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Book Reviews

The enemy of my enemy is my friend

Plant-Provided Food for Carnivorous Insects: A Protective Mutualism and its Applications edited by Felix L. Wäckers, Paul C.J. van Rijn and Jan Bruin. Cambridge University Press, 2005. US$130.00/£75.00 hbk (356 pages) ISBN 0521819415

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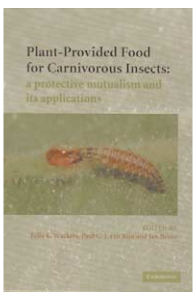

Mutualisms continue to fascinate ecologists, although studies of competition and predation still dominate the literature. Initial studies (reviewed in [1]) focused on how mutualisms could evolve and persist, given their mathematical instability. Once mutualisms were mathematically justified, researchers began to examine their roles in a variety of communities [2]. Among insect–plant mutualisms, those between ants and plants have received the most attention [3,4]. Such mutualisms run the ecological gamut from nutrient supplementation (ants feed plants and *vice versa*), seed dispersal, and pollination, to protection and defense from competitors and herbivores. *Plant-Provided Food* expands the taxonomic range of insect–plant mutualisms by encompassing a broad range of insects but focuses on protection mutualisms.

Students of mutualisms are conscious of historical antecedents that assert the importance of positive interactions in ecological communities. Similar to Boucher's *The Biology of Mutualism* [1], *Plant-Provided Food* begins by surveying our unfolding awareness of mutualisms. Whereas Boucher, reflecting the political currents of the 1960s and 1970s, emphasized historical relationships between mutualism and socialism [6], the first example of a mutualism in *Plant-Provided Food* [the interpretation of 'manna' (Exodus 16:13–36) as honeydew from a scale insect] accurately reflects the millenarian tenor of the early 21st century. The three plant-focused chapters on what plants provide to insects, three insect-focused chapters on how insects respond to these provisions, and four chapters on human uses of these insect–plant interactions emphasize the notion that the antagonistic interactions among insects mediated by plant-provided foods will lead us to agricultural prosperity.

Many plants provide habitat and/or resources to insects and, in return, insects defend plants from encroaching herbivores or competitively dominant weeds. Variants on this mutualistic interaction have been studied extensively (e.g. [5]), but, except for ant–plant interactions, the widely scattered publications on this topic have not been synthesized previously. *Plant-Provided Food* is an uneven first pass at such a synthesis and provides many new twists on the plant–insect defense-as-mutualism story. Some of these promise to lead to new research directions, whereas others are more likely to turn into blind alleys. Many of the contributing authors reiterate the hypothesis that biological control by predators and parasites of insect pests of crop plants can be enhanced in polycultures in which some of the plants provide food for the beneficia l predators and parasites. However, this premise is weakly supported by the data that the authors present, distracts the reader from the main messages of many of the chapters, and relies on a surprisingly naïve understanding of statistics and plants.

For example, in their review of studies of whether floral nectar improves biological control by parasitoids, Heimpel and Jervis show conclusively that 'no single study has definitively shown that nectar-feeding by parasitoids has led to increased levels of pest parasitism in managed systems'. Furthermore, they report that, in 50% of studies in which monocultures and polycultures were compared, polycultures supported lower pest density. Presumably, the other 50% (a virtual coin-flip) did not. Thus, whereas most ecologists and statisticians would conclude that the response of pest density is random with respect to cropping system, the authors use the data to postulate a mechanism (resource provisioning) for Root's 'enemies

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hypothesis' [7], that increased plant diversity enhances the action of natural enemies of pests. This kind of wishful thinking regarding the role of plant-provided foods in enhancing biological control in agricultural systems detracts from the utility of the data presented.

Most of the contributors are entomologists, and the strongest chapters are those that examine the needs and responses of insects to plant-provided foods, including floral and extrafloral nectar, pollen, honeydew, specialized food bodies (e.g. Beltian, Müllerian, Beccarian and pearl) and elaiosomes, fresh and rotting fruits, sap and other exudates. These chapters point towards a richer understanding of insect life history and multitrophic, reticulated food webs. Weaker are the chapters that examine the plants themselves and their responses to carnivorous insects. For example, the discussion by Sabelis *et al.* of plant fitness and selection for edibility of 'wasted' pollen as a means to attract predatory arthropods neglects decades of work on pollination biology and imputes an adaptive explanation for pollen feeding when none is really necessary.

Entomologists and biological control specialists now recognize that 'carnivorous' insects are mostly omnivorous, either throughout their lives or at certain points in their life cycle. *Plant-Provided Food* provides a valuable collation of data and will provide much food for thought among plant and food-web ecologists. A better prescription for a research agenda in biological control, however, can be found elsewhere [8].

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Mélange à trois: hosts, parasites and Combes

The Art of Being a Parasite by Claude Combes Translated by Daniel Simberloff. University of Chicago Press, 2005. US$65.00/US$25.00 hbk/pbk (280 pages) ISBN 0 226 11429 5/0 226 11438 4

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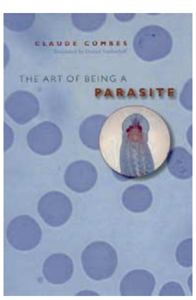

Have you ever considered tasting a parasite – a tapeworm for example? If this sounds like an interesting culinary experience, you can go to France and order a bécasse. Apparently, any gourmet would know that woodcocks owe their particularly delicious taste to the fact that they are consumed with their intestines intact. Another reason for this palatal experience is that woodcock intestines harbour millions of tiny tapeworms. Stories such as this are possibly what you would expect from a French author of a book about parasites, but *The Art of Being a Parasite*, by Claude Combes, is much more than strange stories from French cuisine.

Current books about parasitology tend to be either huge catalogues, marketed as textbooks (but which are more useful as reference works), natural history books, or theoretical works filled with graphs and equations. *The Art of Being a Parasite* is something else. At first glance, it might seem like just another text describing all the beautiful and weird adaptations between hosts and parasites; however, contrary to most volumes on natural history, there is an ongoing theme that weaves the biological details together into a fascinating treatise on coevolution. Combes forces the reader to think about all kinds of host–parasite systems, from retroviruses to cuckoos, in the context of a few simple principles. Among parasites, we have selection for 'encounter genes' generating 'avoidance genes' among hosts. This must sound familiar to those interested in predator–prey systems, but hosts are different from prey. If the avoidance strategy fails, the host becomes a predator and the parasite is the prey. Combes' major message is that parasites and hosts are always involved in two concurrent arms races, with far-reaching consequences for the development and adaptation of organic life.

As in his earlier book [1], Combes makes frequent use of his concept of filters, the encounter filter and the compatibility filter. This unifying metaphor enables him to present seemingly unrelated aspects of host and parasite biology in a comprehensive way. As opposed to his former book, the current is thinner, deals with a more restricted set

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