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Book Reviews

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Ant ecology at large

Lach, Lori, Catherine L. Parr, and Kristi L. Abbott, editors. 2010. **Ant ecology**. Oxford University Press, New York. xvii + 402 p. \$150.00 (cloth), ISBN: 978-0-19-954463-9 (acid-free paper); \$62.95 (paper), ISBN 978-0-19-959261-6 (acid-free paper).

Key words: ant behavior; ant biogeography; ant conservation; invasive ants; Formicidae.

A close-up picture of an army ant convoy on the cover of *Ant ecology* surely catches the eye. The much-anticipated book, divided into four parts, includes 16 chapters and 15 plates of high quality pictures. An impressive consortium of mostly junior ant biologists from around the world joins forces in compiling a collection of ant-related works, for the most part published in the last two decades. In his foreword, E. O. Wilson refers to *Ant ecology* as a book that will carry forward the “torch of myrmecology.” While the book offers an updated summary of work conducted in select spheres of ant ecology, those who were craving to read about ant natural history might be left unfulfilled.

Ant ecology is divided into four parts. Part I is devoted to explaining the origin and distribution of ant diversity and to setting conservation priorities. Part II covers topics on ant community dynamics, including competition, mutualistic interactions, and resource use. Part III on population ecology, includes chapters on colonial reproductions and life histories, colony structure, nestmate recognition, and foraging and defense strategies. Part IV is entirely devoted to invasive ants and contains chapters on biogeographic and taxonomic patterns of introduced ants, invasion processes and causes of success, consequences of ant invasions, and invasive ant management.

The first chapter by Phil Ward summarizes the numerous advances accomplished in ant “taxonomy, phylogenetics, and evolution” in recent years. Also included are notes on the natural history and geographic distributions of all known extant ant subfamilies, which sets the stage for the remainder of the book. The following chapter (2, by Brian Fisher) on ant “biogeography” does a good job describing what is known about the evolutionary processes that have led to the current geographic distribution of extant ant species. Within this chapter, the section on “phylogenetic-based biogeography” is a must-read. However, much remains to be learned about the historical biogeography of most ant taxa.

One main objective of *Ant ecology*, as stated in the preface, is to “highlight the contributions of myrmecology to ecology more broadly.” While certain chapters achieve this, they at times get stuck in explanations of general ecological theories, often neglecting to make connections that are specific to ants. It is the case of Chapter 3 (Robert Dunn et al.) on geographic gradients (full disclosure: My Ph.D. advisor and several friends wrote this chapter), which effectively synthesizes the causes and consequences of diversity gradients, but meanders through five pages of diversity theory. On the other hand, select chapters nicely succeed in putting ant ecology into a broader context without compromising on ant natural history. For example,

Chapter 7 (Nico Blüthgen and Heike Feldhaar) focuses on the trophic ecology and on physiological and morphological adaptations of ants that facilitate or constrain the use of diverse food resources and nesting habitats. Among other things, the authors discuss how stable isotopes have taught ant ecologists a few things about the position of ants in food-webs. For instance, the use of stable isotopes led to the discovery that ants in the tropical rain forest act as primary consumers by exploiting large amounts of plant-derived nitrogen through feeding on nectar and honeydew. The series of morphological and physiological adaptations facilitating the uptake, transport, and storage of liquids in ants suggest that exploitation of these food resources might have been key to ants’ ecological success. This chapter offers a gripping synthesis, not just a review, and shows that much of the basic natural history of ants remains unknown and that it will be necessary to uncover this information to gain a better understanding of community organization and mechanisms of coexistence.

A clear strength of the book is the ability of most authors to convey sometimes complex concepts in a way that facilitates understanding, even for readers with a limited knowledge of the topic in question. Chapter 11 is on communication systems in ants, wherein d’Ettorre and Lenoir explain that the ecological success of ants arises from their ability to discriminate nestmates from non-nestmates. This chapter nicely integrates notions in comparative psychology and analytical chemistry without getting entangled in specialized jargon. In addition, the eight-pages-long glossary at the end of the book includes most terms that could give an uninitiated myrmecologist a headache.

