

Book Reviews

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BURNING AMBITIONS: THE SCIENCE AND POLITICS OF FIRE ANT CONTROL

Buhs, Joshua B. 2004. **The fire ant wars: nature, science, and public policy in twentieth-century America.** University of Chicago Press, Chicago, Illinois. x + 216 p. \$55.00 (cloth), ISBN: 0-226-07981-3 (alk. paper); \$22.50 (paper), ISBN: 0-226-07982-1 (alk. paper).

Key words: conservation; fire ants; Formicidae; invasive ants; pest control; public policy; *Solenopsis invicta*.

Fire ants. These two words are now permanently seared onto the physical and cultural landscape of the southeastern United States. Today the red imported fire ant, *Solenopsis invicta*, inhabits nearly 300 million acres in the southeastern United States and is establishing itself in southern California. It occupies virtually all disturbed open habitats, and in some places has managed to invade woodlands and traffic light control boxes. Seventy-five years of interactions between the fire ant and southerners have produced a history rich in exaggeration, invention, and humor. *S. invicta* is blamed for billions of dollars in damage to agriculture and is considered by some to be a threat to public safety and the environment. Attempts to control it have inspired such novelties as the wind-powered McCoy Ant Stomper[®] and the ant-zapping Yardvark[™] (not to mention the over 200 million dollars spent by state and federal governments). The fire ant is the subject of songs and tall tales, a critical ingredient in several chili recipes, and the inspiration for the annual Fire Ant Festival in Marshall, Texas. Despised in many circles and venerated in some, the fire ant today is easily the most notorious invasive insect in the United States.

It is against this backdrop that Joshua Blu Buhs tells the history of the fire ant invasion and the state and federal efforts to eradicate or control it. Buhs had access to a vast amount of unpublished archival material in private and public collections, so that his book must be considered the definitive historical account of the “fire ant wars.” Buhs’s goal in writing his book was “to investigate how human history and the natural history of an animal have intertwined, and the consequences of that relationship for both the animal and for us.” This he does very well, but it is the theme of seemingly countless other books as well. What really sets this book apart is the historical detail Buhs provides of interactions among federal bureaucracies, universities, individual scientists, and the American public from the beginning of the fire ant invasion until the end of the 20th century. As someone who has worked on fire ants, I am familiar with much of this history, but certainly not in the detail provided by Buhs. It turns out these details are essential to the story, which I found both fascinating and disturbing.

Two themes emerged from Buhs’s historical analysis of the fire ant eradication/control program and reaction to it. First, many of the decisions regarding this program were governed more by bureaucratic and personal ambitions than by hard

data and good science. In the 1950s within the USDA, the fire ant served as a fulcrum in the power struggle between the Plant Pest Control Division (PPC), which advocated eradication via pesticides, and the Entomological Research Division (ERD), which advocated a biological solution to the fire ant problem. Through political maneuvering, the PPC grew in power and influence at the expense of the ERD, and its “chemical solution” to the fire ant problem was implemented. In hindsight this eradication program was doomed to fail from the beginning due to a lack of interest at the PCC in understanding the potentially complex ecological interactions affected by broadcast application of pesticide and its impact on non-target organisms. According to Buhs, this insensitivity to the ecological consequences of pesticides played an important role in the emergence of the modern environmental movement and the formation of the Environmental Protection Agency in 1970, a federal bureaucracy with its own set of ambitions. Buhs’s book reminded me of the central role the fire ant eradication program had in Rachel Carson’s book *The silent spring*. It is doubly ironic, then, that the ERD, when denied a role in the fire ant control program, applied its biological perspective to the screwworm problem in southern cattle by implementing the sterile-male release program, which is still today one of the most impressive examples of successful biological control. One cannot help but wonder how different history would be if the ERD was allowed to pursue the fire ant problem instead of the PCC.

