



REVIEWS AND BRIEF NOTICES

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HISTORY, PHILOSOPHY & ETHICS

RE-ENGINEERING PHILOSOPHY FOR LIMITED BEINGS: PIECEWISE APPROXIMATIONS TO REALITY.

By William C Wimsatt. *Cambridge (Massachusetts): Harvard University Press.* \$49.95. xvii + 450 p; ill.; index. ISBN: 978-0-674-01545-6. 2007.

This collection of essays (written over a period of 30 years) advocates a vision of the philosopher of science as a conceptual engineer. Wimsatt shies away from global solutions to problems of explanation, reduction, realism, and the nature of scientific discovery and justification in favor of, as the title indicates, “piecewise approximations to reality.” The 13 essays, eight of which have appeared elsewhere, are separated into four sections, each with a useful introduction.

The first section (Introduction) contains three essays that develop the ideas of nature as a “backwoods mechanic,” the utility of models as local approximations to the real, and introduces the idea of the philosopher as a tinkering engineer doing his or her best with the limited conceptual tools at their disposal. Part II, Problem-Solving Strategies for Complex Systems, consists of five essays that develop the central themes of robustness, heuristics, and generative retrenchment along with false models as tools for the

construction and criticism of scientific theories. An important part of this section is concerned with the identification of more-or-less hidden biases in experimental design and theory evaluation. Part III, Reductionism(s) in Practice, contains four papers that champion a causal understanding of “reductionism” that leaves room for “emergent” properties of complex systems. One important conclusion is that complex natural and social systems are best investigated from a variety of perspectives, each of which contributes to our understanding of how the world works. The final part, Engineering an Evolutionary View of Science, consists of one paper (specially written for this volume) that readers who are interested in understanding Wimsatt’s personal evolution from naïve to nuanced reductionist are advised to read first. In addition, there are four indexes, including a glossary of key concepts, a birds-eye view of heuristic strategies, and a number of biasing Laplacean and Leibnizian demons. There are extensive notes, a bibliography, and an index.

This is a rich work written from a naturalistic point of view that contains many suggestive analyses and insights. It should be of interest to philosophers who are unhappy with “nothing but” reductionistic views, as well as practicing scientists who want to develop

multiperspectival takes on their fields that do justice to the complexities of their subject matters.

MICHAEL BRADIE, *Philosophy, Bowling Green State University, Bowling Green, Ohio*



GENERAL BIOLOGY

A PROBLEMS APPROACH TO INTRODUCTORY BIOLOGY.

By Brian White and Michelle Mischke. Washington (DC): ASM Press. \$34.95 (paper). xi + 265 p; ill.; no index. ISBN: 1-55581-372-0. [CD-ROM included.] 2006.

This softcover book is intended as a teaching supplement for introductory biology courses. It is separated into three sections: genetics, biochemistry, and molecular biology. Genetics is very suited to problems, and the ones discussed in this volume will take students through basic Mendelian genetics, sex and autosomal linkage, and gene mapping. There are quite a few human genetics examples and human pedigree analysis is also included. The problems are excellent and proceed from simple to complex. The answers on the accompanying CD-ROM are also extremely well presented. The biochemistry section goes through all of the basic classes of biological macromolecules, but puts a great emphasis on proteins. It works from basic principles of chemical bonds and forces, rather than just presenting structures. Again, the accompanying CD-ROM is very important, and contains programs for drawing chemical structures and manipulating three-dimensional structures of proteins. The molecular biology section proceeds from the classical experiments of Avery, MacLoed, and McCarty to Hershey and Chase, as well as Meselson and Stahl. DNA replication, transcription, and translation are also discussed. Once again, the questions and explanations are quite insightful.

Overall, I found this book to be excellent. The authors focus on critical thinking and logical reasoning, which is to be commended. My only problem with this volume is how to use it. Most introductory biology courses are much broader and cover many more topics than the three that are presented in this work. Although most courses include these subjects, they do not do so to the depth that is covered here. The authors cut their teeth teaching introductory biology at MIT, and this book probably does well there. I fear, however, that this volume, and especially the biochemistry section, would be too difficult

for most introductory biology students. If your students could handle the material, this book would be very helpful.

EUGENE R KATZ, *Microbiology & Molecular Genetics, Stony Brook University, Stony Brook, New York*



MOLECULAR BIOLOGY

NANOBIOTECHNOLOGY II: MORE CONCEPTS AND APPLICATIONS.

Edited by Chad A Mirkin and Christof M Niemeyer. Weinheim (Germany): Wiley-VCH Verlag. \$190.00. xxvi + 432 p; ill.; index. ISBN: 978-3-527-31673-1. 2007.

Nanobiotechnology is a growing multidisciplinary research field that brings together expertise ranging from applied physics and the materials sciences to chemistry and electrical engineering for the purpose of developing nanodevices and nanostructures for biological and biochemical uses. Such devices and structures may one day be part of nanoimplantable medical devices, biocomputers, nanosensors, and components of other nano- and microsystems. Many of the underlying concepts and applications of this fascinating research are presented in an extensive collection of articles gathered by Mirkin and Niemeyer in two volumes of *Nanobiotechnology*. The four sections in this second volume focus on the principles of self-assembly and nanoparticles, and on the use of nanostructures for analytical and medicinal applications, as well as components of nanomotors. For example, the third section is particularly interesting for anyone who wants to learn more about the use of nanostructures for medical applications. Readers will find the discussion about organic nanoparticles—and how techniques from the electronic industry can be adapted for use in generating shape-specific, functionalized carriers for applications in medicine—fascinating examples of the interdisciplinary nature of nanobiotechnology. The discussion about nanoparticle contrast agents is also intriguing as it demonstrates how such particles can be used for inner-depth molecular magnetic resonance imaging in humans.

With a total of 21 chapters and a large number of color illustrations and photographs, spanning over 400 pages, the book will be a treasure for students, researchers, and educators who will find it useful both for fundamental reading and as a rich reference source.

TZVI TZFIRA, *Molecular, Cellular & Developmental Biology, University of Michigan, Ann Arbor, Michigan*



CELLULAR BIOLOGY

THE CELL CYCLE: PRINCIPLES OF CONTROL. *Primers in Biology.*

By David O Morgan. London (United Kingdom): New Science Press; distributed by Sinauer Associates, Sunderland (Massachusetts). \$49.95 (paper). xxvii + 297 p; ill.; index. ISBN: 0-87893-508-8. 2007.

The cell cycle field has seen explosive growth over the last two decades, fueled by the discovery of underlying principles common to all eukaryotic cells. Morgan has been a major contributor to aspects of this work and is the ideal person to provide this timely and extremely readable summary. The book skillfully integrates genetics, molecular biology, cell biology, and biochemistry from the major model systems that have contributed to our current understanding. In doing so, the author succeeds in focusing on the major control points of cell-cycle regulation and provides a very up-to-date review of the current status of the problems. He draws out the common pathways among systems and also points to where real differences lie or where the data are not yet complete. He also integrates the cellular level with some of the major areas (such as development and cancer biology) where cell-cycle control plays out its central role in biology. He does all of this with a keen sense of the mechanism and biological importance of the control points and of the data on which the conclusions are based. The work is highly integrative and will serve the needs of a very broad range of readers from senior undergraduates to graduate students and researchers active in the field.

The book is well organized and richly illustrated. The text is clear, concise, and easily accessible. Every page includes either summary diagrams of the pathway being discussed or images of cells from the research literature that show the actual processes in action. The major primary references are provided as footnotes for each topic discussed. This organization will make it very easy for readers to appreciate the biology, our knowledge of the mechanism(s), and papers for future reading. As a pedagogical tool, the volume could teach a course by itself.

P G YOUNG, *Biology, Queen's University, Kingston, Ontario, Canada*

IMMUNITY: THE IMMUNE RESPONSE IN INFECTIOUS AND INFLAMMATORY DISEASE. *Primers in Biology.*

By Anthony L DeFranco, Richard M Locksley, and Miranda Robertson. Sunderland (Massachusetts): Sinauer Associates. \$49.95 (paper). xxx + 389 p; ill.; index. ISBN: 0-87893-179-1. 2007.

This textbook on immunology puts as much emphasis on presentation as it does on substance. Chapter 1 provides an overview, Chapters 2 through 8 deconstruct the immune response (discussing specific cel-

lular and molecular components), while Chapters 9 through 14 reconstruct the immune response by describing immunity to pathogens (such as bacteria, viruses, and fungi), and the participation of the immune system in autoimmunity, allergy, transplantation immunology, tumor immunity, and vaccination. In overall structure, therefore, the textbook is similar to others in the field, taking a classic approach to the teaching of immunology.

What sets this volume apart is its packaging. Subtopics within each chapter are organized into two-page modules. Each module begins with a title, followed by an informative summary of the material. Narrative text occupies the center two-thirds of each page and is flanked in the margins by figures and tables. Set apart at the bottom of each two-page module are more detailed definitions of terms mentioned in the narrative, and a short list of supporting references in the literature.

The modular packaging of material into easily digestible bite-size nuggets makes this an excellent book that is both informative and fun to read. Do you want to learn about dendritic cells in adaptive immunity, mechanisms of V(D)J recombination, or the immune response to *Candida albicans*? Find the topic in the Table of Contents, flip open the relevant section, and with a few minutes of reading you will have familiarized yourself with the essentials. Within each module, text, figures, and a glossary complement one another and are well integrated. The material might be a bit dense for students new to the field. For those who have at least some knowledge of immunology, this is a highly readable publication that admirably serves a dual role of both a textbook and reference.

JAMES D GORHAM, *Pathology and Microbiology & Immunology, Dartmouth Medical School, Lebanon, New Hampshire*



GENETICS

RECOMBINANT DNA: GENES AND GENOMICS, A SHORT COURSE. *Third Edition.*

By James D Watson, Amy A Caudy, Richard M Myers, and Jan A Witkowski. New York: W. H. Freeman and Cold Spring Harbor (New York): Cold Spring Harbor Laboratory Press. \$134.90 (paper). xxii + 474 p; ill.; index. ISBN: 0-7167-2866-4. 2007.

Recombinant DNA technologies have revolutionized modern science and have infiltrated nearly every niche of biological research. Furthermore, various biotechnological products, such as medicines and transgenic crops, have been developed and/or pro-

duced by the use of recombinant DNA technologies. The crucial role that recombinant DNA technologies have come to play in our daily lives calls for means by which those who wish to enrich their education about these powerful scientific and biotechnological tools can do so. This book will serve as an excellent source in college-level classrooms where professors and students will enjoy the straightforward approach taken by the authors to describe the basics of molecular biology. The volume is also recommended for anyone else with an interest in genes, genomes, and their applications in biotechnology, who will find the book's focused approach on the facts, experiments, and procedural outcomes very simple to follow and understand.

The 16 chapters are organized into four sections. The first section, comprising one-half of the volume's 474 pages, is dedicated to the foundations of DNA. Some of the topics discussed in this section will introduce readers to DNA as the genetic material as well as the tools of recombinant DNA. The authors have done a remarkable job of presenting enough information so that readers will understand a particular concept, technique, or tool without tedious discussions that may draw them away from the main points. With such a focused and highly illustrative text, readers will find this first section and the remainder of the book (which highlights specific issues in whole-genome analyses and human genomics) to be not only educational and informative, but also a pleasure to read.

TZVI TZFIRA, *Molecular, Cellular & Developmental Biology, University of Michigan, Ann Arbor, Michigan*

MEASURING GENE EXPRESSION.

By Matthew B Avison. New York: Taylor & Francis Group. \$54.95 (paper). xi + 324 p; ill.; index. ISBN: 0-415-37472-3. 2007.

Common questions in biomedical research involve the timing, localization, and level of gene expression. This volume provides a thorough and practical introduction to the main methods used in laboratories for measuring gene expression. It presents the theory, background material, and basic protocols sufficient to enable biologists to apply the techniques to laboratory research, and adapt the approaches as necessary. The strength of this book is the comprehensive coverage of background, methods, and protocols relating to the measurement of transcriptional gene expression.

Topics include: a basic introduction to gene expression and its regulation; RNA isolation and analysis; hybridization-based methods for measuring RNA levels, including microarrays; polymerase chain reaction (PCR)-based methods for measuring RNA levels, including quantitative real-time PCR; differential display, subtractive hybridization,

and related amplification suppression approaches; serial analysis of gene expression (SAGE) techniques; reporter gene assays; and both parametric and nonparametric statistical analysis of gene expression data. The first chapter outlines the biological processes underlying gene expression (transcription and translation) and its control/regulation. The book concludes with a chapter that provides a brief summary of several parametric and nonparametric approaches fundamental to any quantitative analysis of gene expression data. However, this volume has a few deficiencies. The coverage of posttranscriptional gene expression is limited to part of the first introductory chapter and the penultimate chapter, which is devoted to several methods commonly used in proteome analysis. In fairness, comprehensive coverage of approaches relating to posttranscriptional gene expression would require an additional volume of equal size. Another deficit is that there is no discussion of massively parallel signature sequencing (MPSS), a higher-throughput SAGE-like approach for "digitally" sampling transcriptomes to characterize gene expression on a whole-genome scale.

In summary, this will be an excellent resource for novices because it provides background on the development of the methods, their advantages and disadvantages, information on how the methods can be used to address different biological questions, and a discussion of potential sources of error.

TODD C MOCKLER, *Botany & Plant Pathology and Center for Genome Research & Biocomputing, Oregon State University, Corvallis, Oregon*

MOLECULAR FORENSICS.

Edited by Ralph Rapley and David Whitehouse. Chichester (United Kingdom) and Hoboken (New Jersey): John Wiley & Sons. \$160.00 (hardcover); \$75.00 (paper). xiii + 244 p + 8 pl; ill.; index. ISBN: 978-0-470-02495-9 (hc); 978-0-470-02496-6 (pb). 2007.

This volume is a compilation of 14 chapters edited by Rapley and Whitehouse, and written by 37 different subject-matter experts that cover a variety of forensic genetic topics. The book begins with a discussion of current and future trends in forensic molecular biology followed by a brief overview of basic tools and techniques (such as polymerase chain reaction and DNA sequencing). Automated DNA extraction techniques are reviewed as are current real-time quantitative PCR chemistries for human nuclear and mitochondrial DNA quantitation. The genetic markers used in forensic testing (including minisatellites, microsatellites, and single nucleotide polymorphisms) are covered, followed by chapters on X-chromosome, Y-chromosome, and mitochondrial

DNA analysis as applied to forensic science. Statistical presentation of DNA data is addressed as are laboratory information systems and potential new areas of protein profiling and prediction of postmortem interval with magnetic resonance spectroscopy.

Although useful and (for the moment in this rapidly changing field) up-to-date information on many subjects is contained in the book, the various contributors did not write to a common criteria and, thus, the volume does not seem cohesive or complete. The coverage of information seems uneven and lacking in some areas. For example, the chapter on laser microdissection lists 13 authors, yet is only eight pages long. Unfortunately, the figures for this chapter are in color and located with several other color plates in the middle of a separate chapter. Alternatively, a sole author covers X-chromosome analysis quite well in 24 pages with excellent references, formulas, figures, tables, and case examples. Likewise, the SNP applications and Y-chromosome chapters provide a nice—although limited—review of their subjects. The book may be helpful to some as a reference, but it is by no means a comprehensive coverage of the field nor does it describe topics in enough detail to be a single textbook for students.

JOHN M BUTLER, *Biochemical Science Division, National Institute of Standards & Technology, Gaithersburg, Maryland*



MICROBIOLOGY

GENESIS: THE SCIENTIFIC QUEST FOR LIFE'S ORIGIN.

By Robert M Hazen. Washington (DC): Joseph Henry Press. \$27.95 (hardcover); \$17.95 (paper). xix + 339 p + 8 pl; ill.; index. ISBN: 0-309-09432-1 (hc); 0-309-10310-X (pb). 2005.

This is the second volume that an interested student should read about the origin of life. The first should be a competent astrobiology textbook that provides the background in chemistry, biology, and thermodynamics that is needed to understand the magnitude of the problem—the enormous gap that exists between the chemical chaos provided by natural processes and the elegant construction of the simplest living creatures known to us.

Having mastered this material, students would then be prepared for Robert Hazen's volume. At first glance, it would appear to be another textbook, but it offers a very different and utterly entertaining experience. It provides a view of

the workers in the field, the ideas that inspire them, and the experiments that they perform from the perspective of a geochemist who is thoroughly immersed in the area. We go from a firsthand description of a heated debate over the legitimacy of ancient fossils to a sad tale of how a promising collaboration ended with the untimely death of the author's colleague.

