbard Brook can be considered to be clumped, random, or uniform, depending upon quadrat size. An important conclusion is that distinct factors (social facilitation, intraspecific territoriality, interspecific aggression, floristics) determine dispersion patterns at different spatial scales. Burger and Hutto both point out that habitat selection

is a process of hierarchical choices. For example, Hutto notes that at general levels (i.e., geographical regions), the selection of a habitat may be made only once or twice during the lifetime of a bird, and at such levels habitat choice tends to be based more on innate responses than learned preferences. At finer levels, choices are made repeatedly on the basis of learning, and proximate cues more closely match ultimate factors such as food abundance or safe nesting sites.

Various authors sound the cry for an experimental approach. To elucidate the mechanisms of habitat selection and to advance beyond the correlational studies of the past, argue Morse, Sherry and Holmes, we need to manipulate habitat structure or alter species compositions, while simultaneously gathering observational data in control plots. In this light, Greenberg's (1983) important experimental work on neophobia in wood warblers should have been included in Morse's review. The difficulty of investigating habitat selection experimentally may be reflected in the fact that the only experimental study in the book is that of Alatalo, Lundberg, and Ulfstrand, who added nest boxes to Pied Flycatcher territories, thereby elevating population densities and altering social systems. A most provocative paper is that of Herrera, who hypothesizes that birds that consume fruits and disperse seeds have the unusual capacity to improve their habitat over ecological and evolutionary time, increasing its carrying capacity. Herrera's argument could be extended to pollinators as well. Rosenzweig closes the volume with an optimistic appraisal of the role theory can play in guiding studies of habitat selection and a demonstration of the application of foraging models to habitat selection.

As editor, Cody deserves credit for the volume's three major strengths. First, this is an exceptionally eclectic book, citing the relevant contemporary literature on habitat selection in birds worldwide. The introductory chapter by Cody, for instance, contains ten pages of references, many of which, drawn from the European literature, may be unfamiliar to most North American ornithologists. (Cody's bibliographic contributions make up for the impenetrable figures that illustrate each of his three chapters.) Second, the contributions to this volume were selected to allow comparisons between avian taxa, geographical regions, and seasons. For example, Cody's censuses suggest that Old World sylvine warblers overlap broadly in habitat use; interspecific territoriality is common in the group. New World wood warblers, on the other hand, exhibit distinct species-specific habitat preferences, according to Morse. Other aspects of habitat selection in these same subfamilies of birds are discussed by Winkler and Leisler (ecomorphology of sylvine warblers), Sherry and Holmes (dispersion of breeding wood warblers), and Hutto (habitat use by migrating wood warblers). For Old and New World warblers, at least, an exceptionally complete picture of habitat selection emerges. Cody, Wiens and Burger's reviews of grassland, shrub-steppe,

and marsh-inhabiting birds, respectively, allow a useful comparison of habitat selection in different open habitats. Several authors encourage the consideration of alternative explanations of habitat selection by taking a mechanistic approach, with Walsberg discussing physiological consequences of microhabitat selection, Winkler and Leisler concentrating on morphological adaptations, and Klopfer and Ganzhorn focusing on behavior. The latter paper is of particular interest because it actually addresses the question of "selection" (i.e., choice) of habitats. Too many papers in this area tacitly equate the observed *distributions* of birds with habitat *selection*—regardless of whether distributions result from historical accident, randomly directed dispersal, aggressive exclusion by other animals, or other causes or constraints. Hutto consequently recommends the more neutral term "habitat use."

The third strength of this book is that it raises once again a central question in avian ecology: why do birds occur where they do? The question is so enduring and intractable because the subject of habitat selection encompasses foraging theory, dispersal theory, biogeography, social behavior and mate choice, reproductive biology, physiological ecology, the development of cognition and the role of learning, functional morphology, speciation, and community ecology, to name just a few related fields touched on in this book. Rosenzweig laments the paucity of theory in the study of habitat selection, but the greater problem may be that each of the fields listed above has its own, independently evolving body of theory. The key breakthrough in the study of habitat selection may be the discovery of principles that unify these fields while taking into account problems of scale and hierarchy. The synthesis will not be easy, needless to say. As these papers effectively demonstrate, habitat use even in closely related bird species may be dictated by distinct factors, such as food supply, nest sites, predators or competitors; the same species may be sensitive to different factors at different times of the year or at different levels of resolution. These complications make the challenge of unraveling the causes of habitat selection in birds even more provocative.