Buhs also documents the role played by fire ants in the professional ambitions and career advancement of several well-known myrmecologists. As a myrmecologist myself, I enjoyed reading about how these conflicting ambitions and professional jealousies played out among people whose work I know and admire. My favorite quote in the book is attributed to W. S. Creighton, E. O. Wilson’s predecessor as North America’s greatest myrmecologist, who in a 1968 letter to M. S. Blum, longed for the day “when *Solenopsis* can be regarded as just another genus of ants—not a springboard for personal advancement or a means for extracting large sums of money from the government.” Not surprisingly, Creighton’s wish is no closer to being true today than it was in 1968. Ambition and jealousy are on display in a new generation of fire ant researchers as they jockey for fame and funds. These rivalries are the human side of science and, as long as they promote new ideas that are freely exchanged, they serve the cause of science. However, when they are transformed into rivalries among soulless bureaucracies with access to vast sums of non-competitive, pork barrel funding and political power, they can do great damage, as the fire ant “eradication” program illustrates.

A second theme that emerges from Buhs’s book is how seemingly unimportant hard facts and good data were to the whole fire ant control program. From what I can tell by reading Buhs’s book, for years much of the evidence for the agricultural damage caused by fire ants was based on a late

1940s study by a very young E. O. Wilson and J. H. Eads in central Alabama. Apparently, Wilson and Eads's study was not replicated and expanded as the fire ant spread throughout the southern United States, and much of the subsequent "data" on damage caused by fire ants was based on hearsay and studies extremely limited in scope. Moreover, there was no real consensus among entomologists on the pest status of fire ants. Depending on the situation of a particular study and the people involved, the fire ant was rated as a pest as dangerous as communism, a minor nuisance, or actually beneficial. Even E. O. Wilson later vacillated on the pest status of the fire ant. This is not the sort of foundation on which a federal agency should start a multi-million dollar eradication program. Lack of solid data on the ecological effects of pesticides or other potential control methods also plagued the fire ant control program, nor did there seem to be much interest within the USDA in collecting such data. It is utterly astonishing that the departments within the USDA responsible for the fire ant program seemed so uninterested in detailed studies of ecological interactions and the application of well-grounded ecological theory. Once studies were conducted, evidence suggested that the broadcast application of pesticides did more harm than good and may have actually

facilitated the spread of the fire ant. It is hard not to conclude that the whole fire ant control program was driven more by politics and bureaucratic self-interest than by necessity backed by solid science.

Buhs ends the *The fire ant wars* on an upbeat note by describing a return to basic science and the re-emergence of a biological solution to the fire ant problem, as first advocated by the ERD. Biological control by phorid flies shows promise, but as the one who first suggested the paradigm now being implemented by the USDA, I am troubled by the absence of convincing data that these flies play a role in population regulation in the fire ant's native range in Brazil and Argentina. The fire ant will continue to amaze and challenge us for years to come. All of us who work on fire ants should read this book and take its lessons to heart, as should anyone interested in the interaction between science and public policy.

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PIPER: COMPARATIVE BIOLOGY OF A HYPERDIVERSE GENUS

Dyer, Lee A., and Aparna D. N. Palmer, editors. 2004. *Piper: a model genus for studies of phytochemistry, ecology, and evolution*. Kluwer, New York. xiii + 214 p. \$120.00, ISBN: 0-306-48498-6.

Key words: comparative biology; multitrophic interactions; chemical defense; hyperdiverse genus.

This slim volume approaches comparative biology from a perspective rarely seen in book-length treatments. In evolutionary ecologists' libraries, books that focus on processes (arms races) or patterns (species diversity) jostle for shelf space with tomes on biogeographical provinces (Madagascar) or biomes (tropical rain forests). Books that focus on a single evolving lineage as a case study in adaptive radiation are unusual. They do include some classics, though; Lack's *Darwin's finches* comes to mind. As well-resolved phylogenies become increasingly available, taxon-centered studies like this book should become an evermore attractive and instructive format for synthesis in evolutionary ecology.

The book's premise is that species-rich lineages such as *Piper* are convenient models for studying questions of general interest using comparative methods. Summarizing how this model group has already served, the editors and authors have also evidently aimed to attract others to its study, by offering well-dosed, well-founded speculation and by identifying, at the end of most chapters, questions for the future. Graduate

students looking for ideas or groups with which to test their ideas, should find this book interesting.

