

stories from his perspective. Paul served as his elderly father's field assistant. By relating these stories in the first person, Paul conveys to us the flavor of participating in the research his father conducted, which he calls "playing tricks on the insects."

Paul, from his perspective as a young observer, is able to recognize that his father's behavior is different from that of the folk in their sphere in France. He comments that his father has been called a hermit (though he realizes that this is actually not correct in that Père lives with his second wife and children). Even in his writings, Fabre indicates that his family was not supportive of his development as an entomologist, chiding him for his interest in such useless activities. Nonetheless, Fabre persevered in his entomological pursuits, eventually writing a ten-volume work, *Souvenirs Entomologiques*.

Paul particularly seems intrigued by the difference between insects' innate behaviors, which usually serve them so well, and their lack of ability to learn. Even to a child's mind, it is apparent that straightforward situations that would require minimal reasoning skills are beyond the capabilities of these insects. Instinct is their strategy, and, when eons of evolved instincts fail, they have no alternative approaches. For example, when covered with a bell jar, wasps emerging from a hole in the ground continue to fly upward, bashing themselves against the glass. Instead of going back into their nest and fashioning a new exit beyond the confines of the jar, they persist in a strategy that evolutionarily has been adaptive, but which dooms them under such artificial conditions.

The children whose opinions I sought regarding this book were not so taken with it as I was. The target audience of 7–10 year olds will find the text rather laborious, whereas older readers may consider the material too childish for them. For this reason, this is the type of book that should be read by parents to their children. Not only does this allow for sharing between generations, but it simultaneously conveys to youngsters the adult's interest in insects. Perhaps this will help counteract the impression that young children get from their parents and teachers that insects are nasty and dangerous, to be either killed or avoided. Hopefully, this will develop in them an appreciation and understanding of the world of insects and their fascinating behaviors.

The pleasure of reading about other entomologists reminds us of what drew many of us to entomology. The time we've spent in the field watching insects is mirrored by Fabre's experiences, and his excitement and amazement at the fabulous ways of insects reflect what we experienced when we began studying these fascinating creatures.

The artwork, provided by Marie Le Glatin Keis, supplies the perfect counterpoint to the text and illustrates scenes from Fabre's adventures. *Children of Summer: Henri Fabre's Insects* is well worth its \$14.00 hardcover price.

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Manu: The Biodiversity of Southeastern Peru

D. Wilson and A. Sandoval, eds.
Smithsonian Institution Press,
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MANU NATIONAL PARK, LOCATED IN A REMOTE area of the eastern Andean cordillera, is remarkable for its high species diversity, both faunal and floral. This book reports the results of a decade of field work in biotic inventory, systematics, biogeography, and biodiversity monitoring as part of the Smithsonian's BIOLAT programs. The Biological Diversity of Latin America (BIOLAT) program facilitates and coordinates research on biological diversity between the Smithsonian's National Museum of Natural History and host-country participants.

Wilson and Sandoval begin with a short introduction on the cultural and natural setting of the Manu Biosphere Reserve. The next nine chapters deal with various aspects of the flora: composition, diversity, soil quality, litter accumulation and decomposition, palms, bamboos, and bryophytes. The first two of these chapters were particularly interesting because they discussed the methods and technology used to map the research site using computer graphics and database software as well as the protocols for forest plot studies using a biological monitoring database. The information in these chapters has broad applications for entomologists as well.