I came away from reading this volume with a new enthusiasm for the subject and a better understanding of why the question of habitat selection in birds remains alive a half century after Lack's original paper. I suspect that it will be with us for at least another half century. But this does not mean that we have not progressed or will not continue to do so. The descriptive study of habitat selection in birds is much more quantitative now than in the past, taking advantage of sophisticated statistical analyses of many habitat variables simultaneously. The data base for comparing the distribution of diverse species has expanded explosively; if this book is as widely read as it deserves to be, it will convince many biologists of the importance of understanding habitat selection, and the data base will grow even more rapidly. Finally, the recognition of interactive effects, complexity, and scale preclude the return to single-factor explanations of an exceedingly knotty but important problem in ecology that is admirably addressed in this book.—NATHANIEL T. WHEELWRIGHT, Department of Biology, Bowdoin College, Brunswick, ME 04011.

**The dialectical biologist.**—Richard Levins and Richard Lewontin. 1985. Harvard University Press, Cambridge, MA. ix + 303 p.

Anyone who is not brain-dead will be jolted into serious reflection by *The Dialectical Biologist*, Levins and Lewontin's recent attempt to show how to approach the business of science from a dialectical perspective. A collection of polemics and essays, many previously published, the book is meant as a sampler of dialectical thinking, rather than a linearly developed textbook on how to think dialectically. Except for the last chapter, a rather formal description of dialectical principles that should have come first, the essays cluster loosely around three themes: evolution, statistical analysis, and the relationship of science and society.

One goal of the book is to show that science and society are parts of a seamless whole and that Cartesian reductionism is both ontologically incorrect and *had* to result in scientific service to capitalist atrocities. Levins and Lewontin are far from successful in this endeavor. The philosophical stance differs little from that in Engel's *Anti-Dühring* (1878) and *Dialectics of Nature* (1940) except that, where Engels saw metaphysics as the evil force, Levins and Lewontin view Cartesian reductionism as the enemy. The key beliefs of the opposition, however, remain the same:

- (a) Any whole system can be analyzed into homogeneous parts.
- (2) The parts are ontologically prior to the whole and have intrinsic properties that they possess in isolation and convey to the whole.
- (3) Causes are separate from effects. Causes are properties of subjects and effects are properties of objects. There is no difficulty distinguishing subject from object or cause from effect.

In contradistinction to this schema, Levins and Lewontin present their version of dialectical materialism, which consists roughly of five principles:

- (1) The whole is a relation of heterogeneous parts.
- (2) The parts have no prior existence as parts.
- (3) Parts and wholes interpenetrate one another as a consequence of the interchangeability of subject and object or of cause and effect.
- (4) Change is a characteristic of all systems and of all aspects of all systems.
- (5) The Biggie: Contradictions exist everywhere in nature.

This rendition does not differ appreciably from Engels' (1878, 1940), who made many of the same points about how to do research and how to think about scientific questions and did it in much livelier, less jargon-ridden prose. (The writing in *The Dialectical Biologist* is often turgid.) Yet Engels failed to transform science, or else *The Dialectical Biologist* would be unnecessary. It is terribly difficult to tell people how to do research, and even harder to exhort them to do research according to a particular philosophical stance. The proximate aspects of how to do scientific research—frame hypotheses, conduct day-to-day operations, examine assumptions—are probably more effectively transmitted by example and osmosis, through years of watching or collaborating with colleagues.

Levins and Lewontin do a good job of conveying

what they mean by such connotation-laden concepts as part and whole, interpenetration, cause and effect, and even contradiction. Once one knows the meanings, many examples and even some dialectical principles seem straightforward. I will wager that many readers who would as soon be accused of pederasty as of dialectical materialism will find themselves saying, "Of course I always knew that . . ." "We all know that organisms modify their environments; this action is classically viewed as driving ecological succession (e.g., Odum 1971). Similarly, the self-negation, interpenetration of seemingly mutually exclusive categories, and coexistence of opposing principles that are key aspects of dialectical contradiction seem straightforward and unassailable when translated into terms of thresholds, deterministic aspects of random processes, positive and negative feedback mechanisms, and other rather prosaic concepts.

What is really distinctive about Levins and Lewontin's viewpoint is their thorough commitment to a dialectical conception of all problems. One might be convinced by *The Dialectical Biologist* that a dialectical approach to biology could be a fruitful philosophy or mental framework, but that is exactly where Levins and Lewontin, following Engels, demur from Hegel; their contention is that, independently of laws of thought, nature itself is dialectical and that is why it can only be understood by a dialectical approach.