What do hyperdiverse lineages such as *Piper* offer? As emphasized by Nancy Greig in her introduction to the book, most important is the opportunity they afford for comparative study of the functioning of hundreds of often only slightly different versions of the same basic set of adaptations. With sources of potentially confounding variation thus minimized, it becomes easier to use correlations between traits to infer causal mechanisms, and to design experiments to test these inferences. As Greig points out, *Piper* spp. present additional advantages, for example, the ease with which they can be clonally propagated, allowing the design of replicated experiments that remove genetic variation as a potential confounding factor.

What questions are treated in this analysis of a radiation? Reflecting the interests of the still-small band of scientists that have followed the *Piper*, most of the book's 11 chapters are focused on the web of interactions between *Piper* and animals. Letourneau's chapter provides a lively summary of her extensive work on the ant-plant protection mutualisms that characterize some species, illustrating how the study of a pairwise interaction evolved into an investigation (in collaboration with the book's senior editor) of trophic cascades in communities. Gastreich and Gentry's contribution further develops the theme of *Piper* as a model for studying indirect interactions. *Piper* defenses against herbivores include not only protective ants, but also chemicals. Dyer, Richards, and

Dodson treat the chemical ecology of *Piper* amides, among the most characteristic secondary metabolites of the genus. Although their chapter is focused on amides, comparatively well studied, they emphasize the diversity of potential allelochemicals present and the great potential for synergistic interactions between them.

Piper depend on animals for pollination and seed dispersal, and two chapters treat these transport mutualisms. Fleming's contribution is a masterly review of *Piper* seed dispersal ecology, in which bats play the leading role, at least for neotropical species. (As emphasized here and elsewhere in the book, there are gaping holes in our knowledge of the evolutionary ecology of Old-World *Piper*.) Fleming also offers ideas about how distribution patterns, and ultimately genetic diversity and speciation of *Piper*, may be influenced by the foraging ecology of *Piper* bats. De Figueiredo and Sazima's chapter on pollination ecology is also information rich, although I found unconvincing their focus on competition and character displacement as forces shaping *Piper* floral phenology, composition of insect visitors, and species coexistence. Reading this chapter inspired the thought that hyperdiverse lineages such as *Piper* could play particularly important roles in testing some aspects of Hubbell's "neutral theory" of community ecology. If ecological drift is an important process, there should not be any concerted pattern of commonness across communities; different species should be rare in different places. Is this true of *Piper* spp., or are species that are abundant locally also frequently encountered across the landscape? Such a pattern would run against predictions based on ecological drift.

The evolution of several Old-World species of *Piper*—most notably *P. nigrum* (black pepper) and *P. methysticum* (kava)—has been strongly influenced by interaction with another kind of animal, *Homo sapiens*. Domestication is touched upon only in two chapters focused on phytochemistry, that by Dyer et al. mentioned previously and that by Briskin et al., which sketches the history of kava use as a prelude to a detailed treatment of kavapyrone production in tissue culture. It would have been interesting to complement this contribution with a treatment more evolutionary in its orientation. Kava, in particular, has undergone fascinating evolutionary change under domestication, including the apparently complete loss of sex. This and other consequences of the interaction of *Piper* with a peculiar primate would have been a very interesting story.

Analysis of adaptive radiations depends on having good phylogenies on which to build and test evolutionary scenarios. The chapter by Tepe, Vincent, and Watson presents the book's only explicit use of a molecular phylogeny in comparative analysis of adaptive radiation in *Piper*. Their in-depth and interesting treatment of the evolution of ant-associated plant structures in *Piper* sect. *Macrostachys* exemplifies what could be done with traits in many other functional domains, once information on traits is available for a wider range of species. Jaramillo and Callejas show where we stand in our

knowledge of phylogenetics of the genus as a whole. Their demonstration of evolutionary trends in morphology of inflorescences and flowers, as well as architecture, shows the potential of their phylogenies for studying the evolution of adaptation in *Piper*, once studies are able to link morphology and function.

The chapter by Marquis on biogeography of neotropical *Piper* presents a rich synthesis of patterns of diversity and abundance of *Piper* in 40 sites across Central and South America. In interesting counterpoint to the rest of the book, Marquis emphasizes abiotic factors, finding little evidence that biotic interactions have driven diversification of *Piper*, or that they limit the number of *Piper* species present in a site. I found myself wishing that he had gone a step further and grasped the nettle of neutral theory, for the data he has at hand on relative abundances and species distributions would certainly seem pertinent to examination of some of its predictions. The book closes with a tightly written four-page summary by Jaramillo and Marquis of the biggest open questions.

