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# BOOK REVIEW

Basset, Y., Novotny, V., Miller, S. E. & Kitching, R. (Eds) (2003). *Arthropods of Tropical Forests: Spatio-temporal Dynamics and Resource Use in the Canopy*. Cambridge University Press. 474 pp. ISBN 0-521-82000-6 (hard cover).
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We are beginning to appreciate the importance of tropical forests. They play a fundamental role in key ecosystem processes, affecting the dynamics of regional and global climates. In addition, tropical forests are reputed to support most of the world's biodiversity: almost countless species of animals and plants, the vast majority of which are still unknown. Less still is known about the complex web of interactions that weave these species into ecological communities. Thus, tropical forests represent one of the last great frontiers of biological exploration to which increasing numbers of scientists are flocking. This edited volume showcases some of this burgeoning research activity from the last 5 years, concentrating on changes in arthropod distribution and resource use at different heights and times within tropical forest canopies.

The various abiotic and biotic factors likely to influence arthropod distribution will vary in importance not only across species, but also within the lifetime of an individual animal. This is especially true for holometabolous insects whose larval and adult niche requirements are often extremely different. Many years of temperate ecosystem research have given scientists a good grasp of the major factors that regulate arthropod distribution. Arthropods in temperate forests experience a largely predictable annual cycle of food resources. In contrast tropical forest plants exhibit a huge variety of leaf, flowering and fruiting phenologies, with knock-on effects to herbivores and their enemies. Similarly there are major differences in canopy structure between temperate and tropical forests. Therefore, whilst scientists might be guided by principles elucidated from temperate forests when looking at tropical arthropod ecology they must be acutely aware that different forces may structure these divergent ecosystems. This sort of comparative approach thinking is in evidence in this book, with comparisons being made across different types of tropical forest (savanna, dry and rainforest) and the same forest type in different geographical locations.

As a young science, canopy entomology is still beset by some teething troubles. Canopy height (often well over 60 m) and the sheer number of specimens to sort and catalogue provide obvious logistical problems. However, recent progress in canopy access has allowed arthropods to be sampled *in situ* under more controlled conditions and also at night. Insect activity patterns can be highly structured in seasonal and daily time in response to specific resource availability. Hence what you see really does depend not only on how and where you look, but also on when. This is something canopy ecologists are now beginning to address. For example Basset *et al*. (chapter 27) showed marked faunal turnover between day and night within the same canopy layer, particularly for the upper rainforest canopy. This suggests that arthropods less well adapted to the more severe microclimatic fluctuations in the upper canopy move downwards. However, this illustrates an intrinsic problem of such presence/absence data – we don't know why species are where they're found. Kitching *et al*. (chapter 29) acknowledge that current methodologies are really only short-cuts to provide a broad overview and that there is no substitute for extended natural historical observation, which remains the only real way ahead to address this and other such questions.

In attempting to understand how biodiversity is distributed within tropical forests, we see that the species richness of tropical canopies is highly dependent on the forest type and our definition of 'canopy'. If we include all vegetation above ground then the canopy is indeed extremely diverse; whereas if the vegetation is more thoroughly stratified, then the highest part, the true 'canopy', is home to a relatively specific species assemblage which is not necessarily particularly diverse. We may need to reconsider our astronomical estimates of overall canopy biodiversity and hence the global estimates which depend upon them. For example Ødegaard *et al.*'s (chapter 21) estimates of phytophagous beetle diversity and host specificity were orders of magnitude lower than previously reported. Forest type also has a significant bearing on both the distribution and overall level of biodiversity supported. Levels of canopy stratification and species diversity, appear relatively low in montane, dry and savanna forests and higher in rainforests. Perhaps this imbalance can, to some extent, be explained by the relative sampling efforts expended in respective forest types. From a conservation perspective Speight *et al.* (chapter 34) point out that managed forests and some exotic plantations retain similar species abundance and diversity to primary forests, although the species present change.

Overall this well edited and coherent volume contributes much to what we know about the spatial and temporal distribution of canopy arthropods in tropical forests. The contributed chapters provide food for thought with an interesting melting pot of ideas and new perspectives on many of these.

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