The biggest problem with *The Dialectical Biologist* is that, while the Preface implies that the essays will be examples of science conducted dialectically and that these examples will help us to think and work under the same inspiration, none of the thirteen essays reports on empirical research performed dialectically. Instead, the first six are more or less didactic tracts telling us how to do science or how to think about certain questions. Six of the remaining seven are largely polemics about the role of science and scientists in perpetrating various capitalist horrors.

Dearth of empirical results aside, however, one cannot simply reject as preposterous Levins and Lewontin's provocative statements: one is forced to confront them. Tuberculosis, we are told, is caused as much by capitalist exploitation of workers as by a bacterium. Classical analysis of variance is not only often unable to do the jobs we expect but is frequently misleading. Reductionists are biological determinists. The call at UNESCO for a new information order was aimed at fighting the information monopoly and commercialization of the means of communication. The jarring proclamations occur about one per ten pages. Arguments are generally epideictic, stating as revealed truths that nature is a certain way, or that we think a certain way, or that the way we think is the result of something other than nature, with occasional examples or citations. About half the contentions are carefully argued. The rest seem at first as if they are meant only to rattle our chains, but are embedded in discussions that ultimately make most of them seem at least plausible.

The polemics, except for part of "What is human nature?," seem excellent to me. Not since J. D. Bernal's *The Social Function of Science* (1939) has as trenchant and insightful an indictment been handed down. Many scientists will reject much of this material almost re-

flexively, on political grounds. However, conservative as well as liberal academics will find that "The commoditization of science" has a disturbing ring of truth, while anyone who has worked on agroecosystems, especially in the tropics, should applaud "The political economy of agricultural research" and "The pesticide system."

How we think about the nature of nature, and the nature of science—these characteristics certainly influence how we perform research, and a well-argued essay should be able to affect our views on these matters. For instance, anyone who uses analysis of variance and is not just plugging numbers into a computer program will be forced to think very carefully and in new ways about what he or she is doing. Sometimes Levins and Lewontin score in this way. More often, they are less convincing.

The authors' treatment of ecology is particularly disturbing, questionable at best and remarkably free from alternative considerations. For instance, we are told that the interaction between owls and lemmings helps to establish their population cycles. Some people feel this might be true (e.g., Taylor 1984). Others think it less likely that owls affect lemming cycles (e.g., Krebs 1985), which is the point of Levins and Lewontin's example. All researchers agree that the final word is not yet in, but Levins and Lewontin seem not to recognize that there is a debate. Similarly, discussing the discredited dictum that species diversity and ecological complexity beget stability, Levins and Lewontin contend that this line of reasoning "can only be understood as ideological in origin" (p. 22). Certainly one can argue that there is an ideological component to the persistence of this idea, but it is not the only argument possible. For example, Goodman (1975) outlines a number of common empirical observations, such as the instability of crop monocultures and apparent vulnerability of island communities to invasion, that he and many others feel led to the persistent dogma.

This kind of presentation is unlikely to convince us that Cartesian reductionism is dead wrong and dialectical materialism the correct view. Much less do such arguments demonstrate that science in a reductionist mode must inevitably contribute to societal ills.

Does the book convince us that, whatever the state of nature, a dialectical approach is most fruitful in science? There is not much evidence one way or the other. The authors cite the impact of their own books, *Evolution in Changing Environments* (Levins 1968) and *The Genetic Basis for Evolutionary Change* (Lewontin 1974) as "confirmation of the power of dialectical analysis" (p. viii). The latter was certainly widely cited and perhaps inspirational for several years; it seemed to define a set of fundamental problems in evolutionary genetics. However, it is not clear to me upon re-reading it why it could only have resulted from "a conscious application of Marxist philosophy" (p. 165), or even that it *did* result from such an approach. The former work is more problematic. I believe one could argue that its influence was never large and that several contemporary works that were surely not conscious products of a Marxist approach were much more important in setting the ecological agenda, and many of them treated a similar set of problems. Levins and

Lewontin ask (p. 193) as an aside whether Monod's Marxism was critical to his role in the discovery of genetic feedback mechanisms, an eminently dialectical process, but do not pursue this intriguing possibility. So it remains an open question whether, whatever the state of nature, a Marxist dialectical approach is likely to increase understanding of natural phenomena.

*The Dialectical Biologist* is thus unconvincing on many points that it states as aims. However, it presents such a battery of ideas and so frequently juxtaposes customarily disparate notions that it is a joy to read.—DANIEL SIMBERLOFF, Dept. of Biological Science, Florida State University, Tallahassee, FL 32306.

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