The last part of *Ant ecology* is all about invasive ants. Though the current distribution of invasive ant taxa is generally well known, ant ecologists are still at the dawn of understanding which ants are most likely to become invasive and where. Chapter 14 (Krushelnycky et al.) investigates the causes and processes underlying successful ant invasions. Recent debates have arisen regarding the role of disturbance in facilitating ant invasions and here the authors succeed in covering both sides. While some argue that invasive ants are the main drivers of decline in native ant diversity, others argue that they only exacerbate the effect of disturbance. The authors provide a nuanced opinion on the point of contention, but leave no room for misinterpretation in their conclusion that even though there is a clear connection between disturbance and ant invasion, most “invasive ant species are capable of spreading from human-modified habitats into largely undisturbed natural areas if the abiotic conditions are suitable.”

While there is no doubt that invasive ants are among the most disruptive introduced organisms world-wide and that enormous progress has been made in the field of ant invasions, it is unclear why a quarter of *Ant ecology* is devoted to the ecology and management of non-native ants. Surely progress in ant ecology has fed itself on research advances in invasive ants and work on invasive ants has contributed to ecological debates even outside the ant world. But, the over-emphasis on invasive ants detracts from basic work on ant autecology, which is lacking in many chapters. In addition, the broad scope of the book relative to its length results in shallow coverage of some topics and, perhaps, the exclusion of some important subjects in ant ecology.

Lacking in *Ant ecology* is a section summarizing the role of ants in ecosystem functioning. How the daily grind of ants affect ecosystem processes is swiftly discussed, but the book mostly refers to a literature review that is 12 years old, even though there has been a considerable amount of recent work performed and published in this area. Ant ecologists noticeably missing in the list of authors include Xim Cerdá, Blaine Cole, Diane Davidson, Donald Feener, Deborah Gordon, Michael Kaspari, Ulrich Maschwitz, Riitta Savolainen, Walter Tschinkel, and Kari Vepsäläinen though their work is cited on many pages in the book. To be fair, maybe these authors were asked to write chapters but chose not to contribute. But perhaps as a consequence of not having these accomplished ant ecologists write chapters in the book, the amount of information on basic natural history and population biology is often thin. Nevertheless, *Ant ecology* is probably the most complete summary of what is known about the ecology of ants to date. Readers should be aware that the book might be better served as a side dish to an entree such as “*The ants*” (Hölldobler, Bert, and Edward O. Wilson. 1990. Belknap, Cambridge, Massachusetts), which the editors acknowledge in the preface.

Overall, *Ant ecology* is a must-read for first-year graduate students either planning to use ants as a model system or

interested in various aspects of ant ecology. One can find shaded boxes throughout the book that provide pragmatic tips for novice ant ecologists. These informative boxes include basic advice on how to sample and curate ant specimens, as well as tool-kit building tips such as how to get started with stable isotope techniques. In addition, each chapter ends with a “future directions” section that provides explicit and pragmatic advice with regard to exciting research avenues. Most insect ecologists and insect conservationists will enjoy reading the book. More generally, some chapters might interest macroecologists, behavioral ecologists, or conservation biologists. *Ant ecology* will serve as a reference for cutting-edge ecological research on ants by among the most up-and-coming myrmecologists around.

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Practical field methods to inform conservation of insects

Samways, Michael J., Melodie A. McGeoch, and Tim R. New. 2010. **Insect conservation: a handbook of approaches and methods**. Oxford University Press, New York. xv + 441 p. \$125.00 (cloth), ISBN: 978-0-19-929823-5 (acid-free paper); \$55.00 (paper), ISBN: 978-0-19-929822-8 (acid-free paper).

Key words: curation; invertebrates; systematics; taxonomy; voucher collections.

Systematics and taxonomy have been deemphasized in academic curricula and some sponsored research. For example, a number of major government funding programs emphasize multidisciplinary syntheses of existing data, which have generated high numbers of well-cited publications. In the United States, terms of awards for such activities explicitly prohibit using funds to collect field data, including collection by postdoctoral fellows whose field experience is still limited. Without such experience, it is difficult to interpret the results of models, however sophisticated, in terms of ecological significance and reality. Conservation is about actual organisms and actual places, and achieving conservation objectives is far more likely when researchers and practitioners understand and appreciate natural history (Noss, R. F. 1996. The naturalists are dying off. *Conservation Biology* 10:1–3).