In other sections, we are treated to a ten-page account of the way in which a graduate student conceived an as yet untested (and in my view, quite unlikely) theory about how life began, a speculative essay concerning the underrepresentation of women in this field, and a brief description of the personalities and rivalries of the scientists who developed the theory that life began in deep, hot vents under the sea. Many more anecdotes present vivid descriptions of the personalities of scientists known to the author, and the manner in which a variety of experiments, successful and unsuccessful, were first put together.

This wealth of material is held together by the concept of emergence—the idea that simple systems, subjected to a flow of energy, can give rise to more complex ones with unexpected properties. By following this idea, Hazen finally arrives at a conclusion that I share: life began with energy-driven evolving reaction cycles, rather than the sudden appearance of a large molecule with the ability to copy itself. Are we correct? Stay tuned for the next installment of this continuing drama.

ROBERT SHAPIRO, *Chemistry, New York University, New York, New York*

MOLECULAR GENETICS OF BACTERIA. *Third Edition.*

By Larry Snyder and Wendy Champness. Washington (DC): ASM Press. \$109.95. xvii + 735 p; ill.; index. ISBN: 978-1-55581-399-4. 2007.

The title of this book is a bit of a misnomer. In addition to being a rigorous guide to the field of prokaryotic molecular genetics, it also includes a fair amount of bacterial biochemistry, cell biology, and physiology. The strength of the volume is its comprehensive coverage of the wide range of subjects that make up bacterial molecular genetics. Topics covered include: the biosynthesis of DNA, RNA, and protein (Chapters 1 and 2); classic genetic analysis (Chapter 3); gene regulation at the operon and global levels (Chapters 12 and 13); transposition, recombination, DNA mutation, and DNA repair (Chapters 9 through 11); plasmid biology, conjugation, and transformation (Chapters 4 to 6); bacteriophage genetics (Chapters 7 and 8); and compartmentalization and sporulation (Chapter 14).

The target audience for this volume is ad-

vanced undergraduates. Because its level of technical detail places it between most other textbooks and review articles, graduate students and research scientists will find it to be a useful reference and guide to subjects outside their immediate areas of research. The third edition has been expanded relative to the second edition, and includes updated material on relatively new topics such as genomics and prokaryotic cell biology. In addition, new material on well-developed experimental models, such as the stringent response, sporulation, and protein secretion, have been added as well.

The book is different from most other current molecular genetics volumes in the amount of space it devotes to several series of classic experiments and the impact they have had on the development of the field. For example, nearly ten pages discuss the bacteriophage T4 rII gene and the role it played in the discovery of mutational hotspots, nonsense mutations, and the logical structure of the genetic code. Although such information may not be of immediate practical value to most readers, its inclusion will broaden their historical knowledge of the field, and will illustrate how complex problems were teased apart using elegant experiments in an era that lacked the powerful tools that are available today.

In summary, this new edition is a significant upgrade from the well-received second edition. Drawing from a wide range of organisms, it presents detailed information, both classical and current, on many aspects of prokaryotic molecular biology. It should find a welcome home on the bookshelves of advanced undergraduate students, graduate students, and established researchers in the field.

DANIEL GAGE, *Molecular & Cell Biology, University of Connecticut, Storrs, Connecticut*

PHYSIOLOGY AND BIOCHEMISTRY OF EXTREMOPHILES.

Edited by Charles Gerday and Nicolas Glansdorff. Washington (DC): ASM Press. \$129.95. xvi + 429 p + 4 pl; ill.; index. ISBN: 1-55581-422-0. 2007.

Extremophiles are organisms that thrive under environmental conditions that are considered extreme. This book provides an in-depth examination of the physiology and biochemistry of these organisms, while also touching on aspects of their ecology and evolution. The volume contains 28 chapters, each reviewing different aspects of the extremophile literature. These chapters are grouped into sections that deal with extremes of temperature, salinity, pH, and pressure. The thermophile and psychrophile sections have the most chapters, reflecting historical interest in extremes of temperature, as well as a

greater body of research relative to other types of extremophiles. Each section appropriately begins with chapters that focus more on the ecology and biodiversity of each group of organisms (covering what organisms are where) before moving onto chapters that are focused on physiology and biochemistry (how and why organisms thrive in these extremes). Other sections of the book discuss the origins and evolution of life, the search for life elsewhere in the universe, and the biotechnological importance of extremophiles. I found that these latter sections served to place extremophile research into a broader context, while the discussions of specific types of extremophiles explored adaptive mechanisms in greater detail.

This book brings together and will be of relevance to a variety of disciplines in addition to extremophile biochemistry and physiology. I would recommend this volume to any biologist who is interested in understanding how life can adapt to and thrive in "harsh" environmental conditions. It will also serve well as a reference for anyone who is interested in only certain types or aspects of extremophiles. More thorough editing would have captured minor errors or awkward phraseology; this is, however, outweighed by a truly international list of contributors, which reflects a global interest in this fascinating subject.

DEREK MUELLER, *Geophysical Institute, University of Alaska, Fairbanks, Alaska*

ARCHAEA: MOLECULAR AND CELLULAR BIOLOGY.

Edited by Ricardo Cavicchioli. Washington (DC): ASM Press. \$129.95. xii + 523 p + 18 pl; ill.; index. ISBN: 1-55581-391-7. 2007.

Archaea along with bacteria comprise the two groups of prokaryotes. The discovery of the Archaea, now over 30 years ago, has blossomed into fascinating revelations about the origin of life and the discovery of unique mechanisms that penetrate diverse aspects of biology, biochemistry, and genetics. The field of archaeal biology is growing rapidly. For this reason, we can anticipate a continued need for comprehensive coverage on these organisms that promotes dissemination of relevant information.

The current volume consists of 23 short, edited chapters, ranging from DNA replication to Archaeosome vaccines. The chapters are generally broad with useful figures and tables. Considerable attention is focused on information processing, including DNA, RNA, and protein synthesis and processing. Additional emphasis is placed on general aspects of cell structure, including the unique archaeal envelope and molecular translocation across this structure. The latter third of the book contains chapters on genetic and genomic research strategies, as well as proteins of biotechnological importance. These par-

ticular chapters will help extend the relevance of this volume into the modern microbiology classroom.

This book will benefit most researchers and, with supplementation, graduate-level microbiology educational efforts. It provides a useful expansion of other recent works on the Archaea, notably *Archaea: Evolution, Physiology, and Molecular Biology* (R Garrett and H-P Klenk. 2007. Malden (MA): Blackwell Publishing). Both are useful textbooks that expand the secondary literature and are worth having.

PAUL BLUM, *Beadle Center for Genetics, University of Nebraska, Lincoln, Nebraska*

BACILLUS: CELLULAR AND MOLECULAR BIOLOGY.

Edited by Peter Graumann. Norfolk (United Kingdom): Caister Academic Press. \$300.00. xv + 454 p; ill.; index. ISBN: 978-1-904455-12-7. 2007.

This volume is comprised of 12 chapters, and most of the authors are from European laboratories with the exception of two from the U.S. and one each from Brazil and Australia. The quality of the chapters is uniformly high. Together they provide a review of significant progress toward a better and deeper understanding of the physical structure and molecular biological organization and function in *Bacillus subtilis*. As a consequence, a truly intimate grasp of this bacterium is achieved. Other bacteria are only mentioned in passing.

Fascinating lines of discovery crisscross the chapters. Many of these discoveries come as a result of diverse applications of fluorescence microscopy using green fluorescent protein (GFP) as a reporter for structural, regulatory, or signaling molecules. One striking example is discovery of the actin-like cytoskeleton that, along with the cell wall, creates the rod shape of these bacteria. This cytoskeleton also establishes internal compartments that separate different functions, such as the differential positioning of transcription and translation. Another interesting finding is the inhibition of Z-ring formation in a new daughter cell and then its release and formation later in the cell cycle to cause segregation of the nucleoid prior to cell division. Many GFP fusions provide abundant evidence of the positions of specific proteins near or in the cell membrane. Clearer pictures of chromosomal replication and DNA repair emerge, as is also the case with the elaborate process of endospore formation. The final chapter investigates unique genetic pathways in *B. subtilis* isolated from soil, as opposed to cells from long-held laboratory cultures, pathways that lead to the formation of multicellular aggregations, or biofilms, of flagellated cells that move about en masse as "swarmers." Wild isolates also form complex, upright, multicellular structures associated with sporulation. In these structures, there is "cannibalism" (lysis) of other cells not engaged in sporulation.

CONRAD A STOCK, *Ecology & Evolutionary Biology, Cornell University, Ithaca, New York*



PLANT SCIENCES

THE EMERALD PLANET: HOW PLANTS CHANGED EARTH'S HISTORY.

By David Beerling. Oxford and New York: Oxford University Press. \$29.95. xvi + 288 p + 16 pl; ill.; index. ISBN: 978-0-19-280602-4. 2007.

As a paleobotanist, it is nice to see a book that essentially says, do not undervalue the contribution of plants to Earth's environment, past and present. From this basic theme—"to understand how the environment shapes plants, and how plants shape the environment, over . . . geological time" (p 3)—David Beerling goes further, presenting a synthesis of current hypotheses about plant/climate/Earth interactions based on models, experiments, and results from biology, geology, chemistry, physics, and paleontology for understanding causes of environmental change over the past 500 million years (mostly). Each section begins with a brief history of questions and early discoveries in that topic, including profiles of some of the scientists (or explorers) involved. Aspects of recent discoveries, questions where data do not fit existing hypotheses, and new ways to address these problems are well presented, most especially those that have been developed through studies in the Beerling laboratory. The author also ties these discoveries to questions and prospects in predicting consequences of current global climate change, providing substantive, relevant food for thought on what an increase in CO₂, methane and, thus, temperature might cause to happen.

Possible causes for a lag in leaf evolution in early plant diversification, the cause of mutated spores (more data needed here) and end-Permian extinction, and plants' contribution to high O₂ and gigantism in animals demonstrate ways fossil plants record previously unrealized facets of Earth history. Old ideas on why polar regions could support forests of warmer climate plants in the past are refuted. Possible consequences of past and current global warming are discussed, based on new experiments. In all of these sections, interactions among plants, Earth processes, climate, and other organisms are well documented, and show that it may not take much (past or present) to generate a cascade of changes that will alter the balance of life and climate on Earth.

Although very readable, the chapters that deal with polar forests could have been condensed. The references and comments in the footnotes

amplify the text, but lead to a lot of page flipping. Illustrations lumped in the middle of the book would be more relevant if inserted in appropriate chapters. Descriptive, taxonomic studies of fossils are downplayed; however, without such knowledge about plants through time, some of the inferences about biological and environmental change documented here would not have been possible.

PATRICIA G GENSEL, *Biology, University of North Carolina, Chapel Hill, North Carolina*

ANATOMY OF FLOWERING PLANTS: AN INTRODUCTION TO STRUCTURE AND DEVELOPMENT. *Third Edition.*

By Paula J Rudall. Cambridge and New York: Cambridge University Press. \$39.99 (paper). xii + 145 p; ill.; subject and taxonomic indexes. ISBN: 0-521-69245-8. 2007.

Basic plant anatomy is succinctly covered in this small paperback. The single column format contains seven line drawings and 64 half-tone figures. It follows a traditional organization starting with cell types and tissues, and continues with the internal structure of vegetative organs, flowers, seeds, and fruits. To cover all of these topics in only 145 pages of text means there is little or no explanation of many technical terms. However, a 16-page glossary does help.

Plant science workers in need of understanding plant anatomy will find the book useful. It is perfect for researchers who want a reminder of descriptive anatomy without a detailed treatise. However, beginning botany students will require some mentoring to understand many of the concepts and terminology that are not explained in the brief text.

At the moment, there are only a few, far more detailed and encyclopedic references on plant anatomy still in print. This third edition is an improvement over the 15-year-old second edition. There are 34 more pages of text and seven additional pages of references (almost one-half are dated from 1992 or later). In referring to plant groups, the author uses the new phylogenetic concepts of magnoliids and eudicots. The black-and-white figures are about the same in number, but many are different, and all are sharper than in the previous edition. Unfortunately, the publisher failed to place scale bars in any of the figures, even though these bars are referred to in the captions.

JACK B FISHER, *Fairchild Tropical Botanic Garden, Coral Gables, Florida*

THE BIOLOGY OF MANGROVES AND SEAGRASSES. *Second Edition. Biology of Habitats.*

By Peter J Hogarth. Oxford and New York: Oxford University Press. \$120.00 (hardcover); \$54.95 (paper). x + 273 p; ill.; index. ISBN: 978-0-19-856870-4 (hc); 978-0-19-856871-1 (pb). 2007.

Because our knowledge of the natural world is based on our observations, it is fitting that terrestrial systems of a relatively pleasant and benign nature have a long-standing and rich history of study. Aquatic systems, and in particular mangrove swamps, with their inherent heat, muck, and mosquitoes (in addition to the exciting potential of harm from snakes, crocodiles and, in the Bay of Bengal, tigers) are not among these observer-friendly systems. This book is one of a series called *Biology of Habitats*, aimed toward providing novices with a basic understanding of the abiotic and especially the biotic patterns and processes within aquatic environments. Because nature does not exist in a vacuum, in this second edition, Hogarth expands his coverage of mangroves to also include seagrass beds, which are commonly (but not exclusively) found near mangroves and have similar support functions, including sediment stabilization, nutrient cycling, and creating structure for animals. Topics are essentially separated into the biology of the plant (physiology, structure-function, life cycle), community dynamics (zonation), and the types of animals that occupy the habitat created by these systems. Attention is placed on how plants and associated animals cope with the stressors of varying salinity, inundation, and low oxygen levels within coastal environments. Most information presented is centered around the diverse Indo-Pacific region with few comparisons to the Americas.

True to its purpose, this book is general in its presentation and will engage readers with several wonderful case studies, including animals with exceptional adaptations (such as fish that breathe air and groups of insects that make mangrove trees seemingly flash in the night). Due to a lack of knowledge, however, broad conclusions or ecological paradigms can not be drawn for many topics covered, and some readers may find this book expensive for its content. Strengths include the topics of biodiversity and biogeography (which are well presented), and a pertinent final section on our impacts to these globally distributed but dwindling plant systems.

CRAIG H FAUNCE, *Tequesta Field Laboratory, Florida Fish & Wildlife Research Institute, Tequesta, Florida*

GROWTH DYNAMICS OF CONIFER TREE RINGS: IM-AGES OF PAST AND FUTURE ENVIRONMENTS. *Ecological Studies, Volume 183*.

By E A Vaganov, M K Hughes, and A V Shashkin. Berlin (Germany) and New York: Springer-Verlag. \$169.00. xiv + 354 p; ill.; subject and taxonomic indexes. ISBN: 978-3-540-26086-8. 2006.

In dendrochronology, fruitful collaborations that crossed political borders were a tradition even during the Cold War. This book, coauthored by two Russians and one American, is a continuation of this positive approach. This volume links conifer tree physiology and ecology with computerized simulations to analyze environmental data stored in tree rings. The first 100 pages examine basic biological processes of tree-ring formation and routine dendrochronological methods. Starting with Chapter 4, the book becomes interesting for dendrochronologists, when modeling of tracheid expansion is treated, and results about the relationship between the rate of cell divisions and tracheid dimension are discussed. Graphs and diagrams present the authors' original data (partly published only in Russian), making this information available to Western readers and the book more interesting. In the last 100 pages, where the Vaganov-Shashkin simulation model of seasonal growth and tree-ring formation is presented and discussed, the volume becomes exciting even for expert dendrochronologists.

The scientific approach used is to "cut out the middleman." The authors studied and analyzed how environment influences cambial activity and differentiation of cambial derivatives leaving the physiological and cellular mechanisms ("middleman") aside. In spite of the lack of specific and detailed physiological discussions, the authors present a wealth of data and test cases of great interest (e.g., anatomical influences of the Chernobyl accident). Changes in tracheid diameter and wall thickness are broadly treated, an aspect of growth-ring structure that got much less attention in classic dendrochronology textbooks than growth-ring width. The ecological perspective is boreal. In boreal regions, with long frozen winters and short summers, conifer wood formation is restricted to a well-defined period with very little flexibility and little cellular variation. The modeling presented here takes advantage of these characters. It is, however, challenging to be able to model wood production with the same level of success in conifers growing under Mediterranean or even tropical conditions, where flexibility in cambial activity is greater.

This volume will be important and stimulating for experts who practice dendrochronology or wood formation, ecologists of boreal forests, and graduate students, but will be too specialized for

introductory courses. It is our hope that any future edition of this volume will include an author index as well as a lower price. This book will interest modelers and forest ecologists who wish to learn more about tree-growth modeling. The modeling cambial activity may significantly contribute to the understanding of how trees grow and help predict the responses of forest ecosystems to climatic changes. We hope that the original approaches presented in this volume will stimulate further and deeper research.