The book is generally well edited, with relatively few typographical errors, except in the index, where I counted at least seven (most concerning Latin names) for 10 pages. The few factual mistakes I found were of little consequence (*Pachysima* [now included in *Tetraponera*] ants are not "small" but the largest pseudomyrmecines known!). The book is also attractively produced. My only gripe is that a good proportion of the black-and-white photographs are too dark, insufficiently contrasted, or too small, to be very informative.

How well does the book do in attaining its objectives? Fairly well, given the gaps that exist in our knowledge of the genus. Accurately reflecting the current imbalance between studies in the Neotropics and in the Old World, between studies of biotic interactions and of abiotic factors such as climate and soil, the book is a progress report rather than a definitive synthesis, ore to be panned rather than a collection of nuggets. Is *Piper* for everyone? For different questions, different models. Any hyperdiverse group has something to offer comparative biology. The genus *Ficus* and its agaonid pollinators, with at least 800 different versions of a nursery pollination mutualism, offer far greater opportunities than any other lineage for the comparative study of questions ranging from the stability of mutualisms to the evolution of sex ratios. Another hyperdiverse genus, *Acacia*, has served for other questions. *Piper*, much less diverse in life form, morphology, and ecology, has also found its uses, as this book shows.

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NO-TAKE RESERVES

Sobel, Jack, and Craig Dahlgren. 2004. **Marine reserves: a guide to science, design, and use.** Island Press, Washington, DC. xviii + 383 p. \$70.00 (cloth), ISBN: 1-55963-840-0 (acid-free paper); \$35.00 (paper), ISBN: 1-55963-841-9 (acid-free paper).

Key words: conservation; ecosystem-based management; environmental policy; marine protected areas; no-take reserves.

Commercial, recreational, and subsistence fishing are devastating the biota of the world ocean. The impacts of fishing extend well beyond the drawdown, genetic alteration, and ultimate extirpation of target populations. Collateral damages include the wholesale destruction of bycatch and physical habitat, as well as cascading ecosystem effects. Scientists and managers have become increasingly convinced that the most effective means of conserving marine life is to establish marine reserves in which extractive activities are prohibited. Although designing, implementing, and monitoring no-take marine reserves are to some extent context-dependent, ad hoc exercises, there are some guiding principles that can be brought to bear. This book supplies those principles, along with a sober evaluation of the efficacy of no-take reserves, in language comprehensible to the general scientific reader.

The book begins with four chapters by Sobel and Dahlgren on the rationale for no-take reserves. The following three chapters, contributed by Joshua Nowlis, Alan Friedlander, and Michael Mascia, explore scientific and social issues pertaining to the design, monitoring, and success or failure of reserves. Case studies from the West Coast (Nowlis), the Bahamas (Dahlgren) and Belize (Janet Gibson and colleagues) highlight the mixed success of no-take reserves and the pitfalls to avoid. The book concludes with a global review of case studies by the principal authors.

In the introductory chapter, Sobel and Dahlgren assert that traditional, single-species approaches to marine conservation have failed. No-take reserves are seen as the workable approach for protecting populations of target species, enhancing fisheries beyond the reserves' borders, and fostering the proper functioning and resilience of ecosystems. Many fisheries scientists, conservationists, policymakers, and managers are convinced of the utility of no-take reserves, although there are some legitimate dissenters.

The critical problem is not whether marine reserves are a valuable tool for conservation; clearly they are, even for migratory fish, lobsters, and conch, as Dahlgren shows with data from the Bahamas (Chapter 9). Nor is it controversial that reserves, whether considered individually or in networks, can enhance fishing outside their boundaries; there are many examples of spillover effects. Rather, we must confront the issue of whether no-take reserves are capable of fixing or helping to fix ecosystems, considering that many other types of disturbance operate on scales far larger than the reserves. How well can they be expected to perform in the face of overwhelming environmental perturbations, which are not easily prevented or controlled?

