

Revue des livres

Book Review

AGOSTA W. C., 2001. *Thieves, Deceivers and Killers: Tales of Chemistry in Nature*. Princeton University Press, 241 p., 15.5 × 24.5 cm, hardback, US\$26.95, ISBN 0-691-00488-9.

As a child one of the reasons I always looked forward to weekends was the chance to read Ripley's *Believe it or Not* in the Saturday paper, especially those related to any biological topic. As a scientist I have retained this fascination of the oddities of nature and thus it is not surprising that this most recent book by Professor William Agosta appeals to me. There are a plethora of tales where truth is stranger than fiction: Flowers that mimic female bees to deceitfully attract males as pollinators, unicellular ciliates that change from a free living form fed on by the mosquito larvae to a parasitic form that exploits its predator in the presence of odors from the insect, or an amphipod high jacking a distasteful sea butterfly and carrying it around on its back to reduce fish predation.

However, this is not just a "gee wiz" book of examples from a diverse array of ecological systems. Professor Agosta provides insights into the chemical mediation of the various systems, ranging from two to more complex multi-species interactions. In addition he underlines the areas where explanations remain to be elucidated, a good source for those in search of fascinating research ideas. Furthermore, he points out just how easily these intricate chemically mediated interactions may be accidentally disrupted, with rather severe ecological consequences. For example, the accidental introduction of an ant *Linepithema humile* into South Africa has endangered the survival of a number of plant species in areas where the indigenous ants have been competitively displaced by the introduced species. The local ants play a major role in the dispersal and survival of seeds which *L. humile* does not.

Today there is considerable interest in natural products as a source of alternative medicines. Professor Agosta provides some historical background to mankind's use of natural products for medicinal purposes and the relative merits of different compounds, including an interesting discussion of the placebo effect. He also discusses the future of natural products as medicines and ecologically acceptable means of controlling pest species. However, as he points out we must understand the basics of chemically mediated interactions in nature to facilitate the discovery of natural products with considerable potential for humans.

My only criticism of this book is minor and pertains to the very stylized illustrations. I did not find them particularly useful and they certainly are not of the quality used by Professor Agosta in his earlier book *Chemical Communication: The Language of Pheromones*. However, this personal opinion certainly does not stop me from strongly recommending this book, which should be of interest to laypersons and scientists alike. There is a great deal of information and the overall message is summed up in the book's closing sentences: "Our self interest and well-being will be well served if we are solicitous of the living world and committing ourselves to long-term health. Besides it is an absolutely fascinating place."

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DUGATKIN, L. A. (ed.), 2001. *Model Systems in Behavioral Ecology. Integrating Conceptual, Theoretical and Empirical Approaches*. Princeton University Press, ix + 551 p., 15 × 21 cm, paperback, US\$35.00, ISBN 0-691-00653-9.

Shortly before receiving this book for review, I had lunch with a group of young scientists at the Northwest Fisheries Science Center in Seattle. During this lunch, one of the colleagues complained about the way "model" organisms are viewed in molecular and cell biology: as subjects to be taken apart, with little consideration for the organism as a whole.

This wonderful book makes it clear that model systems play a different role in behavioral ecology. Dugatkin set out to show how a model system can allow integration of conceptual, theoretical and empirical (including experiments with computer organisms) approaches to important problems in behavioral ecology. The appropriate mix of theoretical/empirical will vary with question and investigator, but both are important (Fretwell's, 1972) preface on these matters is still worth reading), and indeed theory often leads to empirical work, as well as the reverse. Much of the motivating theory is the theory of games; the volumes of Maynard Smith (1982) and Hamilton (1996) are excellent technical companions. The recent interest in John Nash as a person (Nasar, 1998) brings the theoretical ideas into a broader context.

Each part of the book (insects/arachnid systems, fish/amphibian/reptile systems, bird systems, mammal systems) has about half a dozen chapters, so that one can surely find a favorite organism (or close relative) here. Edited volumes often suffer from an unevenness of style and depth. Dugatkin avoided this problem by asking each author to make his or her essay somewhat autobiographical. We thus learn how each investigator became interested in the problem and chose the model system for investigating that problem. As with everything else in life, serendipity plays a role in both finding the question and finding the system. Dugatkin also selected authors who seriously consider all three aspects of their question (theoretical, conceptual, empirical). The pattern of the chapters is roughly the autobiographical sketch explaining how the investigator got to where he or she is, a description of the model system, then the use of the model system in answering an interesting series of questions in a way that allows integration of theoretical and empirical issues, and ending with a discussion of the future. In these chapters, we see that some authors have been in love with their systems since youth, others stumbled upon them, and others chose them to answer a particular question. But we also see the virtues of the focus on a single species and long-term studies. We see that in some cases, a long-term study may generate unique data sets that allow new discovery without additional field work; the recognition of value in this one characteristic that separates behavioral ecology from natural history. To be sure, although the style is uniformly high quality, I still have my own favorite chapters (as does Dugatkin, and as will any reader), but this information is classified.

Behavioral ecology began as a synthetic discipline, but has rightly matured and has much to offer other fields of science by looking outward rather than inward (Mangel, 1997; Caro, 1998; Clark & Mangel, 2000). Dugatkin's closing thoughts focus on the connection between behavioral ecology and Darwinian medicine, perhaps one of the most exciting and new areas in which notions of coupling proximate and ultimate mechanism, and integration of conceptual, theoretical and empirical approaches will provide deep and long-lasting impact.