The next eight chapters deal with invertebrates, and the final 12 chapters discuss the vertebrate fauna. Actually, four of those vertebrate chapters (all by Guerrero) discuss the Streblidae (Diptera) and other external parasites of bats and rodents. In Guerrero's chapter on streblids, he found that of 425 bats (representing 40 species in one chapter and 41 species in the other), 48.5% were parasitized by 1,338 streblids (representing 33 spe-

cies!), and ten of those were new records for Peru—and all of this during a single rainy season! In his second chapter on bat parasites, he observed that of the same number of bats, 83% were parasitized by Diptera and Acarina. The author concludes both of these chapters with a host/parasite analysis of this obviously rich fauna. Tropical bats evidently have a lot to squeak about with such parasite loads. With such a large database, Guerrero seems perfectly positioned to explore co-evolution between the bat and streblid clades. Guerrero's third chapter is a description of a new species of parasitic Staphylinidae found on *Oryzomys* rodents. This brief contribution describing a single new species seems out of place among the more comprehensive and synthetic chapters. His last chapter treats a species group (three species) of nycteriid batflies with description of a new species.

Dealing with such a rich invertebrate fauna in a single volume is clearly beyond the scope of this book. The invertebrate chapters do, however, give some valuable insights into biotic diversity as well as behavior, biology, and ecology of certain selected groups.

Vertical stratification of flight in butterflies is addressed in a small chapter by Medina, Robbins, and Lamas. The authors verified a previous study that demonstrated flying height was correlated with wing pattern, and they also showed a correlation between flying height and wing length. They suggest higher flying ithomiines have longer wings because the distance between perches in the forest is greater with increasing height. This seems intuitively reasonable, and the hypothesis can be tested.

In a fascinating chapter by Robbins, Lamas, Mielke, Harvey, and Casagrande, the authors explore the taxonomic composition and ecological structure of the species-rich butterfly community at the Pakitza study area of Manu. An astounding 1,300 species were sampled on only five field trips. One-third of these species was hesperiids, and another third was Lycaenidae and Riodinidae. A little more than 10% of the species was apparently new to science. That's a pretty high number in a group generally considered to be relatively well-known taxonomically. This community and several others like it in the upper Amazon basin are of great scientific interest because of their unusually high species richness, but they have not yet been well documented. Consider that more species may be found in 3,000–5,000 hectare sites in this area than in most of the African or Indo-Australian countries. For people who have never been in species-rich, tropical rainforests, chapters like this really do give a clear picture of the mind-boggling biotic diversity of such places.

In a similar chapter about spiders, Silva and Coddington discuss species richness at Pakitza and provide extensive notes on community structure. Sampling in early and, then, in late dry season yielded 498 species in 33 families. Theridiidae and Araneidae (both orb weavers) were numerically dominant, each accounting for approximately 28% of the total specimens collected. Not surprisingly (at least for tropical forests), most species (56%) were represented by only one or two individuals. I was especially pleased to see several methods used to estimate species richness as it applies to singletons or rare species because they are nearly always present in intensive or long-term sampling of invertebrates in tropical forests, and their presence in any analysis can greatly influence the species richness results.

In the following chapter, Pogue contrasts the biodiversity of two families of cicadas between the Pakitza study area and the Tambopata Reserved Zone 215 km away. Together these sites contain 13% of the Neotropical fauna (50 species), and Tambopata is the most species-rich site for cicadas in the Neotropics. Pogue's use of species accumulation curves plotted against time is an effective way of establishing whether the number of species at any given site is known or if additional species are likely to be found.

Quintero and Cambra provide an overview of the rich fauna of Mutillidae of Pakitza: 73 species as opposed to 41 species formerly known for the entire country. Of greatest value is the illustrated generic key for the mutillids of Peru with an accompanying, annotated list of species. Supplementing this are new distributional records and a comparison of mutillid faunal diversity between Peru, Panama, and the northeastern United States.

The short chapter by Erwin is a supplement to an earlier, larger paper on the carabids of Pakitza. The revised key to *some* genera of the carabid tribes occurring at Pakitza was a little frustrating because there is no indication of the percentage of coverage implied by *some*.

In a large chapter by Flint, the Trichoptera of the Pakitza region are discussed. Of the 224 species, only 77 (34%) can be reliably named, whereas the remainder are undescribed or belong to complexes needing further study. These caddisflies comprise 14 families and 51 genera, and Flint provides valuable keys down to generic level. Many of the genera and species are accompanied by annotations.