Early in my career, I was fortunate to have mentors with decades of field experience. I spent many years working closely with an extraordinary lepidopterist and natural historian, the late George T. Austin, whose taxonomic focus initially shifted from birds to butterflies because there were fewer restrictions on studying insects. As I read *Insect conservation*, I guessed how he might have reacted to the text. At some points, I imagined him nodding emphatically. At others, I imagined a blast of invective.

Insect conservation's greatest strength is its careful descriptions of field methods that no longer are commonly taught, especially in integrative programs supplanting departments whose names end in -ology. I found its greatest weaknesses to be lack of focus and sloppy editing, such as spelling errors in the literature cited and mismatches between citations in the text and literature cited. Some sections of the book address the reader directly, which can be distracting and occasionally a bit presumptuous.

The book is divided into three sections, characterized by the authors as foundations of insect conservation, studies of single species, and studies of assemblages or communities. The stated purpose of *Insect conservation* is to introduce approaches and techniques for insect ecology and conservation. The introduction notes that the book's intended audience is early-career researchers with undergraduate degrees in biology, entomology, or zoology who are “pursuing practical insect conservation work and writing a technical report, thesis, or research paper.” The back cover, however, highlights the book's potential relevance to postgraduate students, conservation practitioners, and professional entomologists. I assumed the cover text was written by the publisher, and therefore concentrated on its potential use by individuals without postgraduate training.

Given the number of monitoring programs that are inappropriate for informing practical decisions about land use or conservation interventions, I was delighted that the authors consistently emphasize the importance of establishing clear objectives and designing data collection accordingly. In an era in which students at some universities are expected to publish multiple articles before commencement, or consultants are pressured to base land-use plans on cursory assessments, the authors emphasize that one season or year of study is insufficient to inform sound management.

In general, introductory sections on practical techniques, such as treatment of specimens, long-term curation, and methods for sampling different groups of insects, are clear and informative. A section later in the book on mark-release-recapture methods also is directly applicable to field studies. The authors recognize that field work never goes as planned, which students often learn only after considerable anguish. Sections on the purpose and merits of pilot studies and responding to the unexpected are sensible and even humorous. I suspect that mention of Malaise traps turning up as kitchen curtains was not hypothetical. Several other introductory sections are appropriate for the audience, but not specific to insects. A chapter on designing sampling protocols for insect conservation, for example, includes material on formulating hypotheses, type I and type II error, grain and extent of sampling, and pseudoreplication.

The content of a chapter on measuring environmental variables likewise is applicable to virtually any taxonomic group, and seems a bit haphazard. For instance, the chapter contains a table of environmental variables to which insects may respond. Comments for some variables, such as cloud cover, provide guidance on measurement methods or sources of data. By contrast, “invasiveness” of non-native plants is not defined, and there is no guidance on either the nature of “past events” that one might attempt to quantify or feasible metrics. Nor does the chapter reference digital sources of data such as digital elevation models from which elevation, slope, and aspect can be derived at relatively high resolution.

Several chapters address estimation of abundance, status and trend of populations, and landscape ecology. A few sections seem superfluous given the numerous existing treatments of these topics. Nevertheless, the authors explain how general approaches such as transects can be applied to studies of insects in terms of the spatial and temporal sampling frame. Some material seemed a poor fit for the target audience. A lengthy explanation of threat categories used by the International Union for Conservation of Nature (IUCN) may have limited relevance to an individual with a bachelor's degree who is writing a report. Heavily quantitative sections also may be perplexing. For example, compound Poisson distributions and measures such as Taylor's power law are mentioned without explanation.

The book dedicates considerable attention to ethics. With George's voice punctuating my thoughts, I wondered if a number of the statements about collecting insects might be exaggerated in a book aimed at professionals. For example, the authors state, “when very rare or threatened species are studied, the capture or removal of any individuals may be prohibited or a serious threat.” Prohibited, yes, but handling or taking a limited number of individuals incidental to research (presumably to understand stressors or potential management to benefit the taxon) rarely will increase the probability of extirpation or extinction. The mean annual abundance of insects listed as threatened under the U.S. Endangered Species Act often is more than several hundred thousand. When early-career professionals are reluctant to take specimens, and regulatory agencies and the public are reluctant to sanction take in the course of well-designed research, data quality and inferences can suffer.

