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Insect Species Conservation

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(*Oenothera*). These cases highlight the contingency of scientific discovery. For example, de Vries believed that he had found the perfect species for demonstrating his mutation theory—the claim that new species arise in a single step by saltation. At the beginning of the 20th century, this theory was enormously influential and was widely accepted as a viable alternative to natural selection. The mutation theory avoided the two major criticisms that dogged Darwinian evolution: that the age of Earth was too young for natural selection to account for the great diversity of species, and that the small variations Darwin posited would be swamped before they could accumulate in a population. The mutation theory also appealed to many experimental biologists who rejected natural history and wanted to bring the study of evolution into the controlled environment of the laboratory. Impressed by de Vries's claims that he had found new species of *Oenothera* in his experimental gardens, many evolutionary biologists in both Europe and the United States turned to evening primroses as a promising experimental subject. Evolutionary biologists eventually rejected the mutation theory, and the "new" species that de Vries claimed to have discovered turned out to be the result of the unusual behavior of chromosomes of the evening primrose during meiosis. As Endersby aptly describes it, *Oenothera* started out as a botanical superstar, but ended up a freak of nature.

I strongly recommend this book to biologists who have an interest in history. For those too busy to delve deeply into the academic history of science, Endersby provides an engaging overview of recent research in the history of genetics and evolutionary theory. He freely acknowledges that much of his book is based on the earlier work of other historians, yet Endersby has done a wonderful job of synthesizing this work into a unified whole. Even readers well acquainted with the history of biology will find his historical observations enlightening. Endersby has a rare ability to tell an entertaining and engrossing story without sacrificing historical accuracy.

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IN THIS TIME OF MYRIAD HUMAN NEEDS, YOU WANT TO SAVE *INSECTS*?

Insect Species Conservation. Tim R. New. Cambridge University Press, 2009. 272 pp., illus. $69.00 (ISBN 9780521732765 paper).

Professor Tim R. New, of La Trobe University, Australia, is an authoritative researcher and prolific writer on conservation, particularly insect conservation. *Insect Species Conservation*, one of his recent books, demonstrates that he is certainly serious about saving insects. Would that billions of people shared his well-informed and justified passion!

Current local and global changes make it imperative to conserve millions of beneficial species, including insects at all levels from populations through species and communities. These "little things that run the planet" perform significant ecosystem services, from aerating soil to pollinating to recycling nutrients; furthermore, they inspire and create jobs for *Homo sapiens sapiens*. In view of the many studies that have addressed conservation of special habitats and ecosystems, New focuses on insect species and subspecies. He and others have extensively covered insect-habitat and ecosystem conservation elsewhere. Many entomotaxa require immediate aid to prevent their extinction, and many are charismatic microfaunal and umbrella species—for instance, the sadly underappreciated *Rhaphiomidas terminatus abdominalis* (Delhi Sands flower-loving fly) in California. Unfortunately, there is little public support for endangered fly species, and this is the only fly on the US list of threatened and endangered species. Preserving this fly protects the last remaining remnant of an ancient dunes habitat and its other threatened species; nonetheless, some people wish to remove this fly's federal protection so that this habitat can be used for commercial or residential development. Conserving a focal insect taxon can, in turn, save many other species of concern that inhabit the same environment.

Throughout this book readers learn that each insect species differs, often in subtle ways, from other entomospecies, necessitating the development of individual management programs. Successful species programs can result from excellent biological knowledge of a focal species, as well as information gleaned from practical experience and



other conservation examples. Other essential elements of conservation programs include perspicacious planning, insightful legislation, and enduring public support coupled with continual adaptive management. Winning examples are the ant-associated *Paralucia pyrodiscus lucida* (Eltham copper butterfly) in Australia and Nabokov's *Lycaeides melissa samuelis* (Karner blue butterfly) in the United States.

