BOOK REVIEWS

BASSET, Y., V. NOVOTNY, S. E. MILLER, AND R. L. KITCHING (EDS). 2003. Arthropods of Tropical Forests. Spatio-temporal Dynamics and Resource Use in the Canopy. Cambridge Univ. Press, Cambridge, UK. xvi + 474 pp. ISBN 0-521-82000-6. Hardback. $110.00.

This book, written by 79 authors contributing to 35 chapters, aims to provide an overview of data collected during recent canopy studies in Australia, Africa, Asia and South America. The idea for it originated at a symposium of the 21st International Congress of Entomology, at Foz do Iguaçu, Brazil in August 2000. The editors invited 'active research groups' to prepare manuscripts containing new research results. Thus, the book does not begin with a history in which it might have been pointed out that a few 19th century naturalists (e.g., Bates, Müller, Wallace) opened up the subject. Then, several 20th century studies concentrated on mosquitoes, and to a lesser extent on Ceratopogonidae and Psychodidae, with concern not just for their basic biology but with the practical aspect that some of these flies are important vectors of disease. This is mentioned briefly on p. 18, but no research group working on biting flies participated in this book. Also surprisingly, just one chapter (17, pp. 176-185) comes close to dealing with faunal diversity associated with epiphytes or with phytotelmata, when there are several active groups.

Chapters are grouped into five topics. These are (1) Arthropods of tropical canopies: current themes of research, (2) Vertical stratification in tropical forests, (3) Temporal patterns in tropical canopies, (4) Resource use and host specificity in tropical canopies, and (5) Synthesis: spatio-temporal dynamics and resource use in tropical canopies. Chapter 1 reveals controversy in definitions of the terms 'canopy' and 'understorey' (usually spelled 'understory' in U.S. publications). Chapter 2 addresses the now well-known technique of 'canopy fogging' along with use of towers, cranes, canopy walkways, and helium balloons to access the canopy for sampling. This chapter also makes plain the taxonomic difficulties, in which identification of specimens to the species level in the tropics is at best difficult. The ability to collect specimens has exceeded the ability to identify them to the species level by many of the researcher groups who rushed into canopy studies perhaps because the theme has become practicable and is fundable.

Exceptions to the above problem are studies of groups of insects in which the researchers have taxonomic expertise, have identified collections to the species level, and have at least some understanding of the autecology of each species. Chapters 15, 22, and 33 (a powerful data set for saturniid caterpillars on Costa Rican trees by Dan Janzen) take this approach. Such studies can tie abundance of a species to its way of life. In contrast, studies that claim to have collected e.g., 12,000 specimens of Carabidae and 10,000 of Staphylinidae provide little information other than that tree canopies may be important habitats for who-knows-how-many species of these two families feeding on who-knows-what. They disregard the roles of the species encountered: for example some staphylinids are generalist predators, others are specialists (but on what prey?) while others are fungivores (but on what fungi?), and is not the abundance of food (the resource) an important determinant of presence and abundance?

The chapter I liked best was the conclusion, by all four editors, in a valiant effort to see pattern and generalities in the findings of the diverse chapters. It was a difficult task. Of course we may see that that canopies of some tree species maintain more arthropod species and/or individuals than do canopies of other tree species. Generally we see some seasonal effects. We see that there is vertical stratification of some sort. We also see some weak trends with exceptions. What was hard to draw out was generalities given the heterogeneous nature of the localities, the species studied, and the objectives. Sample size was one of the obstacles. Authors were able to obtain many samples of, e.g., Orthoptera or Formicidae, but when these were subdivided to the level of 'morphospecies', sample size often was not great enough for statistical manipulation. And, when authors lumped together all samples of Orthoptera or Formicidae, this was equivalent to lumping together apples and oranges. My conclusion is that canopy diversity (as diversity everywhere else) occurs at the species level and is best understood from the bottom upward, i.e., from the species level. Few of the included chapters showed that projects had the necessary taxonomic expertise to work at the species level. Apart from obtaining specimens that might at some point be useful to taxonomists (if there really are taxonomists prepared to work on these specimens, and if somehow they are funded to do so), most of the included chapters merely pointed at questions to be asked. It is a shame that so many 'canopy studies' have been funded without evident funding for taxonomists who could identify the species encountered, make sense of the diversity, promote autecological studies, and make some progress.

The book ends in References (pp. 407-467) and an Index of subjects and scientific names combined (pp. 469-474). The 6-page index seems a bit skimpy for such an abundance of data. By error,

in the copy I received from the publisher, pages follow in sequence to p. 416, **then begins a duplicative section** in which pp. 393-416 appear again before pp. 417-467. This duplicative section may form a form a 'signature' (a group of pages stitched together, in this instance 12 leaves or 24 pages) that has been repeated. The entire duplicative section ('signature') may be scissored out and discarded.

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