PAOLO CHERUBINI, *Dendro Sciences, WSL Swiss Federal Research Institute, Birmensdorf, Switzerland* and SIMCHA LEV-YADUN, *Biology, University of Haifa-Oranim, Tivon, Israel*

WILD ORCHIDS OF THE NORTHEAST: NEW ENGLAND, NEW YORK, PENNSYLVANIA, AND NEW JERSEY.

By Paul Martin Brown; with original artwork by Stan Folsom. Gainesville (Florida): University Press of Florida. \$29.95 (flexibind). xv + 367 p; ill.; index. ISBN: 978-0-8130-3034-0. 2007.

FUNGI IN THE ENVIRONMENT. *Based on a symposium held at the University of Nottingham, September 2004.*

Edited by Geoffrey Michael Gadd, Sarah C Watkinson, and Paul S Dyer. Cambridge and New York: Cambridge University Press. \$150.00. xix + 386 p; ill.; index. ISBN: 978-0-521-85029-2. 2007.

This book is based on a British Mycological Society Symposium held in 2004. The prime objective of both the symposium and this volume was to "highlight the roles and importance of fungi in the environment together with the modern approaches and tools that are now revealing the importance of fungi in a wider biological context" (p xix). As seems obligatory in mycological reviews, the editors state that fungi are frequently neglected in contrast to bacteria in environmental and microbiological spheres, despite their ubiquity and fundamental importance as symbionts, pathogens, and decomposers.

In total, 49 authors (24 from the U.K., 15 from the U.S., and the rest from six other countries) wrote 18 contributions that are grouped into six sections: Imaging and Modelling of Fungi in the Environment (four papers); Functional Ecology of Saprotrophic Fungi (three papers); Mutualistic Interactions in the Environment (three papers); Pathogenic Interactions in the Environment (four papers); Environmental Population Genetics of Fungi (two papers); and Molecular Ecology of Fungi in the Environment (two papers). I found the various contributions of uniformly high to exceptional quality. Taylor et al. (Chapter 15) make the interesting point that these days literature that is not online seems to be quickly forgotten, which

can lead to strangely disjointed reviews. When writing for a relatively broad audience, as is the case here, it seems essential to embed new techniques or results into a historical context or narrative to stimulate and sustain the interest of readers. This was particularly well done in the chapters on Woronin bodies by Jedd (Chapter 2) and on dry rot by Money (Chapter 14). I also found the discussion by Boddy and Jones (Chapter 6) on the strategy of resource capture and defense by mycelial networks to be very enjoyable and stimulating. They convincingly point out similarities to strategies by swarming ants, touch on self-organizing patterns, and demonstrate the applicability of the marginal value theorem from behavioral studies.

Clearly, no single symposium or book can cover the entire spectrum of fungal ecology; this particular volume gives a fascinating overview of some currently investigated topics and new techniques. I would recommend it to any experienced researcher in ecology who wishes for up-to-date information on areas that may lie outside their research expertise, as well as to any graduate student who is not quite certain what topic to pursue.

FELIX BÄRLOCHER, *Biology, Mount Allison University, Sackville, New Brunswick, Canada*



ANIMAL SCIENCES

PHYSIOLOGICAL ECOLOGY: HOW ANIMALS PROCESS ENERGY, NUTRIENTS, AND TOXINS.

By William H Karasov and Carlos Martínez del Río. Princeton (New Jersey): Princeton University Press. \$65.00. xv + 741 p; ill.; index. ISBN: 978-0-691-07453-5. 2007.

This is an unusually engaging textbook in a field of study that is simultaneously intriguing and difficult to cover. It will be intriguing to those who are fascinated by the multitudes of adaptations among the diversity of animals: four-legged herbivores, feathered aquatic carnivores, flying frugivores, desert dwellers, and so on. How do such different animals process energy, nutrients, and toxins (the book's subtitle)? The authors clearly have a love for teaching this subject, and have matched it with their expertise in physiological ecology research. There are numerous asides in which the authors point out the challenges of testing certain hypotheses, and the excitement that awaits those who will determine the answers to many of the unexamined problems in physiological ecology.

Karasov and Martínez del Río provide detail on the scientific process, including many of the meth-

ods used (such as the use of isotopes and radiotracers). Each of the 14 chapters could easily be expanded into a book. *Physiological Ecology* necessarily leaves a great deal unsaid in each of these areas, and does not pretend to substitute for a literature review on each subject discussed. Indeed, this volume is engaging and stimulating because it does not attempt to cover each subject exhaustively (exhausting the reader!). There is a fine treatment of the chemical compositions of materials that animals use for food, and the morphologies and biochemical adaptations of their guts that can enable them to process compounds as chemically diverse as plant fiber and low molecular weight toxins. The authors have also done a respectable job encompassing the wealth of studies on insects, as well as a balance of representative examples from the literature on birds, mammals, reptiles, and amphibians. Numerous large figures are used to provide emphasis and greater clarity to certain methods and results from key studies. This is an excellent textbook for undergraduate- and graduate-level courses, and is recommended for researchers who are interested in an up-to-date overview of this field.

RAYMOND BARBEHENN, *Ecology & Evolutionary Biology, University of Michigan, Ann Arbor, Michigan*

100 BUTTERFLIES AND MOTHS: PORTRAITS FROM THE TROPICAL FORESTS OF COSTA RICA.

By Jeffrey C Miller, Daniel H Janzen, and Winifred Hallwachs. Belknap Press. Cambridge (Massachusetts): Harvard University Press. \$39.95. vii + 256 p; ill.; no index. ISBN: 0-674-02334-X. 2007.

This is a book about 100 species of butterflies and moths from Guanacaste, Costa Rica and, at the same time, a natural history for the whole of the country's rich lepidopteran fauna. The authors and their teams of gusaneros (caterpillar collectors), as well as associated botanists, systematic entomologists, and molecular biologists, have been at the task for 28 years and it shows. The species accounts are intimate, engaging, detailed looks into the lives of the chosen.

Miller et al. begin with a wide-ranging chapter that introduces readers to butterflies and moths, their diversity, life cycle, and the geological history of Guanacaste. A resplendent gallery of 100 selected Costa Rican butterflies and moths follows: butterflies, especially hesperiids, silk moths, and hawk moths are featured. The insects are gorgeously rendered by Miller. Each has been manicured into a blemish-free work of art. The black backgrounds are dramatic, although in some cases, the approach works against authors (e.g., when black wings and spines meld into the "canvas" or where hyaline cuticle reproduces as black). The core of the book is the collection of essays (with an embedded larval image) written largely by Janzen and Hallwachs,

as if they were leading a tour through one of the project's "rearing barns." The species accounts—replete with interesting natural history morsels—are written to be equally palpable to general readers as well as seasoned entomologists. The phenomenon of mimicry surfaces over and over, a reminder that our planet's tropical forests are very different and special. The observation of silk production by an adult saturniid (pp 8–9) bears further investigation. It is curious that puddling by moths would be so rare in Costa Rica (p 221). Many families of moths puddle northward, and Smedley and Eisner's grand champion, *Gluphisia septentrionis* (an insect capable of imbibing and squirting from its "other" end more than 600 times its own body mass in just 3.5 hours), is a moth. The story of seasonal migration, from dry forest to wet forest and back again, proves to be almost a universal theme—interestingly, so too go the predators and parasitoids. Janzen overlays much of his burgeoning genetic data that often suggests that what is already a fabulously rich and complex fauna is richer still, with dozens as yet unrecognized cryptic species that remain to be described.

At once, this is a handsome coffee-table work, a splendid natural history, as well as a bountiful menu for hungry Masters and PhD students looking for interesting hypotheses and as yet unexplained phenomena to feast upon.

DAVID L WAGNER, *Ecology & Evolutionary Biology, University of Connecticut, Storrs, Connecticut*

FIELD GUIDE TO BUTTERFLIES OF THE SAN FRANCISCO BAY AND SACRAMENTO VALLEY REGIONS. *California Natural History Guides, Number 92.*

By Arthur M Shapiro; illustrated by Timothy D Manolis. Berkeley (California): University of California Press. \$50.00 (hardcover); \$18.95 (paper). xiv + 345 p + 31 pl; ill.; index. ISBN: 978-0-520-24469-6 (hc); 978-0-520-24957-8 (pb). 2007.

LIVING JEWELS 2: THE MAGICAL DESIGN OF BEETLES.

By Poul Beckmann; introduction by Ruth Kaspin. Munich (Germany) and New York: Prestel Publishing. \$45.00. 111 p; ill.; index of beetles. ISBN: 978-3-7913-3777-7. 2007.

The insect order Coleoptera contains over 350,000 described species and, somewhere in this crowd, there are some outrageously beautiful specimens. Poul Beckmann's book, a sequel to *Living Jewels: The Natural Design of Beetles* (2001. Munich (Germany): Prestel Verlag), presents about 100 magnificent photographs of members of the Coleoptera families Buprestidae, Cerambycidae, Curculionidae, and Scarabaeidae. These are preceded by Ruth Kaspin's very interesting introduction, where she traces the history of natural sciences from the 16th-century cu-

riosity cabinets to the Internet age. The photographs reveal intricacies that make it hard to believe, as Kaspin writes, that these are "the product of growing organic matter" (p 9). Several species reveal ideal Halloween costumes, spiky punk hairdos, Van Goghish color influences, fascinating eyes, and even possible personalities.

The photographs are followed by a two-page section entitled Beetle Profiles that, for some odd reason, first presents specifics on beetle families and then on the second page, general information on the Order Coleoptera. It would have been better to go from the general to the specific. It is agonizing to read in three different paragraphs that members of the specific family being discussed "are widely varied in size, coloration, patterning, and global distribution" (p 108). The same page also incorrectly mentions the "subfamily Eupholus"—it should be Entiminae. *Eupholus* is a genus. Sadly, several insect genera are misspelled in the photographs and in the index. For example, "*Eupoelica*" should be *Eupoecila*; "*Celedota*" should be *Celidota*, and "*Cylindrothorax*" should be *Cylindrorhax*. Finally, *Eupholus* is presented in the index as a member of the Curculioninae, when in reality it is a member of the Entiminae (broad-nosed weevils). After such an enormous amount of work to produce the magnificent photographs, it would have been a good idea to have a Coleoptera expert proofread the two pages of text and the scientific names. Nevertheless, *Living Jewels 2* is a fantastic presentation of some crawling masterpieces of nature. These delightful beetles represent one additional conundrum to our "civilized" species: an astounding beauty we are willing to destroy in a heartbeat for the sake of "progress."

FERNANDO E VEGA, *Silver Spring, Maryland*

PREDATOR UPON A FLOWER: LIFE HISTORY AND FITNESS IN A CRAB SPIDER.

By Douglass H Morse. Cambridge (Massachusetts): Harvard University Press. \$49.95. xi + 377 p; ill.; index. ISBN: 0-674-02480-X. 2007.

There are few biologists who can claim to be as intimately acquainted with the behavior and life history of a single invertebrate species in both wild and captive populations as Douglass Morse. *Predator upon a Flower* provides a comprehensive account of his studies of the crab spider, *Misumena vatia*, spanning more than 25 years of detailed and painstaking research. Chapters on foraging strategies, their constraints, life-history consequences, learning, sensory biology, morphological variation, sexual interactions, and trophic interactions tackle a diverse array of behavioral, ecological, and evolutionary questions, many of which are unfortunately neglected in the current literature.

A recurring theme in the book is the unusual tractability of Morse's wonderful study system, in which it is possible to trace the fitness consequences (in terms of survival and fecundity) of many traits that vary quantifiably from individual to individual. This, coupled with the level of detail achieved in many of the descriptions of *Misumena*'s natural history, will make this volume a valuable stimulus to any reader who has an interest in invertebrate behavior and evolution. Chapter 6, which sketches a fascinating series of experiments that explore developmental changes in the significance of learned and innate foraging behavior, is a particular highlight.

If there is one fault with the book, it is that some of the frequent, laudable attempts to set studies of *Misumena* into the context of the broader literature feel rather outdated, with references to "recent" developments and debates that focus on publications from the 1980s. This is not to say that the volume fails to contribute to our understanding of the research questions that are currently in vogue. As a beautifully detailed account of a fascinating and scientifically valuable study organism, its value is clear.

TOM READER, *Biology, University of Nottingham, Nottingham, United Kingdom*

A FIELD GUIDE TO THE AMPHIBIANS AND REPTILES OF BALI.

By J Lindley McKay. Melbourne (Florida): Krieger Publishing. \$39.50. vii + 138 p; ill.; index. ISBN: 1-57524-190-0. 2006.

With more than 17,000 islands and the most complex geological history anywhere on the planet, Indonesia possesses a startlingly diverse and highly endemic herpetofauna. As the land of the Komodo Dragon, and home to the sharpest faunal boundary on the planet (Wallace's Line), the islands constituting Indonesia represent one of the world's true superpowers of biodiversity and the origin of many of its most spectacular amphibians and reptiles. Given these facts, plus the simple truth that Bali is a popular vacation spot, a good field guide of the amphibians and reptiles of this island has been badly needed. Bali is an ecotourism mecca. Its amphibians and reptiles ought to be readily accessible to the many thousands of travelers who visit annually.

Thus, it was with some enthusiasm that I heard of the publication of J Lindley McKay's recent guide. This is a handsome, large format, hard-bound book, with a colorful photograph of a well-fed Paradise Flying Snake, *Chrysopelea paradisi*, on the cover. At a first glance, the contents are appropriate, with a general introduction, an informative identification section, instructions on how to use dichotomous keys, an introduction to amphibian

and reptile habitats (entitled The Environment of Bali), a brief overview of the total herpetological fauna of Bali, a section on traditional uses of amphibians and reptiles (e.g., food and medicine), a discussion on first aid for snakebites, a section on keys (for reptiles, frogs and toads, and tadpoles), and individual species accounts. A particularly welcome addition is the inclusion of a key to the species in Bahasa (Indonesian). All good, so far.

This work has a number of strengths, including simple but effective illustrations, decent keys, reasonable quality habitat photographs, an abundance of color images of most species in life, and presentation of general information on ecology of included species. The author clearly has spent a reasonable amount of his own time on Bali, has personally visited most habitat types, and has encountered many (hopefully most) of the included species in life.

McKay's volume also has a number of shortcomings that will no doubt infuriate field biologists, herpetologists, and systematists who may attempt to use this book for anything more than a semi-popular field guide. Chief among its problems is the superficiality of the included information (species accounts are *very* basic) and a near complete lack of documentation as to the source of included data. Most basic biological information (e.g., body size, scale counts, coloration, geographical distribution, elevational range, diet, and habitat, among others) is presented without reference to its origin and so one wonders if these are data collected by McKay or possibly reproduced from other publications, based on animals in other parts of their range. This, plus the fact that so many of the images presented in the book (including the one on the cover) are actually not photographs of animals from Bali (5% of frogs; 100% of turtles; 30% of lizards; and 61% of snakes), suggest that readers should treat much of the reported information with a degree of caution. Finally, although Indonesia's herpetofauna is constantly being revised, the taxonomic treatment of many species is overly simplistic, confusing and, in certain instances, incorrect. In some cases, new revisionary work clearly has been considered and included (e.g., species of the lizard genus *Eutropis* and snakes of the genus *Coelognathus*) and in others, widely accepted taxonomic work (e.g., frogs of the genus *Fejervarya*) has been ignored. There is no mention of generally recognized subspecies, even for widespread taxa with subspecies restricted to Bali and Java (a few of which are already recognized by some workers as full species). Finally, although this may seem trivial, the large format of this volume is more akin to a coffee-table book and not a "work-

ing" field guide that can be easily slipped into a back pocket for a day of hiking.

In conclusion, although this is a welcome contribution to the literature (which I will personally use and recommend to others), I suspect its value will be limited to use by general readers, ecotourists, and perhaps students. If any of these parties convert to a life dedicated to herpetology in Southeast Asia, well, then, McKay's book will have served its purpose admirably.

RAFE M BROWN, *Herpetology, Natural History Museum & Biodiversity Research Center and Ecology & Evolutionary Biology, University of Kansas, Lawrence, Kansas*

HOMALOPSID SNAKES: EVOLUTION IN THE MUD.

By John C Murphy. Malabar (Florida): Krieger Publishing. \$68.50. viii + 249 p; ill.; index to scientific names and higher categories. ISBN: 978-1-57524-259-0. 2007.