The last invertebrate chapter, by Louton, Garrison, and Flint, is concerned with the Odonata of Manu. Their natural history and species richness are described, and comparisons of diversity are made with other Peru-

vian sites. The area around Pakitza yielded 136 species although the authors concede there may be more if different habitats are sampled. An annotated species list is given.

As with all books of this kind that attempt to provide a broad overview of the flora and fauna of a particular area, there is a feeling of "incompleteness" because of the synoptic nature of the coverage. No one volume could, of course, accomplish anything resembling complete coverage for a tropical forest site. Nevertheless, I believe all the chapters provide valuable contributions. I found particularly useful those contributions dealing with sampling methods and estimating species richness as well as those that contain keys with which to identify insect taxa. The book should have broad appeal to anyone interested in tropical biodiversity and the methods of assessing it as well as those systematists, ecologists, and natural resource managers who deal with the specific insect taxa that are mentioned.

The volume is priced attractively at \$35, but the binding is so poor that a few extra dollars will be needed for rebinding. The extremely low number of illustrations and graphics probably contributed to the lower price. The cover design using shadow imaging of the subtitle is exceedingly distracting and difficult to read. None of these minor irritations is the fault of the editors, and they are to be congratulated for bringing together a diverse and interesting array of papers about this biologically rich area of Peru.

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An Introduction to Invertebrate Conservation Biology

T. R. New
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ISBN: 0-19-854051-5 (paper)

THIS WORK BY NEW IS AMONG THE FIRST ATTEMPTS at a synthetic, global overview of the relatively recent field of invertebrate conservation biology. Because invertebrates are so astonishingly diverse, abundant, and generally less understood and investigated than their vertebrate kin, anyone contemplating

such an overview faces a Sisyphean task at best. Despite this, New most successfully rolls his rock.

The book is well organized, highly readable, and targeted at a much broader audience than entomologists. Its readability certainly will help meet the stated goal of introducing "the emerging science of invertebrate conservation to students, naturalists, biologists, and conservation managers" (p. v). At 194 pages, the book cannot offer exhaustive detail. Rather, New adopts a thematic approach for broad coverage. The body of each of the eight chapters contains citations to the original literature, and the chapters end with a few selected larger works for further reading. I would have liked more deftly chosen figures that convey points to the reader (there are 37 tables and 22 figures), but this is a minor complaint.

The first three chapters (pp. 1–70) provide a frame of reference for invertebrate conservation: an entree to the field; arguments for why invertebrates should be conserved; and the changing physical state of the world. The middle three chapters (pp. 71–130) overlay a "how to do it" onto this frame of reference; prioritizing and implementing pragmatic conservation programs; captive breeding and re-introductions; and formal legislation and status assessments. The final two chapters (pp. 131–168) treat exemplary case histories and offer glimpses at the future. The book concludes with an Appendix of IUCN status definitions (p. 169), 560 references (pp. 170–190), and a subject index (pp. 191–194).

New has a skill for distilling in a few sentences the essence of a broad area of inquiry and how it relates to other topics while also weaving in his own spin on the matter. He uses this effectively in each chapter (especially the introductions), thereby allowing one to pick the book up and begin reading almost anywhere and still have a sense of linkage to the overall structure, flow, and philosophy.

New spends a considerable time discussing differences in scale and mode as these apply to effective conservation practice and policy. For example, species-level and habitat-level approaches to conserving invertebrate diversity are contrasted, as are the merits of focusing on umbrella, flagship, or indicator taxa, and scale is addressed as an issue relating to uniformity in legislation (pp. 24–28, 70–89, and 124–125). A partly obvious but nevertheless central lesson is that there are no monolithic solutions that can be applied, and that any plan must be flexible and open to (potentially severe) amendment, given that data on the natural history and biology of invertebrates will always be limiting.

Throughout the book, New points to our highly fragmented and incomplete knowl-