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Snakes: Ecology and Conservation.

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motivated by xenophobia; and he proposes a dubious acronym as an alternative to the term "invasion biology."

I have several relatively minor criticisms of the book. I was concerned that the emphasis on the invasion pressure model (introduced in chapter 6 and revisited in chapter 8) was unwarranted. Davis uses the model to argue that propagule pressure (*N*) and invasibility (*P*) have approximately equal impacts on the invasion process, and that there is a management sweet spot called the "invasion cliff" at which invasion pressure exhibits a nonlinear relationship with *N* and *P*. However, I found it difficult to believe these claims for two reasons: First, invasibility (*P*), although well defined mathematically, is difficult to measure biologically and cannot be expected to have a linear relationship with management effort; and second, the invasion cliff is an artifact of log-transforming the *N* and *P* scales. On another issue, while I agreed with Davis that much theory in invasion biology has been characterized by "duplication, redundancy, and reinventing the wheel," I did not feel that this justified his subsequent assertion that theory has a limited future role in contributing to management. One could just as easily argue the opposite: The mediocre performance of past theory and the sheer impossibility of managing all invasions across the globe motivates the development of better theory, so that scientists can work with managers and policymakers to allocate resources optimally between different strategies for the prevention, eradication, and mitigation of those invasions that pose the gravest threat to economic and environmental resources. Finally, the abundance of typographical errors that have slipped into this book, mostly in parts one and two, are distracting to the reader and suggest that the editing process was completed hurriedly.

Overall, I recommend *Invasion Biology* as an essential reference for invasion biologists and a useful addition to the library of other ecologists. It is also an excellent starting point for those new to the field. Davis has produced a thorough record of the current state of the subject, and he has charted a roadmap that will guide research for years to come. In calling for invasion biology to be unified with community ecology, Davis has staked out a position that will fuel lively discussions. Although readers may disagree with him on this point or another, Davis's tone is generous and admits such disagreement. It seems unlikely that ecologists will heed the call to unify invasion biology with community ecology, or that the exponential growth in the invasion biology literature will cease any time soon. Thus, Davis's book will not be the last monograph on the subject, but it is nevertheless a valuable contribution to the literature.

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References cited

Kot M, Lewis MA, vandenDriessche P. 1996. Dispersal data and the spread of invading organisms. Ecology 77: 2027–2042.

Shigesada N, Kawasaki K. 1997. Biological Invasions: Theory and Practice. Oxford University Press.

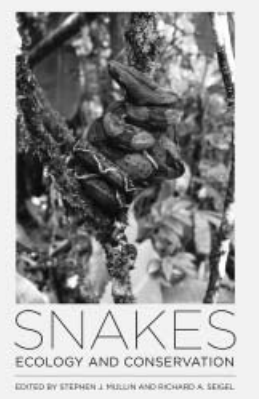
Williamson MH. 1996. Biological Invasions. Chapman and Hall.

FOCUS ON SNAKE CONSERVATION

Snakes: Ecology and Conservation. Stephen J. Mullin and Richard A. Seigel, eds. Cornell University Press, 2009. 384 pp., illus. $60.00 (ISBN 9780801445651 cloth).

Snakes: Ecology and Conservation represents an intellectual outgrowth of the Snake Ecology Group, which periodically holds informal meetings and fosters the publication of books that aim to synthesize current knowledge and perspectives related to the ecology of snakes. This book follows two others—*Snakes: Ecology and Evolutionary Biology* (1987), and *Snakes: Ecology and Behavior* (1993), and focuses on conservation. It reflects three goals of the editors and collective authors: to summarize current knowledge and concepts of ecology and conservation as related to snakes; to compile primary literature that can guide both new and established researchers; and to identify deficits in our knowledge of these subjects, thereby stimulating new and innovative research in an effort to advance understanding. Because the diversity and abundance of snakes are in decline, as with many other other vertebrate taxa, two other goals are implicit: namely, to enhance awareness of threats to snake populations, and to examine strategies that are available to counteract further population declines or extinctions.

Editors Stephen J. Mullin and Richard A. Seigel are snake ecologists known for promoting communication and synthesis of ideas among herpetologists. Leading snake biologists—including specialists in ecology, behavior, genetics, and evolutionary biology—have contributed 12 chapters to this volume. Collectively, these cover a breadth of topics and include relevant discussions of tools, modeling, and methodologies related to snake ecology and conservation. Many of the topics relate to broader conceptual issues and perspectives, but the presentation here is focused specifically on snakes. Covered also are the challenging problems of how we must address ophiophobia, design conservation programs, and promote the utility of snakes as indicator species for monitoring ecosystems and managing habitats and reserves. The disciplinary themes represented



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by the various chapters are tied to an underpinning belief that greater understanding of snake ecology at various scales from individuals to landscape will aid in the development of more effective conservation programs.