Many biologists choose their profession based on a lifelong love of nature's rich diversity, yet paradoxically, most biological research focuses on only a tiny fraction of that diversity. A few "model organisms" attract detailed study, and the rest are largely neglected by all except for a few passionate enthusiasts. John Murphy and his colleagues are just such people, and have devoted several years to exploring the biology of a poorly-known lineage of semiaquatic snakes. The reasons for the low scientific profile of homalopsid snakes are not difficult to identify: investigators must slog through the muddy margins of Southeast Asian ponds and rivers to find these drab snakes lurking beneath the murky water. Researchers are likely to be severely bitten if they attempt to capture the animal. Nonetheless, the results emerging from fieldwork on homalopsids hint at many fascinating biological stories: unexpectedly high diversity, remarkable convergence among distantly-related taxa, and some truly unique phenomena. For example, a minority of homalopsids feed on crustaceans—an unusual prey type for snakes, and one able to autotomize appendages such as legs and claws if attacked. Thus, these homalopsids have the distinction of being the only snakes that routinely dismember their prey before consuming it. Similarly, the massive abundances and "fast" life histories of these snakes support a massive (but perhaps sustainable) offtake of snakes from the wild, with an estimated 3.8 million snakes taken each year from one lake in Cambodia alone.

Murphy has produced a detailed book on these intriguing serpents, and one that will be the benchmark for this group for many years. It is unlikely to attract casual readers. The author provides a summary of homalopsid biology rather

than setting any new research directions. Nonetheless, the volume succeeds admirably in its purpose, and may well stimulate other biologists to trudge across the fetid mudflats of tropical Asia and Australia in search of these enigmatic reptiles.

RICHARD SHINE, *Biological Sciences, University of Sydney, Sydney, New South Wales, Australia*

HERPETOLOGICAL HISTORY OF THE ZOO AND AQUARIUM WORLD.

By James B Murphy. Malabar (Florida): Krieger Publishing. \$79.50. xvi + 327 p; ill.; no index. ISBN: 978-1-57524-285-9. 2007.

THE ATLAS OF BIRD MIGRATION: TRACING THE GREAT JOURNEYS OF THE WORLD'S BIRDS.

Edited by Jonathan Elphick; Foreword by Thomas E Lovejoy. Buffalo (New York): Firefly Books. \$35.00. 176 p; ill.; index. ISBN: 1-55407-248-4. 2007.

As the title would suggest, most of this book contains maps showing the seasonal distribution of selected species of migratory birds along with circular 12-month calendar diagrams that indicate the timing of spring and fall migration and the breeding season. Each circular diagram is color coded to the same color used in the map data for a species so that confusion is avoided when more than one species is considered on a single map. Most of the maps show the flight trajectories of fall migration and only rarely are spring routes pictured. This eliminates some of the clutter that would result if both spring and fall pathways were pictured on the same map, but some readers will certainly wonder about the geography of return movements in the spring. A combination of color photographs and paintings by a number of artists accompany the maps for each species along with basic facts: common and scientific name, wing span, length of migratory journey, and a silhouette of the species flying against a grid that indicates length from tip of bill to tip of tail.

The atlas is separated into sections. The first, *Birds on the Move*, contributed by Chris Mead, includes brief one or two page discussions of topics such as the genetics and evolution of migration, general geographical patterns, timing, flight strategies and techniques, altitude, physiological preparation, ecological barriers, weather and climate, staging and stopover areas, orientation and navigation, a very brief survey of the techniques used to study migration, and the conservation of migratory birds. No citations to the pertinent literature are included in this or any other section of the atlas.

The next four sections deal with North American migrants (28 pages written by Bette and

Jerome Jackson), Eurasian migrants (32 pages authored by Malcolm Ogilvie and Chris Mead), winter visitors from the far north (16 pages by Ogilvie), and Southern Hemisphere migrants (14 pages by Peter Fullagar). The last three sections cover migratory seabirds (12 pages), irruptions (two pages), and a catalog of migrant species (seven pages) with information on wing length, weight, breeding, wintering ranges, and the length of the migratory journey—all by Ogilvie. Species selection for inclusion depended on how typical their migration pattern is for a larger grouping of species and if its migration pattern tells an interesting story.

Overall, the layout of the volume is attractive and the artwork is outstanding. The book succeeds in portraying the astonishing accomplishments of migratory birds during their seasonal journeys, and readers without prior knowledge of bird migration will be stimulated to read more about this amazing behavior. To that end, the final page of the volume has a list of sources for further reading.

SIDNEY A GAUTHREAUX, JR, *Biological Sciences, Clemson University, Clemson, South Carolina*

THE BIRDS OF COSTA RICA: A FIELD GUIDE.

By Richard Garrigues; illustrated by Robert Dean. *Zona Tropical Publication. Comstock Publishing Associates. Ithaca (New York): Cornell University Press.* \$65.00 (hardcover); \$29.95 (paper). xxvi + 387 p; ill.; index of scientific names and index of English common names. ISBN: 978-0-8014-4587-3 (hc); 978-0-8014-7373-9 (pb). 2007.

Because of its beauty, tropical climate, and tremendous biodiversity, Costa Rica is a popular locale for birding. Therefore, a simple, effective field guide would be an invaluable tool for residents and visitors seeking to observe and identify birds. This is exactly the focus of *The Birds of Costa Rica: A Field Guide*—to assist with identification in the field—and the book succeeds admirably.

The core of this volume contains over 300 pages of color plates of Costa Rican birds, with small text boxes of relevant information on the facing pages. The color plates are labeled by species, and they display males and females where the sexes differ, and color morphs or breeding stages where appropriate. Where the size scale of birds on the same page differs, the authors indicate this with a black line. The facing text provides a range map, common and scientific names, key identification tips, and notes on habitat and vocalization—that is, everything you need to identify a bird, without a lot of additional material to add weight and slow identification. Additional in-depth information, as the author points out, is available in *A Guide to the Birds of Costa Rica*, by F Gary Stiles and Alexander

F Skutch (1989. Ithaca (NY): Cornell University Press).

The current book offers several other useful features. One is an eight-page survey of avian morphology, which can orient serious birders to what to look for and what names to assign to particular structures. There is also a two-page section that illustrates vultures and raptors in flight, indexes that are arranged by scientific name and by common name, a map of Costa Rica, and a glossary. There is a six-page section that lists birds that have scientific or common names that have changed since the publication of Stiles and Skutch's volume. In addition, the author provides a seven-page introduction that lays out how to use this book to assist in effective identification of Costa Rican birds. For example, Garrigues explains that a section of northwestern Costa Rica called the Guanacaste de Cordillera is made up of volcanoes with low passes between them, allowing lowland birds to move between the Caribbean and Pacific sides of the mountains more easily than they can move over higher-elevation mountain ranges further to the south. Such details can help birders make informed conclusions in the field. The introduction provides many such examples of valuable context, and is also a pleasure to read—as is this entire book.

JOHN P ROCHE, *Biology, Boston College, Chestnut Hill, Massachusetts*

THE ECOLOGY AND BEHAVIOR OF CHICKADEES AND TITMICE: AN INTEGRATED APPROACH.

Edited by Ken A Otter. *Oxford and New York: Oxford University Press.* \$110.00. xxiv + 319 p; ill.; index. ISBN: 978-0-19-856999-2. 2007.

This is an edited book of 18 chapters written by highly qualified (and predominantly) young scientists. Susan Smith, author of the once definitive textbook on chickadees (1991. *The Black-Capped Chickadee: Behavioral Ecology and Natural History*. Ithaca (NY): Comstock Publishing Associates), wrote the introduction to the current volume. She correctly notes that an amazing amount of information has been discovered about chickadees since her book and much of it is by the authors of these chapters. The most important reason that so much has been discovered is that chickadees are amazing birds. The chapters describe photoperiods and reproduction, behavioral aspects of hybridization, social dominance, vocalizations, food caching, cavity nesting, and more.

The quality of the research and writing varies across chapters from very good to excellent. Scholarship in citing the most relevant work and integration of the research on a topic, unfortunately, varies more widely. Also, the order of topics in the

book is ill-advised. Primary material often follows more advanced work, which will not bother advanced researchers, but will make the material more difficult for novices. However, the volume's virtues far outweigh its faults. It should be required reading for students and researchers interested in chickadee biology and for anyone more broadly interested in spatial representation, reproduction, bioacoustics and acoustic communication, and social dominance.

Finally, I wish to correct an annoying citation error in the text. The article by Horn et al. (1992. *Auk* 109(4):847–852) demonstrated that chickadees shift their songs across a range of frequencies, but never showed the songs were transposed (i.e., maintained a constant relative pitch). That critical link was described by Weisman et al. (1990. *Condor* 92:118–124). Citing one of these articles without the other as evidence for the transposition of chickadee song is like walking wearing only one shoe.

RONALD G WEISMAN, *Psychology and Biology*,
Queen's University, Kingston, Ontario, Canada

PENGUINS OF THE WORLD. *Second Edition.*

By Wayne Lynch. *Buffalo (New York): Firefly Books.* \$34.95 (hardcover); \$24.95 (paper). 175 p; ill.; index. ISBN: 978-1-55407-334-4 (hc); ISBN: 978-1-55407-274-3 (pb). 2007.

This is not a scientific volume. The text is a simple but engrossing account of the life of penguins that targets a general audience. Lynch presents a personal voyage of discovery written in a journalistic style, peppered with anecdotes that he lavishly illustrates with his own stunning photographs. The book begins with two introductory chapters that encompass the diversity and distribution of penguins and then continues with four chapters that follow their life cycle. The volume concludes with two appendixes, the first gives brief, 50 to 100-word accounts for each of the 17 species and the second addresses human impacts. The bibliography is brief, but comprehensive.

The book contains several errors—most notably “[t]he wing bones in all penguins . . . are fused together to form stiff, durable paddles that the bird uses to swim underwater” (p 22)—but these are just minor distractions. The only major shortfall is that all of the photographs in this book were taken ashore, so penguins at sea remain a pictorial enigma. This impacts Chapter 5, which presents a lucid and insightful description of the relationship between diet and foraging patterns and how this differs among species. The main target prey groups—krill, squid, and lanternfish—are not depicted, leaving general readers to guess what they look like.

As a youngster, I would have devoured this book. I can imagine hours spent gazing at the photographs and reading their captions. The text is easily understood and Lynch's bubbling enthusiasm over penguins is contagious. This volume will be a perfect vehicle to stimulate a passion for wildlife.

CHRIS LALAS, *Dunedin, New Zealand*

THE BIRDER'S COMPANION.

By Stephen Moss; illustrated by Clive Dobson. *Buffalo (New York): Firefly Books.* \$16.95 (paper). 208 p; ill.; index. ISBN: 1-55407-212-3. 2007.

MAMMALS OF MADAGASCAR: A COMPLETE GUIDE.

By Nick Garbutt. *New Haven (Connecticut): Yale University Press.* \$39.95 (paper). 304 p; ill.; index. ISBN: 978-0-300-12550-4. 2007.

The current volume is an updated, paperback edition of Garbutt's *Mammals of Madagascar* (1999. New Haven (CT): Yale University Press). Filled with new references, and reflecting the increased number of known Malagasy mammal species (especially lemurs), it is a worthy descendant of the original. The new book includes brief introductory chapters on Madagascar's biogeography and ecological regions (including a discussion of how the terrestrial mammals likely migrated to the island), and a taxonomic listing of the mammals. The main body of the text is dedicated to describing the individual species of each of Madagascar's five endemic mammalian clades (Lypotyphla, Chiroptera, Primates, Carnivora, and Rodentia). Short descriptions of nonendemic mammals, conservation and protected areas, and key locations for observing specific mammals, organized by ecological region conclude the volume. The coverage is dominated by lemurs, with slightly more than one-half of the pages dedicated to species descriptions of lemurs, roughly the same as the earlier volume. However, the number of pages per species is more equitable in the current book, with lemurs and carnivores nearly equal. This is largely a product of the 135% increase in recognized lemur species, based on Garbutt's revised taxonomic list, far greater than any of the other Orders. In part, this dramatic increase has resulted from the elevation of a number of lemur subspecies to specific status. It also reflects the tremendous focus on lemur research and conservation in Madagascar, the island's “flagship” fauna. With fewer pages per lemur species, some information from the original volume has been reduced—for example, locations to view lemur species (e.g., *Lemur catta*). The inclusion of some recently introduced taxa (e.g., *Rattus rattus*) in the Order-specific chapters, rather

than in the short section on nonendemic mammals, is inconsistent.

Although a number of travel and field guides have recently been published on Madagascar, these focus on, or are entirely devoted to, lemurs. As such, Garbutt's new guide is a needed addition to the literature on Madagascar's fauna, as it provides abundant information, including superb photographs and species' distribution maps on the entire radiation of Madagascar's unique mammals.

FRANK P CUOZZO, *Anthropology, University of North Dakota, Grand Forks, North Dakota*

EXOTIC ANIMAL FIELD GUIDE: NONNATIVE HOOFED MAMMALS IN THE UNITED STATES.

By Elizabeth Cary Mungall; Foreword by Ike C Sugg. College Station (Texas): Texas A&M University Press. \$23.00 (flexbound). xxv + 286 p; ill.; index. ISBN: 1-58544-555-X. 2007.

Field guides generally point users to key features of species that allow their identification in natural settings, including photographs, hoof prints, and distribution maps, among others. This nicely produced book takes that format in another direction, probably appealing to a rather small group of aficionados. Using good quality photographs, maps, and an accessible writing style, Mungall sets out to provide a "field" guide on the identification, native range, habits, and conservation of exotic hoofed mammals kept in managed conditions in the United States.

The guide portion of this volume is well done and straightforward. In addition to the general animal profiles, there are sections on photography and resources for owning and keeping exotics in the United States. Overall, this work is clearly oriented toward members of organizations such as the Exotic Wildlife Association, which aided in its publication.

The least developed portions of the book relate to the broader scientific and conservation implications of exotic species and potential ex situ conservation efforts. Although the captive rearing of exotic animals can promote and facilitate their protection, the examples given in the text are limited in scope and are never ultimately linked with conservation outcomes in the wild, other than providing a place for the species' safekeeping. Likewise, the issue of the impacts of exotic species is treated only cursorily in spite of the widely recognized role that invasive exotic species can play as both potentially beneficial and harmful organisms.

Nonetheless, the topic brought to light by this volume inspires some reflections on broader themes not fully addressed here. For example, a recent debate brought focus on the issue of "re-wilding North America" (J Donlan et al. 2005.

Nature 436:913–914), even considering the use of exotic fauna to reoccupy niches left empty due to native megafauna extinctions. Mungall shows us that this "re-wilding" is already underway, at least on a number of private ranches and game reserves in Texas.

In short, this is a well-made volume that will appeal to a reduced readership devoted to nonnative hoofed animal husbandry but, at the same time, it proves to be an interesting curiosity for anyone interested in the topic of exotic species.

CHRISTOPHER B ANDERSON, *Millennium Institute of Ecology & Biodiversity and Omora Ethnobotanical Park, University of Magallanes, Puerto Williams, Chile*

BOBCAT: MASTER OF SURVIVAL.

By Kevin Hansen. Oxford and New York: Oxford University Press. \$29.95. xvi + 212 p + 16 pl; ill.; index. ISBN: 0-19-518303-7. 2007.

This slim volume packs an amazing amount of information about bobcats (*Lynx rufus*) into just over 200 pages. The book is written for nonprofessionals and wildlife enthusiasts, and is sure to be engaging to this audience. But the text is also heavily referenced, so professional ecologists and wildlife biologists will find the volume edifying.

Each chapter begins with an anecdote about bobcat lore, which are mainly stories about various kinds of human-bobcat encounters and interactions that are very entertaining. Interviews with primary research scientists are reported along with references to their work in the literature. This gives the book the feel of a "story" being told, but one that is scientifically accurate.

The author obviously has great respect and admiration for the species that he has so carefully documented. Bobcats are remarkable among cat species because they are not endangered. They were a historical source of furs for clothing, and they remain a legal resource. Thus, bobcats fall between conservation concerns and exploitation. This topic is handled particularly well in this volume, as is the fascinating role of the bobcat in Navajo lore. The book includes information about bobcat evolutionary history, habits and habitat, behavior and foraging, population dynamics and, finally, conservation and management. Although densely informative, this volume is well written in a conversational style that made me sorry to come to the last page. The center of the book contains stunning photographs of bobcats in the wild and of applications of research techniques.

F STEPHEN DOBSON, *Biological Sciences, Auburn University, Auburn, Alabama*

GORILLA SOCIETY: CONFLICT, COMPROMISE, AND COOPERATION BETWEEN THE SEXES.

By Alexander H Harcourt and Kelly J Stewart. *Chicago (Illinois): University of Chicago Press.* \$75.00 (hardcover); \$30.00 (paper). xviii + 459 p; ill.; author and subject indexes. ISBN: 978-0-226-31602-4 (hc); 978-0-226-31603-1 (pb). 2007.

