Book review

BIGNELL, D.E., ROISIN, Y. & LO, N. (Eds.) 2011: Biology of termites: a modern synthesis

Springer, Dordrecht, XIV + 576 pp; Hardcover, ISBN: 978-90-481-3976-7, Price: € 169.95

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Myrmecol. News 16: 60 (online 30 September 2011)
ISSN 1994-4136 (print), ISSN 1997-3500 (online)
Received 26 August 2011; accepted 27 August 2011

Evolutionary biology lends itself well to synthesis. The underlying unity of life allows separate bits of information to be drawn together like pieces of a puzzle. Famously, the merger of Mendelian genetics with Darwin's concept of natural selection during the first half of the 20th century was such a successful integration of ideas that it is still dubbed *The Modern Synthesis* – a timeless motto that not only reminds us of our academic forefathers, but is appropriately re-deployed whenever significant progress is made from meshing seemingly disparate ideas into a unified thesis. Such is the case with a new book on termites. *Biology of termites: a modern synthesis* draws together distinct but complementary topics from the front lines of termite-oriented research to promote a holistic understanding of termite biology.

Edited from three corners of the globe by well-connected termite specialists, *Biology of termites* is a hefty edited-chapters volume that seems to demand much from its contributing authors. It covers many aspects of termite biology, from the broadest macroevolutionary patterns that explain the diversity and distribution of termites as a whole, to the most thought provoking, and sometimes quirky, genetic and life history details that continue to emerge from their primeval and deeply cryptic societies. One presumes the authors were asked to be thorough in presenting their topic of choice, as chapters are extensively referenced and often well illustrated. In this sense, the book is unapologetically for the termite lover – *You think you know termites? Read this!*

For context, the book is informally the third in a trilogy (so far) of must-have termite texts, starting with *Biology of termites* volumes I & II (Academic Press, 1969, 1970) and followed, two decades later, by *Termites: evolution, sociality, symbioses, ecology* (Kluwer Academic, 2000). Like its predecessors, the current title aims for an authoritative overview of major themes in termite biology – that is, topics that in some way address the *hows* and *whys* of termite ecology and social biology, including their co-evolution with microbes and fungi.

Though the book is not explicitly organised into themes, the 19 stand-alone chapters do reflect a broad cross-section of research curiosities. If we step back to view the broadest patterns, we learn how termites are situated within the tree of life, nestled in against other cockroaches – albeit non-social ones. We learn of the co-evolution between termites and the all-important set of cellulase genes that help them digest wood, and of the co-evolution between their symbiotic gut microbes and, for some species, their domesticated fungal friends. We learn of gross social analogies between termites and other insects, and the merits of a roach-first approach to evaluating scenarios of early social evolution.

If we draw a closer look, and crawl amongst the workers and soldiers of the best studied species, we learn just how termite societies are structured (not always from a reigning pair), how they resist disease (individually and as a group), how they propagate themselves (sexually and asexually), how they communicate (with vibrations and pheromones), how they build mounds (some modest, some spectacular), and how they develop and differentiate (in response to genetic and environmental cues). On this latter point, there is invigorated thinking on caste homologies and caste function that helps to infer how each caste evolved, and when.

Though "white ants" are no such thing, there is plenty in this book for the myrmecologist. Why soldiers as opposed to major workers for defence? How is immunity preserved in the absence of metapleural glands? Why horizontal over vertical transmission of fungal spores? Why equal sex ratios among the working class? Why such big genomes? And … how *do* they get away with so much inbreeding? Though clearly divergent in some respects, there is remarkable convergence between ant and termite societies. One chapter tackles this comparison head-on.

Like its predecessors, *Biology of termites* reflects current consensus. My only caveat is that this consensus is upheld too safely, with only a minority of chapters championing topics that are truly unique from past offerings. In my view, the book is perhaps too rich in topics related to digestion and gut symbionts (five chapters) and too shy at promoting termites as a valuable test case for kin theory and sociogenomics. Despite the slightly conservative approach, the book is overwhelmingly successful at the synthesis it proclaims in its title. Further, it stands to facilitate an even greater one, as ideas and data from this research community fuse more and more with the broader field of insect sociobiology.