New writes that the main goal of *Insect Species Conservation* is to help others design and implement effective insect-species management and restoration plans, and he aims to inform the many resource managers who are essentially unfamiliar with the special

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conservation requirements of insects. His selected case studies are from insect orders including Coleoptera, Diptera, Lepidoptera, Odonata, and Plecoptera in Australia, Europe (particularly the United Kingdom), Japan, New Zealand, and North and South America. New educates readers about many insect conservation topics, including laws, policies, priorities, and strategies; inferring and defining threats (including habitat destruction, alien species, pesticides, and overcollecting); bioclimatic variables and climate change; and future needs. Readers learn about conservation methods such as *ex situ* and *in situ* programs; site modification and restoration; and captive breeding, monitoring, reintroduction, and translocation methods.

Public education, acceptance, and promotion are key parts of insect conservation programs. Many children go through a "bug phase" during which they are fascinated with insects. Teachers and society as a whole should nurture and protract this phase as part of lifetime Earth stewardship. Nature deficit disorder is on the rise worldwide as more children spend more and more time indoors in our increasingly technological world. We need additional adopt-a-caterpillar (and other larvae) programs, such as the one New described for *Ornithoptera richmondia* (Richmond birdwing butterfly) in Australia, not only to help the insects in the short term but also to raise children's and others' awareness of nature in the long term. Further, New understands the positive reasons for insect collecting and suggests that collectors sometimes be allowed to gather even rare species in moderation, because amateur entomologists often provide important biological information and can be staunch conservationists as well. A child's insect collection, which need not contain any rare species, can lead to a career in conservation biology or other science, as occurred with several biologists I know.

When reading, I tried to put myself in the shoes of a hands-on, very busy, dedicated conservation manager who is unfamiliar with insects to try to imagine how such a person would relate to the book. *Insect Species Conservation* covers laws, taxa, biological and conservation concepts, and conservation measures that require training and experience—biological and otherwise—to understand fully; I concluded, then, that this postulated conservation manager would want to consult additional sources, such as conservation recovery plans and reports, scientific articles and books, and accurate Internet pages, to augment his or her understanding. Governments (e.g., Australia and the United States) provide online information sheets on many threatened and endangered species and legislation; New makes little reference to this wealth of online material.

If the hypothetical conservation manager were a visual learner, he or she would want to see inspirational and informative photographs of focal taxa and their habitats; there aren't any in this book, save for two photographs on the cover. To help identify and decipher the many concepts, legislation, and species covered in the text, this manager would profit from an excellent glossary, an annotated list of legislation, and an annotated list of the insect taxa mentioned in the book. I began gathering these things for myself to guide my reading for deeper understanding. The book has a comprehensive index that helps readers find topics, but it is not a good substitute for synthesized lists. In addition, I think New could have made his book more readily understandable and saved the reader time by using more subtitles and section summaries. His chapter summaries are helpful, but he could have eliminated them if he had used more descriptive, subject-verb-type subtitles. Overall, the book is well edited, but the light font and words trapped in the gutters of the pages decrease readability.

Insect Species Conservation is conceptually accurate and logical; nonetheless, it has two factual errors of note. Page 36 erroneously indicates that the Chesapeake Bay is in New England, and on page 124, readers learn about an endangered lycaenid butterfly "*Erynnis comyntas*." I could find no evidence that this "unicorn" exists after referring to my six books on North American butterflies and consulting with two Smithsonian lepidopterists. *Erynnis* is a genus of skipper butterflies and *comyntas* is the specific epithet of a so-far-non-threatened, spritely North American lycaenid butterfly called the Eastern tailed blue.

Insect Species Conservation is a significant summary and synthesis of insect conservation that should be read by conservationists and others to broaden their horizons. Conservation managers should keep this book handy to help inform their adaptive-management programs, while fully realizing that methods that work in conserving some species may not work for others.

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FINDING A WATER BALANCE

Animal Osmoregulation. Timothy J. Bradley. Oxford University Press, 2009. 320 pp., illus. $60.00 (ISBN 9780198569961 paper).

Animal Osmoregulation is the newest publication in the Oxford University Press Animal Biology Series. The small books in this series are designed to serve as brief references for scientists looking for an introduction to a topic, or as supplementary

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