Gorillas have been in the news over recent years because of concerns about their survival. These are the magnificent animals that have been subject to the loss of habitat, the bushmeat trade, politically influenced killings, as well as decimation from the Ebola virus.

The current book is organized around the study of primate socioecology, focusing particularly on gorillas in the wild. The socioecological model examines the ways that the two sexes differentially meet the various demands of gaining food resources, avoiding predation, mating and rearing offspring, and how these differences impact societal structure. The first part of the volume presents an overview of primate socioecology in general. For those not familiar with the socioecological perspective, this part of the book is worth the price of admission by itself.

The remainder of the volume focuses on the socioecology of gorillas. In Part 2, the authors examine the biology, habitat use, and social structure of gorillas. The third part describes female strategies and Part 4 discusses male strategies. The presentation of the socioecological argument is clear and logical. The various chapters on female strategies examine female competition over food, cooperation in competition over food, the overwhelming influence of the silverback male on the females' competition and cooperation, the anti-predation and antiinfanticide value to females of joining males (not groups), and female emigration from the natal group and choice of males. The chapters on male strategies examine the influence of the environment and females and then male mating strategies. Each of the two parts on females and males has a summary chapter that discusses the socioecology of the two sexes. Part 5 suggests a variety of future questions and then concludes with a chapter on gorilla conservation.

The authors suggest that the book will typically be used as a reference, with readers "dipping in" to various parts of the volume, and therefore included some repetition. This is a useful strategy as each part of the book can stand on its own. This will be a nice addition to existing research-based publications on gorillas. It will be of great interest to researchers, zoo personnel, and gorilla aficionados.

MICHAEL P HOFF, *Psychology, Dalton State College, Dalton, Georgia*



AQUATIC SCIENCES

QUANTITATIVE ANALYSIS OF MARINE BIOLOGICAL COMMUNITIES: FIELD BIOLOGY AND ENVIRONMENT.

By Gerald J Bakus. *Hoboken (New Jersey): Wiley-Interscience.* \$99.95. xv + 435 p; ill.; index. ISBN: 0-470-04440-3. [CD-ROM included.] 2007.

This book provides an overview of sampling and analytical methods relevant to the marine sciences. An impressive breadth of topics are covered, including sampling equipment, sampling strategy, univariate statistical methods, multivariate statistics, power analysis, randomization methods, species diversity indices, demographic estimates, meta-analysis, fractals, chaos, spatial pattern analysis, maximum likelihood and Bayesian statistics, mathematical modeling, and selected concepts in marine ecology. This breadth comes at a price: the coverage of topics is often superficial, which will frustrate most experienced workers in the field. The depth of coverage is somewhat idiosyncratic, reflecting the research interests of the author and his colleagues. For example, extensive discussion on the finer details of using line transects is presented, whereas sampling of gelatinous zooplankton is mentioned in only one sentence.

Overall, the book serves primarily as a menu of suggestions for how to collect and analyze data, rather than as a guide for implementing particular analyses. To this end, several references are typically presented on each topic to provide readers with an entry into the relevant literature. As the title suggests, many of the examples are derived from marine studies, but studies from other systems are also presented. Although using nonmarine examples may help to facilitate a broader reading of the literature and expose readers a wider array of potential methods, techniques are sometimes described without reference to relevant marine studies that would also serve the intended audience of marine biologists well. The book is most appropriate for early- to mid-career graduate students who are in the process of developing their thesis projects, as well as for some advanced undergraduates. Given this target audience, the price is somewhat problematic. However, it will be a useful addition to any college or university library.

J TIMOTHY WOOTTON, *Ecology & Evolution, University of Chicago, Chicago, Illinois*

THE SILENT DEEP: THE DISCOVERY, ECOLOGY AND CONSERVATION OF THE DEEP SEA.

By Tony Koslow. Chicago (Illinois): University of Chicago Press. \$35.00. vi + 270 p + 16 pl; ill.; index. ISBN: 0-226-45125-9. 2007.

When I first saw this coffee-table style volume, my immediate thought was how will it add to Gage and Tyler's excellent textbook, *Deep-Sea Biology: A Natural History of Organisms at the Deep-Sea Floor* (1991. Cambridge: Cambridge University Press)? The answer is manifold. First, the gorgeous photographs and line drawings of deep-sea organisms and exploration give it broad appeal. The text is deceptive, in that it is written in a way that nonspecialists can follow and enjoy, but it is also extremely detailed and scholarly in its thoroughness. This trick is achieved by using a narrative style and numbered references that allow the flow of the text so that readers do not realize that Koslow has summarized a very large number of key studies for them in his detailed history of the exploration, study, and utilization of deep-sea environments.

The enthusiasm of the author for deep-sea ecosystems shines through with personal thoughts and anecdotes that most of us expunge from our terse and often dry writing. Not so here! Koslow presents a compelling story that begins with a section on early exploration through the Challenger Expedition, then moves through scientific progress in deep-sea ecology over the last century, and ends with a compelling and passionate section on very disturbing human impacts. Because this organization scheme follows the historical sequence, it works extremely well and makes it very "untextbook" in form. The author is unique among deep-sea biologists in that he comes to the field from a background in fisheries science, and is therefore also able to bring a management and policy perspective to the problem that few others could. The text is a real joy to read, and because it focuses on a subset of deep-sea issues—namely exploration, ecology, and conservation—it actually complements the Gage and Tyler volume very well. The current book is scholarly in offering new insights to specialists, but it is meant to be read by nonscientists who are interested in learning something about the largest habitat on Earth. Koslow is to be commended for providing an important textbook and viewpoint that is highly recommended for anyone with a professional or personal interest in deep-sea ecosystems.

PAUL SNELGROVE, *Ocean Sciences Centre, Memorial University of Newfoundland, St. John's, Newfoundland, Canada*

WAVE-SWEPT SHORE: THE RIGORS OF LIFE ON A ROCKY COAST.

By Mimi Koehl; photographs by Anne Wertheim Rosenfeld. Berkeley (California): University of California Press. \$39.95. xii + 179 p; ill.; index. ISBN: 0-520-23812-5. 2006.

This volume presents an excellent introduction to the natural history and biology of the shore for non-specialists. For many, a visit to the shore is a pleasant escape or a favorite holiday. This book will encourage readers to look at the shore and the organisms it harbors with a new eye. Marine shores are one of the most physically rigorous environments, and one that has provided a rich model system for studies of ecology, physiology, and biomechanics.

As is indicated in Chapter 1, this is a book of "how" organisms survive and thrive on the shore, which is explained by morphology, mechanics, and biophysics, rather than "why" questions, which are the essences of ecology and evolution. Chapter 2 focuses on water, its power both in terms of physical forces, but also in terms of the essential need for the presence (or absence) of water for life on the shore. Chapter 3 deals with waves, boundary layers, and the nonintuitive way in which water moves and works. For many, it will be surprising to learn that even on the most wave-swept shore, there are places where organisms are protected from the forces of moving water, and the extreme differences in flow seen by organisms over very short distances allow much of the rich diversity found there. Chapter 4 moves to the properties of organisms faced with the rigors of shore life. It also illustrates that organisms have found many different types of solutions to these problems enhancing the diversity we see. This chapter also does a superb job of explaining important concepts in mechanics (such as stress, strain, and fracture) and how both the material and structural properties of organisms affect their responses. Chapter 5 concerns the large-scale movement and mixing of water. Although moving water is a physical challenge for organisms, for many (especially those that are sessile), it is also essential for the delivery of food and nutrients and the dispersal of offspring. Chapter 6 takes us to the shore in the absence of water—when the tide is low or the fringing areas are high on the shore, and the ways organisms cope with heat and desiccation. The only constant in the shore environment is change, which is covered in Chapter 7. Here, the author deals with both physical and biological changes that occur from short time scales (such as waves washing in and out) to long time scales (such as seasons) and how the timing of life matches these changes.

Each of the eight chapters is complimented by excellent illustrations and many beautiful photographs of common animals and plants, as well as

scenes that illustrate concepts. The photographs alone make the book one that many readers will want in their home. The author also provides useful footnotes with definitions and references for additional readings for anyone who wants to know more. In a time when public scientific literacy is low, this volume provides an excellent and visually appealing entrée into this wonderful world. The audience for this book includes educated nonexperts, and it should be especially appealing to anyone who lives close to or regularly visits the shore. I think this would also make an excellent textbook in a science course for nonmajors. The appeal of the photographs combined with the approachable prose and excellent deciphering of science and engineering into intuitive and easy to relate to concepts will help demystify science for many nonexperts, and may inspire students to want to learn more about biology, biomechanics, and the natural world.

DIANNA K PADILLA, *Ecology & Evolution, Stony Brook University, Stony Brook, New York*

WILD CARIBBEAN: THE HIDDEN WONDERS OF THE WORLD'S MOST FAMOUS ISLANDS.

By Michael Bright. *New Haven (Connecticut): Yale University Press.* \$25.00 (paper). 224 p; ill.; index. ISBN: 978-0-300-12549-8. 2007.

This is a well-written, idyllic, armchair voyage of exploration of the biological diversity of the islands of the Caribbean Sea. A companion volume to a four-part television series produced for the Travel Channel, the book is laden with color photographs and accurate, detailed accounts of the natural history of many of the enormous variety of organisms that inhabit one of the world's hotspots of biological diversity. For a popular work, I particularly liked the geological context and human historical accounts that help explain the evolutionary development and contemporary distribution of this diversity.

It is, however, painful for me to read this book from my perspective of over four decades of travel and biological research in the region. The greater Caribbean washes the shores of over 35 nations—from among the poorest to the richest in the world—with perhaps 200 million people. The island and mainland areas have suffered from all of the insults of a relentlessly expanding human population: deforestation; rampant development; pollution; overexploitation; and alarming social and economic problems, to name but a few. On too many pages I was confronted by a brilliant photograph of a reptile, bird, or mammal and the unrequited expectation that the text would discuss the alarming trend of decline or threatened or endangered status of that particular species. For example, the ivory-billed woodpecker, unseen in Cuba since at least 1986, is miraculously brought to life.

Although the book concentrates on terrestrial species, the blithe and breezy accounts of coral reefs, fishes, sharks, turtles, and manatees are perhaps even more flagrantly idealized. The author ignores the tragic losses of habitats and populations to overfishing, habitat loss, and coral diseases that have raised alarms and international calls for action. The term “shifting baseline syndrome,” coined to describe the perception of decline in fisheries, comes to mind (see D Pauly. 1995. *Trends in Ecology and Evolution* 10(10):430). Until we recognize what we have lost, we cannot influence the public, set goals, and implement governance policies that might allow humans to live sustainably with what is left of the natural patrimony of the planet.

Acknowledging its high production values, excellent illustrations, and scientifically informed text, *Wild Caribbean* reads, perhaps not unexpectedly, like an ecotourism development department brochure. For an old Caribbean hand, it is a sad, nostalgic trip through the “paradise” that once was and may never be again.

JOHN C OGDEN, *Biology and Florida Institute of Oceanography, University of South Florida, St. Petersburg, Florida*

SAVING PUGET SOUND: A CONSERVATION STRATEGY FOR THE 21ST CENTURY.

By John Lombard. *Published by American Fisheries Society, Bethesda (Maryland), in association with University of Washington Press, Seattle (Washington).* \$35.00 (paper). xvii + 336 p; ill.; index. ISBN: 0-295-98674-3. 2006.

This is an ambitious volume that wrestles with a key challenge facing modern North American society: How do we conserve natural ecosystem functions in a human-altered landscape? Like other books of this genre, Lombard argues for major changes to the management regimes currently in place and a fundamental reevaluation of societal values and economic decision-making. He concludes that urban environments, as presently configured, are essentially lost from a conservation perspective. The author condemns urban sprawl within the Puget Sound region, and argues that conservation priority should be given to those natural areas that contribute most to the ecosystem services of a region. His analysis is multidisciplinary and focuses on the legislative, regulatory, and judicial context for the current state of Puget Sound's endangered salmon runs, water quality, and growth management. His review of the history and current application (or misapplication!) of Washington State's Growth Management Act is particularly insightful.

This book is, however, not without its shortcomings. For example, climate change is frequently

cited as a threat, yet it is not clear exactly how this phenomenon is affecting the biological integrity of the region. The text would also benefit from a better explanation of ecosystem-based management and how it can be used to address environmental problems in Puget Sound.

Finally, the author fails to recognize existing collaborative planning instruments such as the Northwest Straits Commission and the Puget Sound Action Team, organizations that share Lombard's conservation goals. Regulatory authorities in this area would be well advised to allocate more resources to these organizations rather than to create yet another body.

Readers who want a comprehensive, science-based conservation volume may be disappointed by this work. However, it offers broad interdisciplinary solutions to the challenges facing Puget Sound—and it is through such holistic approaches that conservation will be most effective. In the end, this is an important book for those who want to better understand the issues facing Puget Sound and other similarly stressed ecosystems.

DAVID A FRASER, *Clayoquot Biosphere Trust, UNESCO Clayoquot Sound Biosphere Reserve, Tofino, British Columbia, Canada*

FUNCTIONING OF MICROPHYTOBENTHOS IN ESTUARIES. *Based on a symposium held in Amsterdam, The Netherlands, 21–23 August 2003.*

Edited by Jacco C Kromkamp, Jody F C de Brouwer, Gérard F Blanchard, Rodney M Forster, and Véronique Créach. Amsterdam (The Netherlands): Royal Netherlands Academy of Arts and Sciences; distributed by University of Chicago Press, Chicago (Illinois). \$78.00 (paper). x + 262 p; ill.; no index. ISBN: 90-6984-453-2. 2006.

The microbial communities of intertidal sediments are recognized as major contributors to estuarine productivity. Yet our understanding of their physiology and ecology, and our ability to model their behavior and productivity, lags behind progress in similar areas of phytoplankton research. This book, the result of a 2003 symposium held by the Royal Dutch Academy of Sciences, adopts a highly eclectic approach to understanding the contribution of the microphytobenthos (benthic microalgae) to estuarine functioning.

The ecosystems examined represent a rather narrow range of estuarine habitat types, concentrating almost entirely on the mudflats and sandbanks that dominate European estuaries. The lion's share of attention is given to intertidal communities and, for the most part, "microphytobenthos" is treated as virtually synonymous with "diatoms."

In contrast, the variety of approaches brought to bear on the subject is exceedingly wide. Disciplines ranging from sedimentology to the social sciences

are represented. The 14 articles are grouped into eight sections: Taxonomy and Systematics of Microphytobenthos (one paper); Photosynthesis in Marine Diatom Assemblages (two papers); Extracellular Polymeric Substances: Function and Role in Mudflats (one paper); Use of Stable Isotopes in Foodweb Research (one paper); Upscaling Primary Production (three papers); Microphytobenthos and Benthic-Pelagic Exchange (two papers); Mudflat Ecosystem Models (two papers); and Mudflats and Socioeconomics (two papers). About half represent original research, with the remainder being short reviews.

Given the wide range of topics (from a mini review of diatom systematics to a study of farmers' attitudes toward nutrient enrichment of coastal ecosystems), little more than a taste of each is gained. The best coverage is given to attempts to measure and model primary productivity in littoral sediments, where the task is complicated by the mobility of the diatom community in response to light and/or tides. The book is likely to appeal to microbial ecologists and physiologists who are interested in gaining an idea of the general scope of recent research on the intertidal microphytobenthos of European estuaries, rather than those seeking an in-depth examination of the included topics.

JOANN C RADWAY, *Marine & Atmospheric Sciences, Stony Brook University, Stony Brook, New York*

THE LIGHT AND SMITH MANUAL: INTERTIDAL INVERTEBRATES FROM CENTRAL CALIFORNIA TO OREGON. *Fourth Edition.*

Edited by James T Carlton. Berkeley (California): University of California Press. \$85.00. xvii + 1001 p; ill.; index. ISBN: 978-0-520-23939-5. 2007.

BRITTLE STARS, SEA URCHINS AND FEATHER STARS OF BRITISH COLUMBIA, SOUTHEAST ALASKA AND PUGET SOUND. *Royal BC Museum Handbook.*

By Philip Lambert and William C Austin. Victoria (Canada): Royal BC Museum; distributed by UBC Press, Vancouver, Canada. \$24.95 (paper). vii + 150 p + 40 pl; ill.; index. ISBN: 978-07726-5618-6. 2007.

AN INTRODUCTION TO HYDROZOA. *Mémoires du Muséum National d'Histoire Naturelle, Volume 194.*

By J Bouillon, C Gravili, F Pagés, J-M Gili, and F Boero. Paris (France): Muséum National d'Histoire Naturelle. €89.00. 591 p; ill.; taxonomic index. ISBN: 2-85653-580-1. 2006.