Twenty-four authors treat a range of relevant topics in 11 chapters (with an introduction and final chapter by Mullin and Seigel). These topics include (a) strategies for conservation (the editors); (b) methods for studying snake ecology and conservation, with focus on spatial, biophysical, and population ecology (Michael Dorcas and John Willson), modeling of snake distribution and habitat (Christopher Jenkins, Charles Peterson, and Bruce Kingsbury) and behavioral ecology (Patrick Weatherhead and Thomas Madsen); (c) genetics, with a focus on population and conservation genetics (Richard King) and molecular phylogeography (Frank Burbrink and Todd Castoe); and (d) conservation strategies related to reproduction (Richard Shine and Xavier Bonnet), captive rearing and translocation (Bruce Kingsbury and Omar Attum), habitat manipulation (Kevin Shoemaker, Glenn Johnson, and Kent Prior), and educational tools for combating ophiophobia (Gordon Burghardt, James Murphy, David Chiszar, and Michael Hutchins). Steven Beaupre and Lara Douglas discuss the utility of snakes as indicators and monitors of ecosystem properties. Each of the chapters is well referenced, and there are both taxonomic and subject indices.

Several emergent concepts will be especially useful to readers of this book. First is the idea that snakes can be important as model organisms and are amenable to paradigms of research that contribute to the conceptual and methodological development of ecology and conservation biology. For example, research on snakes has contributed substantially to understanding energetic adaptation, evolution, and biodiversity. Snakes also have the potential to be model or indicator animals for elucidating the effects of environment-organism interactions on growth, reproduction, and other life-history parameters, and for demonstrating characteristics essential to the structure and resilience of regional biota. Snakes' low energy requirements and temperature sensitivity are exemplary model systems for investigating mechanistic responses to climate change at individual, population, community, or ecosystem scales. Some studies have used snakes for bioassessment, but resource managers unfortunately rarely use these data.

Historically, much has been learned about snake ecology through basic studies focused on single species and questions related to specific aspects of snakes' natural history (such as diet, population size, movements, etc). These studies have provided important information, but several of the current authors propose a new way forward. They emphasize the importance of innovative methodologies coupled with approaches that are based in clearly defined questions. Some examples include automated radiotelemetry and monitoring of snakes; carefully designed population studies with close attention to sampling schemes, spatial scales, robust design, viability analyses, and modeling approaches; the application of biophysical or geospatial modeling and statistical approaches to studies of snake distribution and habitat requirements; and habitat manipulation as part of conservation strategies. As a related theme, studies of multiple, rather than single, species will enable broader inferences to be made about ecological processes and conservation strategies at higher scales. Increasingly, studies of snake ecology and conservation require investigators to embrace multidisciplinary approaches and, at the very least, be aware of advances in a diversity of disciplines. Interdisciplinary communication is obviously critical to applied studies related to conservation. Once again, ophiophobia presents a challenging obstacle to such communication.

Another insight that readers gain from this book is how much remains to be discovered from carefully planned research. Although the understanding of the ecology of snakes has advanced greatly in recent years, accelerated in part by advances in technology, a vast diversity of snakes remains uninvestigated, especially in primitive taxa and in tropical environments. The authors discuss how many modeling and methodological approaches are underused, and they encourage researchers to embrace them. Various fields (e.g., genomic diversity analyses, geospatial modeling, adaptive management) appear to be wide open, as is developing linkages of these fields to conservation objectives.

One important aim of this book is to provide a guide for novice investigators, and this book will be useful in this respect. The information contained in its chapters ranges from discussion of philosophical issues to a specific recipe for preserving DNA from tissues collected in the field. In nearly all cases, the authors thoughtfully and carefully review the subject matter, and provide opinions about where the field of snake ecology should move.

Finally, there is welcome discussion by Seigel, Mullin, and others related to the difficulties of overcoming the negative attitudes that many people have toward snakes. Authors point out that negative public perceptions of snakes can decrease opportunities for research and diminish or eliminate the application of research to conservation. Clearly there is a need to prioritize research, promote awareness of the applied value of snakes, and emphasize to the public the many fascinating and positive aspects of snake biology. Public education programs have been shown to be useful in reducing wanton killing of snakes, yet detrimental activities such as rattlesnake roundups still continue. Ultimately, however, we are likely to be faced with the sobering conclusion that efforts directed to conservation of snakes might prove to be necessary for the conservation of other taxa.