In a number of situations, no-take reserves have restored aspects of ecosystem function. For example, overharvesting of the muricid gastropod *Concholepas concholepas* has drastically altered community structure along the rocky coast of Chile. *Concholepas* populations have recovered inside no-take reserves, and the intertidal communities have reverted to their previous condition. Likewise, the sea otter (or predatory fish, or lobster)–sea urchin–kelp chain of interaction in the rocky subtidal at temperate latitudes is a reasonably straightforward story of cascading effects of predator removal. In this case, evidence for ecosystem-level benefits of no-take regulation comes from California (Chapter 8) and New Zealand (Chapter 11). But can the same be said for coral reefs? The replacement of corals by macroalgae (seaweeds) on Caribbean reefs is routinely held up as the salient example of how fishing has caused wholesale ecosystem collapse.

The first thing that jumps out in the discussion of coral reefs is Fig. 2.2, a graph reproduced from Toby Gardner's recent paper in *Science* (Gardner, Toby A., Isabelle M. Côté, Jennifer A. Gill, Alastair Grant, and Andrew R. Watkinson. 2003. Long-term region-wide declines in Caribbean corals. *Science* 301:958–960). This graph shows the results of a meta-analysis of reef studies in the Caribbean. Regionally, coral cover has declined from 50% in the late 1970s to 10% now. Most of the drop represents the loss of acroporids—staghorn and elkhorn corals—which were dominant space occupants and major framework-building components of Caribbean reefs until the 1980s. Sobel and Dahlgren explain that overfishing of herbivorous parrotfish and surgeonfish left the sea urchin *Diadema* as the most important herbivore on many Caribbean reefs. The effect was especially clear on severely fished reefs such as those along the north coast of Jamaica. Concomitantly, overfishing released *Diadema* from their predators and the *Diadema* increased. All of this is fairly accurate, although there is some thought that *Diadema* were abundant even before fishing pressure intensified. What followed, however, is the subject of a contentious debate.

Sobel and Dahlgren build a scenario in which the regional extirpation of *Diadema* populations by disease in 1983–1984 combined with the pre-existing absence of herbivorous fish and coral mortality from hurricanes to promote macroalgal overgrowth. In a nutshell, you have to kill corals before the loss of herbivores is manifested as overgrowth by seaweeds. This description accords with the known sequence of events, but in the pages that follow the authors contradict themselves. They quote a 2001 *Science* paper (Jackson, Jeremy B. C., Michael X. Kirby, Wolfgang H. Berger, Karen A. Bjorndal, Louis W. Botsford, Bruce J. Bourque, Roger H. Bradbury, Richard Cooke, Jon Erlandson, James A. Estes, Terence P. Hughes, Susan Kidwell, Carina B. Lange, Hunter S. Lenihan, John M. Pandolfi, Charles H. Peterson, Robert S. Steneck, Mia J. Tegner, and Robert R. Warner. 2001. Historical overfishing and the recent collapse of coastal ecosystems. *Science* 293:629–637), which asserted that Caribbean reefs changed because the corals were overgrown and killed by macroalgae after the *Diadema* died.

As my colleague Bill Precht points out, Gardner's graph clearly shows that the first major drop in coral cover around the Caribbean, from 50% to about 25%, occurred from 1977 to 1982, before the mass mortality of *Diadema*. Coral cover held steady from 1982–1987, a period that included the urchin dieoff, and then coral cover declined again around 1987, and again around 1997. The first period of coral decline coincided with an outbreak of white-band disease, which killed staghorn and elkhorn corals throughout the Caribbean. The other two coral declines followed major bleaching events.

Macroalgal overgrowth did not kill the corals. They were killed by regional and global effects, regardless of whether or not herbivory and predation were locally intense. This makes conserving coral reef ecosystems and reversing degradation extremely difficult, a point to which Gibson and colleagues allude for Belize in Chapter 10.