The authors also advocate digital photography as an alternative to collecting. In my experience as both novice and supervisor, it is virtually impossible to learn identification without taking vouchers. Photographs—especially photographs taken in typical field conditions—do not serve as a credible means of identification of all species in an assemblage, especially vagrants. Encouraging no-touch insect watching may be an excellent means of engaging the lay public in efforts to conserve these animals and their habitats. Gaining deep expertise in natural history of insects and maximizing the probability of their persistence, however, can involve a modest amount of blood on the hands as well as mud on the boots. I am not suggesting gratuitous take, but an acceptance that conservation requires sacrifices of a few individual insects as well as difficult choices by humans.

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Reaching higher in conservation

Sodhi, Navjot S., and Paul R. Ehrlich, editors. 2010. **Conservation biology for all**. Oxford University Press, New York. vi + 344 p. \$130.00, £70 (cloth), ISBN 978-0-19-955423-2 (acid-free paper); \$65.00, £34.95 (paper), ISBN 978-0-19-955424-9 (acid-free paper).

Key words: conservation biology, conservation science.

If a book could receive a standing ovation—this one is a candidate. Sodhi and Ehrlich have created a comprehensive introduction to conservation biology that is accessible intellectually, and financially, to a broad audience—indeed it is *Conservation biology for all*. The book is divided into 16 chapters that can stand alone and are complementary when

read in sequence. The authors make excellent use of cross citations of chapters, a useful and often overlooked feature in texts of this nature. In the introductory chapter, Sodhi and Ehrlich eloquently summarize the gravity of the conservation crisis and still retain an optimistic outlook that encourages the reader to continue. I particularly found their recognition of population growth, consumption, and ethics in the conservation arena refreshing and a step toward what will likely become the next major issues of discussion and research in the conservation field.

The quality and clarity of the writing makes this book an invaluable asset to the conservationist's toolbox. In Chapter 1, the description of the emergence of the conservation field provides a foundation for understanding how the field of conservation has changed and is changing. Chapters 2 through 12 summarize the major accomplishments and emerging areas

of conservation research, detailing progression in pertinent domains such as ecosystem services, climate change, invasive species, and extinction. Peres's "overexploitation" chapter astutely presents the current state of research surrounding hunting and extraction, flagging knowledge gaps such as understanding the impacts of selective logging, how extraction of non-timber forest products (NTFPs) affects demographic viability of plant populations, and the degree to which spillover from source-sink populations can sustain human needs for protein. In this regard, *Conservation biology for all* may be viewed as a resource for students searching for a pertinent research topic.

Chapters 13 to 15 focus explicitly on the human role in conservation exploring issues at the boundary between conservation and the social sciences. Claus et al. (Chapter 14) stands out among other conservation texts in its unabashed premise that, "understanding human activities and human roles in conservation is *fundamental* to effective conservation," (emphasis mine). The authors' eloquently describe the complex interplay of the disciplines within conservation biology highlighting the importance of incorporating the social dimensions beyond empty rhetoric. Claus et al. explore the role of power, equity, institutional and cultural beliefs, and governance in affecting conservation outcomes including excellent integration of succinct case studies.

In the final chapter, Bradshaw and Brook provide an overview on the "tools" for designing and analyzing ecologically grounded conservation research. This chapter is likely to be the most challenging for non-English speakers based on the

inclusion of technical language and basic statistics. Though I commend the authors for their extensive references, I would have appreciated a few examples to clarify some of the techniques described (i.e., replication versus pseudoreplication, randomization, or the importance of controls). Furthermore I would have liked to see a similar chapter focusing on social science methods of data collection.

A final aspect that I would particularly note is the editors' explicit targeting of people from tropical countries and intention to, "[p]rovide cutting-edge but basic conservation science to developing as well as developed country inhabitants." True to the editors' declaration, the book is available for free download online (www.ebook3000.com). The editors, in partnership with the publishers, have also arranged that the proceeds from the book will go toward the purchase and distribution of hard copies for conservationists in developing nations who would otherwise be unable to purchase the book. This is an ethic that I hope we can all emulate to achieve the common goal of conservation biology for all.

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