Snakes: Ecology and Conservation provides readers with a comprehensive and useful overview of the methods for research on ecology of snakes and the application of such knowledge to the urgently needed conservation of these interesting and useful animals. The framework of chapters also provides a broad spectrum of guidelines

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and suggestions for future research. The book is interesting and well written, and I recommend it as a critical reference for anyone interested in the ecology, conservation, and management of snakes or other animals.

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LET THERE BE LIGHT

Light and Video Microscopy. Randy O. Wayne. Elsevier, 2009. 312 pp., illus. $99.95 (ISBN 9780123742346 cloth).

Light and Video Microscopy is a written version of the microscopy class Randy O. Wayne teaches at Cornell University. The class, offered in the biology department, is directed at biologists who have forgotten their freshman physics. As such, this book would be an excellent undergraduate-level text on optical microscopy for biologists. There are lab exercises for each chapter and even a final exam. The book has enough sophistication, however, to be appropriate in a physics department as well. As the manager of a confocal microscopy core facility, I deal with graduate students from a wide variety of fields, and very few have an understanding of the basic microscopy that this book successfully conveys.

But *Light and Video Microscopy* is not just a student textbook—it is also valuable to anyone using a light microscope. Because the field is explained carefully, any microscopist will be able to understand it (which is not the case for many books on microscopy). There are numerous excellent diagrams accompanying the descriptions of optical concepts, and in the back are color plates illustrating the different bright-field techniques. The book also lists Web resources for each topic. There are equations, but the author takes the reader through them step by step.

Wayne is, first and foremost, a teacher (I was once one of his students and am now a colleague at Cornell). His calling shows in his writing. In *Light and Video Microscopy,* he explains the complicated science of the subject methodically and patiently. From the nature of light, through geometric optics, and then into image formation and microscopy, he walks the reader through the field's key ideas. Wayne's informal and friendly approach makes the subject easy to learn. If you want to know basic geometric optics, or how phase contrast or differential interference contrast work, he describes them. All facets of transmitted-light microscopy are covered in thorough detail.

An ability to elucidate difficult concepts is not the only thing that makes Wayne an excellent teacher. He is also a historian of science and has thoroughly researched the topic in order to bring historical information to the reader. He quotes early scientists to illustrate their thought processes, bringing the history of microscopy to life. Just as the early microscopists learned how light behaves, the reader learns too. This weaving together of history and physics makes for a book that is both informative and enjoyable to read.

Light and Video Microscopy begins with a discussion of the nature of light and vision. Wayne challenges the reader to question images, beginning with examples of optical illusions. He follows this with a solid explanation of geometrical optics, covering reflection, refraction, and lenses, including that of the human eye. Principles of diffraction, resolution, and image formation in the microscope are covered next. These early chapters provide the foundation for the rest of the book.

Later, we learn how the wave theory and the particle theory of light were developed, and how one or the other predominated at different times until Einstein pulled them together. The emphasis here is on the wave nature of light, which held sway for many years. The book starts with simple contrast-enhancing techniques such as dark field, oblique illumination, and phase contrast, and then moves to polarization principles, which are used in the explanation of interference microscopy, differential interference contrast, Hoffman modulation contrast, and other amplitude-modulation contrast techniques. Finally, we arrive at fluorescence, which requires reconsideration of the particle nature of light. The author delves into the quantum mechanics behind fluorescence and the principles of confocal and two-photon microscopy. Throughout the book, he cautions the reader to remember the difference between object and image.

The book also includes very brief discussions of some unusual types of microscopy, such as centrifuge microscopy and acoustic microscopy, and some nonlight techniques, such as nuclear magnetic resonance imaging and scanning probe microscopy. A chapter on photomicrography covers film, which is useful from a historical perspective. There is also a chapter that describes the workings of video cameras, charge-coupled device cameras, and photomultiplier tubes, and Wayne includes a brief chapter on analog and digital image processing.

The only complaint I have about the book is its title. Because video is now obsolete technology, I worry that the book may appear out of date. In fact, video is only a very small part of the book, and I am surprised the term made it into the title. Light microscopy, especially transmitted-light microscopy, is a field that has fallen out of favor, overshadowed by the newer techniques of confocal, two-photon, stimulated emission depletion, photoactivated localization, and other types of microscopy. But the basic optics and principles of image formation, explained carefully here, are also relevant to these new techniques, making *Light and Video Microscopy* extremely useful for any light microscopist.

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