I wonder how many experimental biologists using *Hydra* as a model system actually realize that this little freshwater polyp is in many ways untypical of hydrozoans, and of cnidarians at large. In the con-

text of hydrozoans, the lack of a medusa stage is a derived trait, one with nontrivial consequences—for example, on the mechanisms of sexual reproduction. A better representative of the generalized organization of hydrozoans is another model species, *Hydractinia carnea* (very often cited as *Podocoryna carnea* or *Podocoryne carnea*), where polyp and medusa coexist within the animal's life cycle. The problem, however, remains of what about *Hydractinia*, or *Hydra*, can be generalized to the whole of hydrozoans. There is, indeed, a widespread though seldom made explicit misconception about these animals. Hydrozoans are commonly regarded as animals of very simple organization and, for this very reason, the group cannot offer scope for great disparity of bodily organization or life-history traits. As a consequence, any species can serve as a good model system for the whole taxon. Nothing could be more remote from truth. For example, think of the relevance for the germ layer theory of the fact that, in several independent hydrozoan lineages, the gametes originate in the endoderm, but are of ectodermal origin in all other species of this cnidarian group. Think of the wonderful diversity of modes of asexual reproduction, either by fission (longitudinal or transversal) of either polyp or medusa, or by fragments (podocysts or propagules) of hydroid colonies, or by budding, again from either polyp or medusa. In the latter case, a medusa will produce either polypoid or medusoid offspring, sometimes on the manubrium, in other species along the radial canals, or on any other conceivable corner of its gelatinous body.

It is difficult to understand how experimental evidence from model organisms can be adequately exploited if these are not placed in an appropriate comparative context. In principle, this would clearly require the availability of a sound phylogeny of the group, but this is often not yet at hand. Under those circumstances, a monograph such as *An Introduction to Hydrozoa* can perform an excellent educational job. Browsing through the pages of a few works of this type, where the sheer diversity of a major taxon can be appreciated without requiring any specialist knowledge in taxonomy or phylogenetics, should become a required exercise for everyone in biology.

The modest title masks an updated synopsis of the world's hydrozoans, with illustrated keys to all genera and a list of the 3702 species known to date. The introductory chapters provide a good summary of hydrozoan morphology and development, as well as several research tools specifically addressed to cnidarian specialists. In particular, the book includes a very articulated survey of the anatomical characters to be considered when describing polyps or medusae, with specific recom-

mendations on the character states to be distinguished within each character; technical details on collecting, fixing, and studying hydrozoans; a very detailed glossary; and a splendid list of references that provides access to all individual papers containing original descriptions of one or more hydrozoan genera or species.

The text is in English, but the legends to the 231 compound figures are also given in French. This is a little, well-deserved tribute paid to the Muséum National d'Histoire Naturelle in Paris, whose series of beautifully produced *Mémoires* hosts this excellent monograph. The five authors, all well-known specialists of this animal group, must be congratulated for producing this precious publication.

ALESSANDRO MINELLI, *Biology, University of Padova, Padova, Italy*

OTOLITHS OF COMMON AUSTRALIAN TEMPERATE FISH: A PHOTOGRAPHIC GUIDE.

By Dianne Furlani, Rosemary Gales, and David Pemberton. Victoria (Australia): CSIRO Publishing. AU\$140.00. vii + 208 p; ill.; species index. ISBN: 978-0-643-09255-6. 2007.

REPRODUCTIVE BIOLOGY AND PHYLOGENY OF CETACEA: WHALES, DOLPHINS AND PORPOISES. *Reproductive Biology and Phylogeny, Volume 7.*

By Debra L Miller. Enfield (New Hampshire): Science Publishers. \$118.00. xii + 428 p; ill.; index. ISBN: 978-1-57808-360-2. 2007.

This publication is a part of a series (edited by Barrie G M Jamieson) that also includes specialty volumes on worms, amphibians, fishes, reptiles, birds, and bats. Thus, it is part of an eclectic smattering of animals, but I do not consider this to be bad at all. It seems to me that it is good to have a volume dedicated to describing reproduction in cetaceans (whales, dolphins, and porpoises), and discussing phylogenetic (i.e., evolutionary) development of reproduction.

The volume includes three chapters that provide an overview, fossil history perspective, and classification; nine chapters on structure and detailed aspects (and theories) of function; one chapter that discusses population genetics; and two chapters on courtship, mating behavior, and conservation related aspects. The book is quite uneven, as I believe it to be excellent in the descriptions of morphology, development, and function, with some of the major present-day researchers contributing in these fields. It is rather mundane and perhaps a bit out of date when examining the aspects of current concepts of historical overview, courtship, and mating behavior.

This is, indeed, a somewhat narrowly focused treat-

tise on cetacean physical and physiological aspects of cetacean reproduction and, as such, it serves a valuable function for students who are interested in a summarized version of the grand field of reproductive biology of marine mammals. It should not be read with the expectation that new insight will be gained into fossil history, cetacean behavior, and aspects of social organization. But then, these chapters are somewhat peripheral to the main thesis, and were probably included only as background information to that major goal. This is not a book to be recommended for all marine mammalogists, but instead to those who need specialized information on male and female cetacean anatomy, endocrinology, and fertilization.

BERND WÜRSIG, *Marine Sciences, Texas A&M University, Galveston, Texas*



ENVIRONMENTAL SCIENCES

ECOLOGY AND ECOSYSTEM CONSERVATION. *Foundations of Contemporary Environmental Studies.*

By Oswald J Schmitz. Washington (DC): Island Press. \$40.00 (hardcover); \$19.95 (paper). x + 166 p; ill.; index. ISBN: 1-59726-048-7 (hc); 1-59726-049-5 (pb). 2007.

In this compact book, the author provides clear and up-to-date explanations of several broad questions that are relevant to the overarching environmental issues of our day—global change, biological diversity, and sustainable ecological systems. What is the role of ecological science in decision-making? What factors govern the assembly of ecosystems and determine their responses to various stressors? How does biological diversity influence ecosystem processes? Schmitz explores these questions using a very forgiving and readable writing style, making it possible for readers to start with essentially no knowledge of the topic. He gradually builds up his explanations, and always does so in a manner that conveys the relevance of the question for one or all of the three overarching issues. The author also seems to emphasize connectedness, in an implicit fashion. This, after all, is the central tenet of ecology. Through his explanations, he reveals the meaning of otherwise mysterious sounding concepts such as “life is a game,” “age-structure population dynamics,” and “diversity begets ecosystem stability.” He conveys the importance of sound scientific knowledge in environmental decision-making quite well. He relies heavily on examples taken from the real world of basic ecological interactions as well as cases of environmental prob-

lem solving. Key references are cited, which will open the door to the literature. A glossary of terms is provided at the back of the book, along with a set of discussion questions for each chapter.

This volume would be ideal as a supplement to more exhaustive textbooks in a wide range of ecology and environment courses, or as the primary work in a discussion course that is supplemented by additional readings. It would also serve as an excellent, science-based introduction to ecology. Most notably, this book makes it clear that ecological science is not only relevant, it is necessary.

MICHAEL COUGHENOUR, *Natural Resource Ecology Laboratory, Colorado State University, Fort Collins, Colorado*

FUNDAMENTALS OF CONSERVATION BIOLOGY. *Third Edition.*

By Malcolm L Hunter, Jr and James P Gibbs. Malden (Massachusetts): Blackwell Publishing. \$74.95. xvi + 497 p; ill.; literature cited and author, species, and subject indexes. ISBN: 1-4051-3545-X. 2007.

The third edition of this classic book in conservation biology both advances the field and makes the subject accessible to a large audience. It masterfully portrays the many issues in conservation without being overly encyclopedic or pedantic. Three of the four parts focus on biodiversity—Biodiversity and Its Importance; Threats to Biodiversity; and Maintaining Biodiversity. Part IV examines the social, economic, and political factors in conservation. Changes to this edition include James Gibb as coauthor who wrote the chapter on genetic diversity, lavish color figures and photographs, and new case studies. It is difficult to imagine a more inviting approach to conservation biology.

A great strength of this volume is its focus on fundamentals. It highlights how conservation biologists think more than what conservation biologists do. Emphasizing how workers in a branch of science think is always more difficult to accomplish than the more typical theory-hypotheses-predictions method of representing a field. An aspiring conservation biologist might find a more “how to” approach useful, but this book will serve the vital role of generating aspiring conservation biologists. My main criticism is that demography is not emphasized, because changes in demography underlie the decline and extinction of any organism. Demography is mentioned only in relation to population viability analyses.

There will be a diverse audience for this book. I think the primary readership will be students enrolled in a university core course in conservation, since a biological background, although useful, is not essential. Life science majors will be exposed

to the social context of conservation. Relevant ecological and evolutionary issues will be more widely accessible to general students. Conservation managers and organizations would benefit from the presentation of the fundamentals. A professional biologist who is unfamiliar with the field will appreciate the emphasis on the basics in a different way, since these readers will readily see how their research specialization can be part of conservation biology. The volume is perhaps less useful as a textbook for an undergraduate course in conservation biology for life science majors, although the faculty teaching the class could supplement the fundamentals to meet the course objectives.

LEONARD A FREED, *Zoology, University of Hawaii at Manoa, Honolulu, Hawaii*

THE CONSERVATION PROFESSIONAL'S GUIDE TO WORKING WITH PEOPLE.

By Scott A Bonar; Foreword by Duane L Shroufe. Washington (DC): Island Press. \$50.00 (hardcover); \$25.00 (paper). xvii + 198 p; ill.; index. ISBN: 1-59726-147-5 (hc); 1-59726-148-3 (pb). 2007.

This book will be an invaluable resource, particularly for students (undergraduate or graduate), but also for professionals inside and outside of academics whose interpersonal skills could use some polish. Bonar recognizes the importance of workplace communications—in the academic, government, nonprofit, and business spheres—and provides an overview of effective strategies. This slim, readable volume condenses key points relating to the psychology of communication. Although much of the content might be familiar to those in business or marketing, it has not yet diffused into academics or the training of science or conservation students. Chapters address topics such as: the importance of effective interpersonal skills; conflict resolution and defusing angry confrontations; techniques of persuasion; customer service as a key to obtaining grant funding; negotiation strategies; self-management; personnel management; making a good impression in the field; and defending against dirty tricks and Machiavellianism. References provide opportunities for follow-up for those who would like more details, while the succinct chapters and chapter summaries make it easy to quickly consult for reminders.

One feature that makes this volume especially useful is that Bonar anchors the content in contexts that will be relevant to his audience. After offering general advice on how to approach particular problems or tasks (e.g., defusing angry confrontations or managing staff or volunteers), he provides examples—sometimes hypothetical, sometimes actual, sometimes both—that demon-

strate how to put that advice into practice in the laboratory, department, office, or field.

Fortunately, *The Conservation Professional's Guide to Working with People* is practical without being cynical. Its heart is in the right place. Rather than giving individuals an edge in the workplace for the sake of giving them an edge, the author attempts to make the workplace a better place for everyone. For example, in explaining how to defuse tense confrontations, his introduction to the methods of verbal judo prepares readers to do more than calm and disarm critics. It also allows them to improve communication between coworkers inside or outside of academics and also between conservation professionals and the public.

Before reading this book, I do not recall ever having heard of Thompson's verbal judo, Maslow's hierarchy of needs, or Cialdini's six compliance strategies. I suspect that these subjects will be equally unfamiliar to most of my students. But I am convinced that they should not be. The content and the large amount of practical advice Bonar offers on a variety of matters are simply too potentially helpful in heading off unnecessary difficulties. I have made *The Conservation Professional's Guide to Working with People* a required textbook for my undergraduate and graduate students. I am just sorry that I did not have access to it sooner.

JEFFREY V YULE, *Biological Sciences, Louisiana Tech University, Ruston, Louisiana*

SELF-ORGANIZATION IN COMPLEX ECOSYSTEMS. *Monographs in Population Biology, Volume 42.*

By Ricard V Solé and Jordi Bascompte. Princeton (New Jersey): Princeton University Press. \$99.50 (hardcover); \$45.00 (paper). xvii + 373 p; ill.; index. ISBN: 0-691-07039-3 (hc); 0-691-07040-7 (pb). 2006.

Complexities of ecological systems are well recognized by the scientific community. Current environmental management practices rely heavily on simplified models and observational data to cope with uncertainty and variability of natural environment. Solé and Bascompte attempt to bring the rigor of basic tools of physics into the complexity of population models in ecology. Their book introduces ecosystems as complex adaptive systems, as well as a detailed review of nonlinear dynamics to provide a good foundation for understanding the generation of nonrandom self-organized patterns in ecology. Topical chapters include: Spatial Self-Organization; Scaling and Fractals in Ecology; Habitat Loss and Extinction Thresholds; Complex Ecosystems: From Species to Networks; and Complexity in Macroevolution. Throughout the volume, the authors provide examples of rigorous mathematical treatment and ecological problems

of local and global significance using concepts and tools of statistical physics. These examples, as well as a solid background on the applicability of fundamental laws of physics in ecology, could provide excellent supplemental information for theoretical ecology courses. The focus on the mathematical apparatus will make the book a difficult read for scientists in applied fields. Nevertheless, it could stimulate creative thinking on balancing simplified environmental management tools used with ecological theories based on both fundamental physics and the complexity theory.

IGOR LINKOV, *U.S. Army Engineer Research and Development Center, Brookline, Massachusetts*

MODELS FOR ECOLOGICAL DATA: AN INTRODUCTION.

By James S Clark. Princeton (New Jersey): Princeton University Press. \$65.00. xiii + 617 p; ill.; index. ISBN: 0-691-12178-8. 2007.

The book's title is a bit misleading. Although introductory in nature, *Models for Ecological Data* requires a substantial mathematical background. In that sense, the volume lacks the user-friendliness that many expect of introductory treatments. Whether or not that represents a shortcoming depends on the reader, however. Clark's introduction suggests that the book offers an "informal" treatment of topics for readers with some mathematical background, but no extensive preparation in statistics (e.g., motivated graduate students who have forgotten their introductory calculus and statistics classes or investigators faced with challenging research questions). Despite the inclusion of helpful appendixes, even for many members of its intended audience, *Models for Ecological Data* is liable to prove difficult going. It is much more an introduction to advanced ecological modeling than to modeling with ecological data. For the right audience, however, it will provide a valuable resource.

The volume is separated into four main parts, each with multiple chapters: an Introduction (with chapters on model context and the elements of models); Elements of Inference (point estimation/maximum likelihood, elements of the Bayesian Approach, confidence envelopes and prediction intervals, and model assessment and selection); larger models (computational Bayes, hierarchical structures); and More Advanced Methods (dealing with time and space-time). Seven appendixes provide the refresher material that Clark's intended audience is sure to need and that many others readers will appreciate, with one appendix each on: Taylor series; differential and difference equations; basic matrix algebra; probability models; life-history cal-

culations; common distributions; and common conjugate likelihood-prior pairs.

For those seeking more basic—or more focused—introductions to ecological modeling, other textbooks would probably be more appropriate. For instance, Shenk and Franklin's *Modeling in Natural Resource Management: Development, Interpretation, and Application* (2001. Washington (DC): Island Press) provides a broad, generally accessible basic introduction to and context for modeling, while Starfield and Bleloch's *Building Models for Conservation and Wildlife Management* (1986. New York: Macmillan) offers an excellent introduction to population modeling. For readers whose interests lie elsewhere and who have more modeling experience and mathematical sophistication, *Models for Ecological Data* will prove useful in advancing their understanding of the subject. For anyone inclined to use the volume as the basis for a graduate-level class, a separate laboratory manual, *Statistical Computation for Environmental Scientists in R: Lab Manual for Models for Ecological Data* (J S Clark. 2007. Princeton (NJ): Princeton University Press), written to complement the text, also provides a potentially valuable resource.

JEFFREY V YULE, *Biological Sciences, Louisiana Tech University, Ruston, Louisiana*

STRUCTURAL EQUATION MODELING AND NATURAL SYSTEMS.

By James B Grace. Cambridge and New York: Cambridge University Press. \$120.00 (hardcover); \$60.00 (paper). xii + 365 p; ill.; index. ISBN: 0-521-83742-1 (hc); 0-521-54653-2 (pb). 2006.