Macroalgal overgrowth has suppressed the recruitment and recovery of coral populations in the Caribbean. The recovery of *Diadema* populations in a few places has reduced macroalgal cover and stimulated coral recovery. Could no-take regulations that protect herbivorous fish accelerate a return to coral dominance? Possibly, so long as other stressors such as disease outbreaks and bleaching episodes do not cause subsequent mass coral mortalities. Monitoring the long-term

response of corals to no-take protections following the worldwide, El Niño-related coral kill of 1997–1998 will be critical in this regard.

To quote a pathetic statistic from Chapter 1, less than 1% of the area of marine waters in the U.S. is protected, and less than 1% of that area is protected by no-take regulations. On the positive side, 33% of the Great Barrier Reef was set aside as no-take reserve in July 2004, representing a huge increase from the original 5%. That action will doubtless help both ecologically and economically. Precautionary management using no-take marine reserves will not buffer marine ecosystems from every large-scale perturbation, but no-take reserves are clearly essential in the fight to save what remains of our natural heritage in the seas. Sobel and Dahlgren charge us with also confronting climate change, nutrient loading, and the other ills besetting the marine realm. The hour is late, but lapsing into paralytic nihilism at this point would be unconscionable.

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Spotlight

RECENT PUBLICATIONS OF PARTICULAR INTEREST

Bock, Carl E., and Jane H. Bock. 2005. **Sonoita Plain: views from a southwestern grassland.** The University of Arizona Press, Tucson, Arizona. xx + 121 p. \$20.00, ISBN: 0-8165-2362-2 (alk. paper). Thousands (eight, to be precise) of acres without human influence, at least for the last 35 years. Where? The Appleton-Whittell Research Ranch in southeastern Arizona. Read the essays and examine the artistic photographs in this book to learn about this intriguing place.

Buscot, François, and Ajit Varma, editors. 2005. **Microorganisms in soils: roles in genesis and functions.** Springer, New York. xxiii + 419 p. \$149.00, ISBN: 3-540-22220-0 (acid-free paper). This book contains 18 chapters divided into six majors sections—"Introduction," "Microorganisms and soil genesis," "Microorganisms and biogeochemical processes in soils," "Biotic interactions involving soil microorganisms," "Function of microbes in specific soil compartments," and "Techniques to investigate soil microorganisms."