We all should own this book. Professionals can open it and have a conversation with a friend. Graduate students can use it to help them shape the kind of scientist they want to be. Undergraduates who are thinking about a career in behavioral ecology will find it incredibly useful. Many of the authors provide direct advice to students who want to know how to pro-

ceed for a career in behavioral ecology; this advice resonates with the algorithm of discovery given by Paydarfar and Schwartz (2001), which should not be too surprising since the psychology of discovery and creation is the same across wide ranges of intellectual endeavor. And the autobiographical aspects of each chapter make it the perfect gift for the friend, partner or in-law who keeps asking "Just what is it that you do?"

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GENSEL P. G. & D. EDWARDS (eds), 2001. *Plants Invade the Land: Evolutionary and Environmental Perspectives*. Columbia University Press, x + 304 p., 15 × 22.5 cm, paperback, US\$32.00, ISBN 0-231-11161-4.

The colonization of land by green plants was one of the cornerstone events in Earth's history. In many ways, the early history of land plants set boundary conditions on the terrestrial ecosystems we study today. However, most of the groundbreaking work on this interval has been published in specialty journals where ecologists seldom stray. *Plants Invade the Land: Evolutionary and Environmental Perspectives* attempts to synthesize a broad range of perspectives on the early history of land plants, with the goal of presenting them to a broad audience. The editors succeed to a significant extent, but beware...this remains a book for those already familiar with the basics of plant paleontology.

The edited volume arose from a symposium held at the Fifth International Organization of Paleobotany Conference held in Santa Barbara, California in 1996. The symposium's goal was to bring together an international community of scientists interested in early land plants to (i) synthesize the past century's accumulated knowledge, and (ii) put the early evolution of land plants into an Earth system context.

A highlight of the volume is the series of synthetic papers which review and interpret much of the last century's work on early land plant paleobotany. For example, Dianne Edwards and Charles Wellman summarize the evidence for the timing of the embryophyte (green plants with embryos, which today include moss, liverworts, hornworts and vascular plants) invasion of land. They document trends in size increase and growth form change that may be among the few clear examples of directionality in

evolution. Linda Graham and the late Jane Gray synthesize the morphology of early land plants to provide ecophysiological interpretations. And in a particular gem, William Shear and Paul Selden provide the most comprehensive review to date of the animal hitchhikers that, with plant colonists, formed the earliest terrestrial food webs.

Synthetic reviews are interspersed with original research papers that add new primary data to discussions of early land plant history. Among these, Hans Kerp and colleagues provide the first detailed look at *Nothia aphylla* from Scotland's Rhynie Chert. They argue that *Nothia* grew by subterranean rhizomes, the first definitive example of this strategy. Hao Shou-Gang and Patricia Gensel present a new plant assemblage from Yunnan Province, China, that expands the biogeographic perspective on early land plant evolution. Finally, Carol Hotton and colleagues analyze the sedimentary environment in which the Early Devonian land plants of Gaspé, Canada were preserved to suggest diverging environmental preferences among lineages. Their detailed descriptive approach serves as a model for future research of this type.

The volume's final chapters illustrate the geochemical transformation Earth experienced as green plants colonized land. Robert Berner uses his familiar model to show that land plants permanently reset the carbon dioxide composition of the atmosphere. Although this paper provides a welcome connection between biological evolution and Earth's physical and chemical systems, its contents will be familiar to those who have read Berner's previous publications. Steven Driese and Claudia Mora present empirical evidence for the decline in paleoatmospheric carbon dioxide during the Devonian. Their careful analysis of fossil soils and associated rooting structures also shows the increasing complexity of the soil system during the Devonian land plant radiation. Finally, Thomas Algeo and colleagues present a more detailed version of their hypothesis linking the rise of terrestrial plant communities, weathering and the Middle-to-Late Devonian marine anoxic events. Again, the idea has appeared elsewhere. This version is somewhat more comprehensively argued.

The biggest surprise of this volume is what's missing. The systematics of early land plants has long been a quagmire. Thankfully, Gensel and Edwards choose not to revisit the issue. In so doing, however, they have bypassed important recent work in the phylogenetic analysis of early land plants. This may reflect Edwards' opinion that "the record remains a very patchy one and makes any conclusions on phylogenetic relationships, evolutionary and migration rates, and global distributions highly conjectural," (p. 3). However, a little conjecture would have rounded out the volume, which is otherwise noteworthy for exploring disciplines and data not traditionally applied to the early history of land plants.

Despite its breadth and synthetic scope, this remains a book for specialists. For those not already familiar with the Llandoveryan or the ins-and-outs of rhizoidal ridges, this book will be awash with unfamiliar terms. More significantly, the volume lacks the context of space and time that could successfully transport an ecologist into the strange world of the Devonian land invasion.

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KEDDY, P. A., 2000. *Wetland Ecology: Principles and Conservation*. Cambridge University Press, xiv + 614 p., 15 × 23 cm, paperback, US\$52.95, ISBN 0-521-78367-4.

Wetlands have long captured the popular imagination and inspired some of the world's most maudlin poetry because of their haunting beauty and diversity. These habitats lying at the interface between upland and open water have proven fascinating to both scientist and layperson and