Structural equation modeling (SEM), with its emphasis on exploring multivariate interactions between variables, has been responsible for valuable new insights in fields as diverse as economics, sociology, psychology, and genetics. In *Structural Equation Modeling and Natural Systems*, the author makes the compelling argument that applying structural equation modeling techniques to research questions in the ecological sciences could also reap rich dividends. In the first few chapters, students of ecology who are new to SEM are given a thorough introduction to the topics of path analysis, model building, and model fitting. Simple models that involve observed variables are introduced first, followed by more complicated ones that involve latent factors and the LISREL model. Throughout, basic principles are well described and illustrated with many examples taken from ecological research. There is a heavy practical focus, which is different from the approach taken in many SEM textbooks. Even readers who are familiar with SEM are likely to be rewarded by an in-

creased understanding of model selection and interpretation. In the next part of the book, Grace introduces more complicated topics, including the use of composite variables, multigroup analyses, categorical variables, nonlinearity, and latent growth models.

Unfortunately, these topics are given only a brief overview and it is a shame that these and other complexities relevant to ecology (e.g., raw data methods) are not considered in greater detail. The next few chapters continue the applied theme of the book by describing several examples of SEM in ecological research, including a very nice chapter on "cautions and recommendations" that practitioners will find useful when interpreting the results from their own analyses. Finally, Grace concludes with two nice chapters that provide an overview of SEM and discuss some exciting future directions in the field. One area that should be included in subsequent editions of the book is a thorough discussion of commercially and freely available SEM software. Some software packages involve complicated syntax and less than user-friendly interfaces. Newcomers to SEM are likely to find the choice of software package daunting. Additionally, some of the examples in the text could be augmented with code, or this information could be included in an Appendix. If I were an ecologist new to the field, would I come away with a basic understanding of SEM principles, an ability to design structural equation models, and interpret the results of such analyses? Most certainly. Would I be able to easily program and perform the analyses myself? Perhaps not.

DAVID M EVANS, *Wellcome Trust Centre for Human Genetics, Oxford, United Kingdom*

KEY TOPICS IN LANDSCAPE ECOLOGY. *Cambridge Studies in Landscape Ecology.*

Edited by Jianguo Wu and Richard J Hobbs. Cambridge and New York: Cambridge University Press. \$135.00 (hardcover); \$65.00 (paper). xv + 297 p; ill.; index. ISBN: 978-0-521-85094-0 (hc); 978-0-521-61644-7 (pb). 2007.

Landscape ecology remains a vibrant new discipline in search of itself. Is landscape ecology a subdiscipline of ecological science? A transdisciplinary approach to sustainable land management? As this book makes clear, landscape ecologists are still actively discussing what the discipline actually is, in part because of its enthusiastic embrace by an extraordinarily wide range of practitioners, from theoretical ecologists to conservationists and urban planners.

This book presents a "collective view of the state-of-the-science of landscape ecology" (p xiv) and its future directions based on a symposium at the

2003 World Congress of the International Association for Landscape Ecology (IALE), building on a longer-term effort initiated in an IALE symposium in 2001. The volume comprises peer-reviewed chapters by different contributors who discuss specific challenges in advancing landscape ecology, and is framed by introductory and concluding chapters that discuss general challenges facing the discipline in its growth to maturity. Chapters on data availability (mostly from remote sensing), metapopulations, scaling, and the definition of integrative research are especially well-developed and useful contributions. Although the final chapter attempts to unify landscape ecology within a hierarchical and pluralistic framework, this succeeds mostly in portraying the diversity of ideas and practices associated with landscape ecology in text and in a figure. Definition of landscape ecology as a scientific discipline complete with a set of core values and research foci, if this is indeed possible, must await future efforts.

Existing practitioners of landscape ecology will find this to be an essential summary of the state of the science. The book will also benefit graduate students and others beginning to make their way into this discipline. Essential background on key subjects in landscape ecology is backed by solid literature reviews, all of which are well indexed, making them an excellent and timely reference. The volume will be especially helpful to anyone who is searching for novel research topics and is interested in solving some of the basic unsolved problems in landscape ecology. This book focuses primarily on problems without current solutions.

ERLE C ELLIS, *Geography & Environmental Systems, University of Maryland, Baltimore County, Baltimore, Maryland*

BIOLOGICAL GLOBALISATION: BIO-INVASIONS AND THEIR IMPACTS ON NATURE, THE ECONOMY AND PUBLIC HEALTH.

By Wouter van der Weijden, Rob Leeuwis, and Pieter Bol; translated by Jorrit van Hertum and Derek Middleton. Zeist (The Netherlands): KNNV Publishing. €49.95 (paper). 223 p; ill.; index. ISBN: 978-90-5011-234-7. 2007.

Over the last 20 years, biological invasions have been recognized as a serious threat to the integrity of ecosystems. Numerous books have been written about their biology, management, social implications, and other subjects. It is hard to imagine that yet another volume would be interesting and fresh, but the authors—two biologists and a medical epidemiologist with a background in history—have produced a book that will stay on my shelf.

The most novel aspect of this work is the inclusion of public health. Not only are cane toads and

giant hogweed included, but also the bubonic plague, syphilis, and other diseases. This addition addresses the growing concern about such organisms in biological terrorism, although the subject is not sensationalized. There is excellent integration of biology, agriculture, medical history, and economics across all types of organisms. Each invasion is treated as unique, yet underlying factors are also identified.

Although there is a wide audience for this book, I think policymakers and those who seek to inform them would be particularly interested. The text is mostly free of jargon and even though it is translated from Dutch to English, it is very clear. There are numerous additional boxes for each chapter with case studies and other focused information. These "sound bites" give concrete examples to complement the text. Although many are short, additional sources are provided so more information can be sought. The number of boxes for each chapter can be a little overwhelming (87 for a 223 page book!), but they do add specific examples.

There is as bias toward information from the Netherlands (the longest chapter of the eight in the book is specific to that country) and Europe in general. However, a number of additional volumes cover other parts of the world, and the more in-depth look at Europe is interesting.

The final chapter discusses lessons learned and actions needed. There are some excellent points made that could be the basis for future development and research. Much of them are devoted to needed policy, making that audience once again an excellent target for the book.

SARAH REICHARD, *Botanic Gardens, University of Washington, Seattle, Washington*

THE LAW AND POLICY OF ECOSYSTEM SERVICES.

By J B Ruhl, Steven E Kraft, and Christopher L Lant. Washington (DC): Island Press. \$70.00 (hardcover); \$35.00 (paper). x + 345 p; ill.; index. ISBN: 1-55963-094-9 (hc); 1-55963-095-7 (pb). 2007.

Nature provides much that humans value, but not everything that humans value has a price in the marketplace. We are accustomed to thinking of such things as flood attenuation by wetlands and pollination by insects and other animals as free services provided by nature. In part because they are free, however, these "ecosystem services" have often been diminished, as the dramatic loss of wetlands and the ongoing decline of native pollinators attests.

This volume represents the combined efforts of an environmental lawyer, an economist, and a geographer to explore how markets for ecosystem services might be designed and regulated in order to stem the loss or degradation of nature's bounty. This is a

subject that has attracted considerable interest in recent years, particularly because of its potential to add a powerful new tool to the conservationist's toolkit. The treatment afforded the topic here is comprehensive, detailed, and rigorous.

The book begins with three chapters devoted to how the disciplines of law, economics, and geography conceive of ecosystem services. Three additional chapters explore how ecosystem services fare under current property rights schemes, regulatory programs, and social customs. The volume then turns to nine case studies that illustrate the conclusions of the preceding chapters. Although most of the case studies are taken from the United States, one focuses on the agricultural policies of the European Union and another discusses the global issue of climate change and carbon trading to ameliorate it. The concluding chapters then present the authors' recommendations for designing new laws and policies that can better preserve ecosystem services.

The authors have taken a complex subject and made it understandable, if not always easy. They have mustered an impressive array of scholarship across disciplines to produce a highly useful product for creative policymaking.

MICHAEL J BEAN, *Wildlife Program, Environmental Defense, Washington, DC*

GLOBAL COASTAL CHANGE.

By Ivan Valiela. Malden (Massachusetts): Blackwell Publishing. \$89.95 (paper). viii + 368 p; ill.; index. ISBN: 1-4051-3685-5. 2006.

This is a carefully researched, richly illustrated volume that provides a comprehensive treatment of the range of anthropogenic threats to coastal and marine systems, from impacts on the atmosphere induced by global climate change to the effects of toxic contaminants and overexploitation on marine species and ecosystems. Each chapter begins with a case study, proceeds to a more general treatment of the scientific dimensions of a particular threat, and concludes with discussion of possible management measures to mitigate the threat. Valiela draws upon his deep knowledge of northeastern U.S. coastal and marine ecosystems, with examples from the effects of eutrophication on Cape Cod estuaries and overfishing off the east coast of North America. He also brings in a number of international examples, including sea-level rise in Venice and alteration of freshwater flows in the Aral Sea region. The author's writing style is clear and accessible, and the abundant black-and-white figures reinforce his main messages.

Although the organization around human impacts on coastal systems is logical, the discussion of the solutions to these sundry problems is often

buried in the final paragraphs of the chapters (the discussion of overexploitation of shellfish and finfish is an exception). I am not sure if this somber tone could be avoided, but I would be keen to read more of Valiela's thoughts on how to evaluate the effectiveness of the marine management approaches examined earlier in the book. This extension would logically flow from the very interesting last chapter, where he compares the relative importance of agents of coastal change discussed throughout the volume.

Instructors will find *Global Coastal Change* to be a welcome addition to their core teaching textbooks and students will enjoy the informative and collegial discussions of the impacts of human activities on the coastal environment. Thanks to Valiela's in-depth yet broad-ranging review of the recent literature, researchers and conservation practitioners will find much of interest in this volume as well. I heartily recommend it to all.

HEATHER LESLIE, *Environmental Studies and Ecology & Evolutionary Biology, Brown University, Providence, Rhode Island*

LAST GREAT WILDERNESS: THE CAMPAIGN TO ESTABLISH THE ARCTIC NATIONAL WILDLIFE REFUGE.

By Roger Kaye. Fairbanks (Alaska): University of Alaska Press. \$29.95. xx + 283 p + 14 pl; ill.; index. ISBN: 978-1-889963-83-9. 2006.

This volume is a very detailed and excellent overall history of the creation of the Arctic National Wildlife Refuge (ANWR). Kaye begins the book with a somewhat breathless and scattered review of conservation thinking in American history, but does well to situate the history of ANWR within the development of that thinking. In fact, the author's ability to weave a narrative about the nuts and bolts of the refuge's establishment together with a more abstract history of the symbolic currencies of national progress and wilderness preservation is one of the strengths of the book. The opening chapter introduces a number of key actors that help construct the narrative, which stretches from the late 1940s through the early 1960s. Kaye reviews what motivated these actors, who influenced their thinking (principally Aldo Leopold), and the strategies they employed. The book includes a number of great color photographs of an important public relations-motivated expedition through the Sheenjek Valley by some of the original proponents of ANWR. The author also effectively deals with a number of other issues entangled with debates over the establishment of ANWR, including Alaskan native populations, Alaskan statehood, and competing notions of national "progress" that underpinned both pro and antipreservation arguments.

The book's strength is that it does not simply

cast the Arctic Refuge as a static space over which people variably make romanticist or developmentalist arguments, but shows how those ideas precede, and are intricately wrapped up within, the establishment of ANWR. Kaye pulls this analysis off by reviewing accounts in diaries and correspondence among key actors, rather than relying upon more emotively limited policy papers and official documents. For these reasons, this volume is a particularly valuable contribution to the environmental history literature.

KOLSON SCHLOSSER, *Geography & Geology, Western Kentucky University, Bowling Green, Kentucky*

RESTORING COLORADO RIVER ECOSYSTEMS: A TROUBLED SENSE OF IMMENSITY.

By Robert W Adler. Washington (DC): Island Press. \$70.00 (hardcover); \$35.00 (paper). xxiii + 311 p; ill.; index. ISBN: 978-1-59726-056-5 (hc); 978-1-59726-057-2 (pb). 2007.

Over the last several decades, a number of very large, expensive watershed restoration efforts have been initiated in North America—for example, in the Chesapeake Bay, Great Lakes, Everglades, Bay Delta (central California), and Columbia River. These are multibillion dollar projects with ambitious goals and plenty of political backing. In *Restoring Colorado River Ecosystems*, Robert Adler describes current and past attempts to restore one of the west's most altered large rivers. Scientists, managers, and policymakers involved in other restoration programs will have no problem recognizing issues that have emerged in the Colorado River basin and, for this reason, the book has relevance that goes far beyond the Rocky Mountain and southwest desert regions.

Although a lawyer by training, Adler writes about ecology with clarity and insight; he is equally adept at describing watershed processes and fish life cycles. Readers are introduced to the history of development in the Colorado River basin, its unique fish and wildlife, the incredibly complex system of water laws and agreements, the intricate system of dams and irrigation canals, and the strategies behind existing restoration programs. The author argues convincingly that many Colorado River projects are failing, not for the lack of good intentions, but because they are hamstrung by the previous generation's set of legal arrangements, as well as by our inability to look beyond a fragmented, piecemeal restoration approach aimed at achieving habitat or population objectives of uncertain ecological value. What he proposes is a more holistic, watershed process-based strategy that should be less constrained by political boundaries. This leads to some bold suggestions, such as

considering the decommissioning of Glen Canyon Dam as a legitimate restoration alternative.

What I like most about this book is that it takes a hard look at the assumptions—so prevalent within some segments of the restoration culture—that we can have our cake and eat it too, and that environmental losses can somehow be minimized if we just throw a little more money at engineered solutions, and finds them lacking. This volume is well written, with remarkable attention to detail. It would be a very useful supplement to a natural resource management class; more importantly, it should be required reading for watershed planners.

PETER A BISSON, *Olympia Forestry Sciences Laboratory, Pacific Northwest Experiment Station, USDA Forest Service, Olympia, Washington*

OUR FOREST, YOUR ECOSYSTEM, THEIR TIMBER: COMMUNITIES, CONSERVATION, AND THE STATE IN COMMUNITY-BASED FOREST MANAGEMENT.

By Nicholas K Menzies. New York: Columbia University Press. \$50.00. xi + 264 p; ill.; index. ISBN: 978-0-231-13692-1. 2007.

This excellent volume should be required reading for everyone working in forest conservation or resource management. Menzies draws on a wealth of experience (his own and others) to review the past few decades of worldwide experiences with community-based forest management. He cogently synthesizes lessons that have been learned, challenges faced, and complexities confronted. He provides no easy solutions for promoting effective strategies for community management, but does draw out patterns that are the ingredients for success. Menzies uses a comparative approach, first by providing four detailed case studies (from China, Zanzibar, India, and Brazil) and then delving into the central themes invoked in community-based management: defining community; local management capacity; the bases for negotiating partnerships between communities and external actors (governments, international agencies, and interlocutor nongovernmental organizations); and structures of governance and empowerment.

The strength of the book is the attention to context, both historical and contemporary political, social, and economic arenas that determine the ways in which communities will and have managed forest resources in widely differing ecosystems. The author's delineation of the four central case studies (as well as other examples he uses to illustrate his analysis) demonstrates that paying attention to specific local circumstances is central to effective implementation. Menzies concludes that although privileging community-based management of forest resources is extremely difficult,

it must ultimately be an essential component of conservation and long-term natural resource stewardship if forest ecosystems are to thrive. The author neither romanticizes community capacity to manage their resources nor discounts the historical inequalities generated through local disenfranchisement and centralized control of forests. The struggles of forest dwellers to sustain livelihoods, maintain deep connections to their lands, negotiate complex relationships with governments, and retain distinct cultural identity form the moving subtext to this narrative. Menzies argues for continued efforts to find a balance between conservation, state interests, and local empowerment. Although there is a slight disjuncture between the four case studies and the four thematic chapters because so many other illustrative examples are drawn into the narrative, overall, the book makes a convincing case for local empowerment to effectively manage forests in all their diversity.

ALAKA WALL, *Anthropology and Center for Cultural Understanding & Change, Field Museum, Chicago, Illinois*

MIMICKING NATURE'S FIRE: RESTORING FIRE-PRONE FORESTS IN THE WEST.

By Stephen F Arno and Carl E Fiedler. Washington (DC): Island Press. \$49.95 (hardcover); \$24.95 (paper). xviii + 242 p; ill.; index. ISBN: 1-55963-142-2 (hc); 1-55963-143-0 (pb). 2005.