BOOKS AND MONOGRAPHS RECEIVED THROUGH FEBRUARY 2005

- Bock, Carl E., and Jane H. Bock. 2005. **Sonoita Plain: views from a southwestern grassland.** The University of Arizona Press, Tucson, Arizona. xx + 121 p. \$20.00, ISBN: 0-8165-2362-2 (alk. paper).
- Burkhardt, Richard W., Jr. 2004. **Patterns of behavior: Konrad Lorenz, Niko Tinbergen, and the founding of ethology.** The University of Chicago Press, Chicago, Illinois. xii + 636 p. \$80.00 (cloth), ISBN: 0-226-08089-7 (alk. paper); \$29.00 (paper), ISBN: 0-226-08090-0 (alk. paper).
- Buscot, François, and Ajit Varma, editors. 2005. **Microorganisms in soils: roles in genesis and functions.** Springer, New York. xxiii + 419 p. \$149.00, ISBN: 3-540-22220-0 (acid-free paper).
- Carmen, William J. 2004. **Noncooperative breeding in the California scrub-jay.** Studies in Avian Biology. Number 28. Cadmus Professional Communications, Ephrata, Pennsylvania. 100 p. \$15.00, ISBN: 0-943610-59-1.
- Coombs, Eric M., Janet K. Clark, Gary L. Piper, and Alfred F. Cofrancesco, Jr., editors. 2004. **Biological control of invasive plants in the United States.** Oregon State University Press, Corvallis, Oregon. viii + 467 p. \$45.00, ISBN: 0-87071-029-X (alk. paper).
- Cox, C. Barry, and Peter D. Moore. 2005. **Biogeography: an ecological and evolutionary approach.** Seventh edition. Blackwell, Malden, Massachusetts. xi + 428 p. \$79.95, ISBN: 1-4051-1898-9 (alk. paper).
- Cylinder, Paul D., Kenneth M. Bogdan, April I. Zohn, and Joel B. Butterworth. 2004. **Wetlands, streams, and other waters: regulation, conservation, mitigation planning.** Solano Press Books, Point Arena, California. xvii + 418 p. \$50.00, ISBN: 923956-76-X.
- Darsie, Richard F., Jr., and Ronald A. Ward. 2005. **Identification and geographical distribution of the mosquitoes of North America, north of Mexico.** University Press of Florida, Gainesville, Florida. xiv + 383 p. \$75.00, ISBN: 0-8130-2784-5 (alk. paper).
- Ehleringer, James R., Thure E. Cerling, and M. Denise Dearing, editors. 2005. **A history of atmospheric CO₂ and its effects on plants, animals, and ecosystems.** Ecological Studies. Volume 177. Springer, New York. xviii + 530 p. \$149.00, ISBN: 0-387-22069-0 (acid-free paper).
- Flanagan, Lawrence B., James R. Ehleringer, and Diane E. Pataki, editors. 2005. **Stable isotopes and biosphere-atmosphere interactions: processes and biological controls.** Elsevier Academic Press, San Diego, California. xiv + 318 p. \$99.95, ISBN: 0-12-088447-X.
- Futuyma, Douglas J. 2005. **Evolution.** Sinauer, Sunderland, Massachusetts. xv + 603 p. \$89.95, ISBN: 0-87893-187-2.
- Hassol, Susan Joy. 2004. **Impacts of a warming Arctic: Arctic climate impact assessment.** Cambridge University Press, New York. 139 p. \$30.00, ISBN: 0-521-61778-2.
- MacDonald, Samuel A. 2005. **The agony of an American wilderness: loggers, environmentalists, and the struggle for control of a forgotten forest.** Rowman and Littlefield, Lanham, Maryland. x + 187 p. \$65.00 (cloth), ISBN: 0-7425-4157-6 (alk. paper); \$21.95 (paper), ISBN: 0-7425-4158-4 (alk. paper).
- McDaniel, Carl N. 2005. **Wisdom for a livable planet: the visionary work of Terri Swearingen, Dave Foreman, Wes Jackson, Helena Norberg-Hodge, Werner Fornos, Herman Daly, Stephen Schneider, and David Orr.** Trinity University Press, San Antonio, Texas. x + 277 p. \$40.00 (cloth), ISBN: 1-59534-008-4 (alk. paper); \$17.95 (paper), ISBN: 1-59534-009-2 (alk. paper).
- Nickum, Mary J., Patricia M. Mazik, John G. Nickum, and Don D. MacKinlay, editors. 2004. **Propagated fish in resource management.** American Fisheries Society, Symposium 44. American Fisheries Society, Bethesda, Maryland. xvi + 644 p. \$75.00, ISBN: 1-888569-69-7 (acid-free paper).
- Primack, Richard, and Richard Corlett. 2005. **Tropical rain forests: an ecological and biogeographical comparison.** Blackwell, Malden, Massachusetts. ix + 319 p. \$74.95, ISBN: 0-632-04513-2 (alk. paper).
- Sigeo, David C. 2005. **Freshwater microbiology: biodiversity and dynamic interactions of microorganisms in the aquatic environment.** Wiley and Sons, Hoboken, New Jersey. xviii + 524 p. \$180.00 (cloth), ISBN: 0-471-48528-4 (alk. paper); \$65.00 (paper), ISBN: 0-471-48529-2 (alk. paper).
- Thompson, William L., editor. 2004. **Sampling rare or elusive species: concepts, designs, and techniques for estimating population parameters.** Island Press, Washington, D.C. xv + 429 p. \$70.00 (cloth), ISBN: 1-55963-450-2 (alk. paper); \$35.00 (paper), ISBN: 1-55963-451-0 (alk. paper).
- Varma, Surendra, and Mark Winslow. 2005. **Healing wounds: how the international centers of the CGIAR help rebuild agriculture in countries affected by conflicts and natural disasters.** CGIAR, Washington, D.C. xv + 80 p. No charge, ISBN: 92-9127-153-9.
- Yamin, Farhana, and Joanna Depledge. 2004. **The international climate change regime: a guide to rules, institutions, and procedures.** Cambridge University Press, New York. xxx + 699 p. \$120.00 (cloth), ISBN: 0-521-84089-9; \$75.00 (paper), ISBN: 0-521-60059-6.