This volume will take readers on a journey through the history of forest management—from trying our best to eliminate fire to trying our best to mimic fire. The authors clearly define the often contradictory concept of forest restoration, frequently presenting the opposing views of this relatively new approach to forestry. They have incorporated the most recent and relevant literature, along with the invaluable experimental forest descriptions, which provide insights to information that many scientists and land managers may have never been exposed. Drawing on their extensive backgrounds in forestry and fire ecology, Arno and Fiedler present a concise and clear description of a wide range of fire types and severities, illustrating the variability in not only forests and fires, but in the potential treatments that are required for restoring fire-prone forests. Yet, the authors never suggest that forest restoration, regardless of the scale and scope of the effort, will be easy to achieve—indeed, they are quick to point out that the challenges of such an undertaking are formidable, and are fraught with natural, political, economic, and social obstacles. Nevertheless, they encourage the endeavor, where appropriate, and this excellent book will undoubtedly

help many readers identify and understand the myriad of important considerations that arise when contemplating restoration of fire-prone forests.

DANIEL B TINKER, *Botany, University of Wyoming, Laramie, Wyoming*



NEUROSCIENCE

AN INTRODUCTION TO NERVOUS SYSTEMS.

By *Ralph J Greenspan. Cold Spring Harbor (New York): Cold Spring Harbor Laboratory Press. \$75.00 (hardcover); \$45.00 (paper). x + 172 p; ill.; index. ISBN: 978-0-87969-757-0 (hc); 978-0-87969-821-8 (pb). 2007.*

This is a delightful little book, although sometimes quirky and frustrating. It describes evolutionarily ancient mechanisms for signal transmission common to all nervous systems, and how these mechanisms support the tasks that brains evolved to accomplish. Greenspan blends descriptions of invertebrate behavior with lessons on fundamental principles of molecular, cellular, and network neurobiology. He covers a broad span of topics, ranging from the ionic basis of resting and action potentials to the astounding computational abilities of insect brains. His well-written and occasionally humorous prose often reads more like a mystery novel than a textbook. The “mysteries” start as “gee whiz” behavior stories, which are unraveled by explaining their underlying biochemical, ionic, and synaptic mechanisms.

The early chapters establish physiological principles for understanding nervous system operation, including a discussion of neuromodulation as a source of behavioral flexibility. The second half of the book shifts gears to highlight insects as model systems (particularly *Drosophila*) to understand how animals coordinate their activity with environmental rhythms, locomote and navigate, make decisions, recognize and attract mates, and match their biological programs with the environment through learning. The book concludes with big questions to be resolved: Is cognition similar in different animal species? How do reflex and choice interplay to produce behavior? Frustratingly, some of the explanations are shallow, rambling, and vague, several figures are confusing, repetitive, and do not illustrate the text point, and the relevance of some of the chapter opening poetry is obscure. Certain major themes could be strengthened. For example, pointing out the common mechanisms for rhythmic motor pattern gen-

eration in vertebrates and invertebrates would enhance the theme that invertebrate neurobiology teaches us about ourselves.

This is a difficult book to categorize for a specific readership because there is something here for everyone, including seasoned neurobiologists. This will be a good introduction to excite undergraduate students into further neuroscience exploration, and to inspire and initiate graduate students into an evolutionary and neuroethological perspective, as well as its experimental paradigms. I did not learn many new facts by reading this book, but I am able to think more broadly about the origin, structure, and function of nervous systems.

BRUCE R JOHNSON, *Neurobiology & Behavior, Cornell University, Ithaca, New York*

CEREBRUM 2007: EMERGING IDEAS IN BRAIN SCIENCE.

Edited by Cynthia A Read. Washington (DC): Dana Press. \$14.95 (paper); \$8.95 (e-book). xv + 251 p; ill.; index. ISBN: 1-932594-24-8 (pb); 1-932594-29-9 (eb). 2007.

This volume is full of fun stories. There is a lot of information on specific topics, but the whole arrangement makes it feel like you are reading an exciting novel: you finish one chapter and cannot wait to start the next. Every chapter is well written, striking a difficult balance between expertise and general understanding.

Some very practical issues are discussed (such as prevention of stroke) and specific proposals are made (such as the creation of a National Institute of Pain). But, to me, the two highlights were the discussions about the brain as a creative magician and the aesthetic sense of animals. Bruce Hood ably and skillfully examines our tendency to bridge gaps in information to create coherent stories (or percepts). This generation by the brain of new information, and the continuous, intuitive rearrangement of existing information, is explored from various angles and developmental perspectives, as well as from their possible usefulness to individuals and society, and as a source of creativity. I fully subscribe to this optimistic viewpoint. At the other end, the brain as an organ that confers aesthetic sense across the animal kingdom is a fascinating story told in a most captivating fashion by Lesley Rogers and Gisela Kaplan. Wherever the truth lies at the end, whether or to what extent animals do possess aesthetic sense, it is a fascinating field of research, and one very worthwhile to pursue. Overall, *Cerebrum 2007* makes for great reading, and is both informative and entertaining.

APOSTOLOS P GEORGOPOULOS, *Center for Cognitive Sciences, University of Minnesota, Minneapolis, Minnesota*



BEHAVIOR

QUANTIFYING BEHAVIOR THE *JWATCHER* WAY.

By Daniel T Blumstein and Janice C Daniel. *Sunderland (Massachusetts): Sinauer Associates.* \$19.95 (paper). x + 211 p; ill.; index. ISBN: 978-0-87893-047-0. 2007.

Quantitative methods are used to measure the behavior of species ranging from slime molds to humans. Many employ alphabetical or numeric codes to represent operationally defined behaviors. Codes are entered into data collection devices while observing real time, video, or audio recorded activities. Most contemporary methods yield measurement of overall frequencies, durations, proportions, and rates, as well as sequential dependencies among behaviors.

JWatcher is a complete system for observation using focal individual sampling—scoring a single individual in interaction with others and with aspects of the environment. The software includes operations for defining codes, capturing real time or recorded data, checking for accuracy and reliability, redefining or combining codes, and summarizing results. In addition to overall summaries, the system can study sequential relationships using transition probabilities and lag or Markovian analyses. Methodology for handling truncated sessions due to arbitrary start and end points or out-of-site intervals is especially impressive.

JWatcher comes with a manual and CD-ROM. The program runs on either Windows or Macintosh machines with a Java addition. Data collection using a Palm handheld device is also available. I loaded and used the Windows version with no problems. The authors do warn that the Macintosh version may not deliver full utility. The manual has an excellent introduction to observational methodology and comprehensible instructions for program use. The menu-driven system is easy to learn, although applying some functions may seem tedious in details and time to setup data collection. However, following the instructions will save observation novices a number of headaches later.

One problem is that there is no method for combining sessions for overall summaries. To do this, each session must be summarized, then combined for analysis using another system. This is especially problematic for sequence studies, which usually require long behavior strings for valid analyses. Another problem concerns observer reliability analysis. *JWatcher* does not consider synchrony failure, when two behavior streams mismatch due to missing a behavior—called an omission error. This requires using a time or event window for

matching occurrences between streams, but this software has no provision for this typical situation. To adjust for omission errors, the data will need to be edited by hand or a specially written program.

GENE P SACKETT, *Psychology and National Primate Research Center, University of Washington, Seattle, Washington*



HUMAN BIOLOGY & HEALTH

HUMAN RESPIRATION: ANATOMY AND PHYSIOLOGY, MATHEMATICAL MODELING, NUMERICAL SIMULATION AND APPLICATIONS.

By V Kulish. *Southampton (United Kingdom) and Billerica (Maryland): WIT Press.* \$150.00. xv + 218 p; ill.; no index. ISBN: 1-85312-944-5. 2006.

This new book has the potential to fulfill a timely, important need as an update on bioengineering and mathematical modeling approaches to respiratory physiology for researchers and students. Unfortunately, it fails because the innovative and interesting new ideas are overshadowed by errors in fundamental equations, chapters that are essentially primary research reports that have not been peer reviewed, mathematical models of situations that have very questionable physiological significance, and a general disconnect between most of the volume and current views and practices in pulmonary medicine. Even the opening table on nomenclature uses an entirely different system for symbols than the well-defined and referenced system that has been established for respiratory physiology.

The book begins with an excellent introductory chapter on the anatomy and physiology of the respiratory system. It is innovative in presenting dynamic aspects of respiratory mechanics first, and then derives the static properties. The next two chapters develop the equations for analysis of gas exchange, but there are several mistakes in equations and some figures are seriously outdated. For example, oxygen consumption, which is the most basic process in respiration, is defined incorrectly on page 78, and Figure 4 in Chapter 2 is an inexcusably poor picture of the alveolar blood-gas barrier considering the beautiful electron micrographs that have been published in textbooks since the 1970s. Chapter 2 develops a model of the effects of foreign particles on diffusing capacity, but significant effects only occur when the lungs would be clogged, so it would be meaningless to measure diffusing capacity. Chapters 8 and 9 are primary research papers that have not been peer reviewed. Chapter 6 proposes a model for quantifying physiological responses to toxic substances based

on the Weber-Fechner principle, but it is not clear what physiological responses to carbon monoxide poisoning (such as unconsciousness and death) have to do with perceptions, which is what this principle describes. Overall, there are just too many errors and problems with this volume to make it useful.

FRANK L POWELL, *Medicine and White Mountain Research Station, University of California, San Diego, La Jolla, California*

VACCINE: THE CONTROVERSIAL STORY OF MEDICINE'S GREATEST LIFESAVER.

By Arthur Allen. New York: W. W. Norton. \$27.95. 523 p + 16 pl; ill.; index. ISBN: 978-0-393-05911-3. 2007.

It is said that human body is designed for 30 to 35 years of use. Conventional wisdom is that with due diligence, proper nutrition, and preventive public health procedures, we gain another 30 to 35 years. Beyond that we are at the mercy of the more heroic measures of medical technology. In most parts of the world, sanitation and other public health initiatives have contributed to the doubling of life expectancy in the 20th century. Higher population densities and socialization increase the chances of people-to-people transfer of diseases. Therefore, public health measures are indispensable. Vaccination of billions of people against dozens of specific infectious agents has become an integral part of global public health measures to prevent episodic outbreaks of specific infectious diseases. Statistically speaking, modern medical technology has increased average life expectancy by less than a decade. Its cost-effectiveness and possible significance for the quality of life is also debatable (N M Hadler. 2004. *The Last Well Person: How to Stay Well Despite the Health-Care System*. Montreal (Canada): McGill-Queen's University Press). By some reports, such measures that account for 75% of the overall medical care cost and add about 75 days to the average life expectancy.

Vaccination is possibly the most effective way of dealing with scores of communicable contagions under virtually all conditions. Arthur Allen presents a well-researched history of the development of vaccination technologies and practice. It is interesting to read how certain empirical observations found their scientific basis, and the how the resulting vaccination technologies were received by the public at large. The major strength of the book is that it articulates what happens when the practice of science enters public realm. The basic premise of this volume is that vaccines prevent or reduce the frequency and/or severity of infectious diseases. We need effective vaccines as a means to protect us from infections. At a higher level, as vaccines break cycle of transmission of the conta-

gion, the probability of infection also goes down. So, at some stage, one has to evaluate the personal social advantage of vaccination against its adverse effects, which are not necessarily a part of the vaccine action. They can come from a variety of sources ranging from those introduced during the production of serum to postimmunization care. As developed very well in the book, misunderstanding and misinformation of such adverse effects has triggered irrational resistance from the public. Allen discusses how, apparently without any rational reason, opinions and perception clash with facts. The struggle is with the mindsets that find comfort in halls mirrored with limited scientific, economic, political, or faith-based considerations. It is curious that many of the arguments forwarded now are not much different than those a couple of centuries ago. This also holds for the deception and misinformation propagated by the U.S. government to push for a program of mass vaccination (without any demonstrable need) in support of their weapons of mass destruction (WMD) excuse to attack Iraq.

Until 18th century, Europeans believed that diseases such as smallpox were punishments from God. Around 1706, an African-born slave (Onesimus) told his master (Cotton Mather) about the practice of variolation among Africans. In 1718, Mary Montague had her son variolated in Constantinople, where variolation guaranteed beauty and integrity of an Ottoman's harem. Around 1770, Jenner followed up on the legend that milkmaids who suffered cowpox are less likely to be disfigured by smallpox. During the next 200 years, the science of immunization and technologies for vaccination have become part of the rite of childhood as most are routinely vaccinated. Worldwide vaccination effort has eliminated smallpox, and a similar campaign is on the way for polio. Results show that mass vaccination is certainly the most cost-effective public health measure in terms of the lives saved and improved quality of life.

Social acceptance of vaccination has not been universal. Injuries and adverse events associated with vaccination are not uncommon. Allen has reviewed wide-ranging public concerns about vaccines and their origins. Current problems include vaccines designed with improper antigens, use of inactive and tainted vaccines in the field, and the inability to statistically identify the relationship of natural cure and failure for an episodic disease. Development of a product for the mass market also requires empiricism of gut and guess for wide-ranging innovations to evaluate long-term risks. Such risks may be small, but they are real, and are worth the gamble for mass immunization. In fact, one such scenario was presented by Washington

politicians who used words of mass deception to deal with imagined weapons of mass destruction. These politicians also delivered the promise of a “surgical war” that was endless and intelligent precision bombs that hit targets about half the time. Such mixing of real and imagined are not uncommon in matters of public policy and debate. Allen is at his best in teasing out relevant markers from such complex historical situations, and where he discusses the issues related to shelf life and complications from additives.

How do we foresee future events from a limited knowledge base? In dealing with complex situations, facts emerge in stages. Is there a rational empiricism in the gut reaction? Can we implement a prudent policy for an event that may never materialize? These and other issues bear on the age-old question: How do we come to know something that we do not know? The problem is even more interesting if no one has even recognized the problem or appreciated the need for a solution. Such concerns are part of the formulation of a problem whose articulation and solutions require major change in the established way of thinking. The story of vaccines will be useful for anyone who wishes to comprehend how sciences and technologies force a change in understanding how an organism deals with emerging information and its utility.

MAHENDRA KUMAR JAIN, *Chemistry & Biochemistry, University of Delaware, Newark, Delaware*

HUMAN EMBRYONIC STEM CELLS: THE PRACTICAL HANDBOOK.

Edited by Stephen Sullivan, Chad A Cowan, and Kevin Eggan. Chichester (United Kingdom) and Hoboken (New Jersey): John Wiley & Sons. \$195.00. xx + 404 p + 5 pl; ill.; index. ISBN: 978-0-470-03356-2. 2007.

THE HUMAN EXPERIMENT: TWO YEARS AND TWENTY MINUTES INSIDE BIOSPHERE 2.

By Jane Poynter. Thunder's Mouth Press. New York: Avalon Publishing Group. \$26.95. viii + 368 p + 8 pl; ill.; index. ISBN: 1-56025-775-X. 2006.

Poynter provides a first-person “Biospherian’s” account of the planning, construction, colonization, and aftermath of an audacious, privately-funded enterprise in the desert foothills of Arizona: the development of a completely enclosed, hopefully self-organizing ecosystem (Biosphere 2) capable of supporting for two years a crew of eight humans materially isolated from the outside world (Biosphere 1).

Viewed as a prototype for extraterrestrial habitats, Biosphere 2 was a singular technological achievement, but this account (and others referenced) revealed crippling design flaws in organizational structure and management. The project was conceived by an eclectic group of dedicated individuals variously described as entrepreneurs, pseudoscientists, idealists, cultists, and antiestablishment visionaries. It was designed to accelerate orthodox, incremental, scientific investigation by allowing multiple ecological variables to interact *ad libitum*, unencumbered by conventional experimental controls. Consequently, some observers considered this a quixotic dismissal of fundamental scientific principles, and the project was praised, parodied, and criticized to the point of vilification. Skepticism and overt obloquy within the scientific community and news media were additionally fueled by the organization’s penchant for public theatricality and its obdurate obsession with proprietary secrecy. NASA’s initial interest in the potential for serious study of isolated, self-supporting, human habitats rapidly dissipated.

Poynter’s personal journal of this odyssey vividly illuminates the dynamics of human interrelationships under the stress of long-term confinement. She documents in detail the evolution and resolution of these internecine conflicts, particularly those that developed between two factions within the crew, one devoted to the scientific mission led by the only experienced and impeccably credentialed scientist among them, and the other loyal to management’s for-profit proprietary goals. To the credit of all, they united sufficiently to overcome those obstacles and others, including major dietary restrictions and progressive oxygen deprivation sufficient to induce high-altitude sickness. Some omissions and errors in interpretation of medical decisions detract from complete historical accuracy.

Biosphere 2 may be viewed both as a crucible for ecological experimentation and as a disturbing metaphor for the conflict between altruistic pursuit of scientific knowledge per se and the remunerative motivations of commercial enterprises currently debated within academic circles. Despite the uncertainties, difficulties, and controversy, an impressive body of publications in first-line journals eventually emerged and is adequately referenced in this book.

DONALD E PAGLIA, *Pathology & Laboratory Medicine, School of Medicine, UCLA, Los Angeles, California*