

Book review

GORDON, D.M. 2010: *Ant encounters: interaction networks and colony behavior*

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In its title, *Ant encounters* reflects both the first-person account and focus of Deborah GORDON's keen observations, models and experiments on the social dynamics of colonies of the ant *Pogonomyrmex barbatus*. She has written the book for a broad audience, explaining many basic concepts necessary to understand how an ant colony operates while accentuating the contributions of her unique research to the study of *P. barbatus* colony organization, and more generally, biological complexity. It is in a sense a continuation of her book *Ants at work: How an insect society is organized*, informed by another decade of research, and is thus a valuable overview.

The book is composed of six chapters that follow an introduction, *The ant colony as a complex system*. Some chapters present more general considerations of ecology, evolution and sociobiology (*Colony organization, Colony size, Ant evolution*), while others (*Interaction networks, Relations with neighbors*) consider GORDON's research emphasis more directly. The writing is imbued with her mannerism and intonation, and reading the book felt much like having a collegial discussion with her over coffee. The book is not a comprehensive synthesis of ant sociobiology, but rather a series of stories about her findings and their implications, supplemented by broader, related descriptions of ant behavior, ecology and evolution. Naturally, her studies of encounter rates, networks and task allocation are featured, together with her work on foraging, colony growth and community-level interactions. Being able to listen to GORDON perform her repertoire is one of the book's strengths.

Ant encounters is in some aspects unusual. The preface is a set of acknowledgements rather than an account of the author's motivation or the book's intended audience. The final chapter, *Modeling ant behavior*, seemed an afterthought, as models of ant colony organization are often presented in considerable detail throughout other chapters. Lastly, there are only three illustrations and no photographs, unfortunate in a book whose content could benefit from visualization and whose subject is a charismatic invertebrate with Hollywood appeal.

While perhaps intentional to maintain focus on the author's work, citations of relevant literature can be selective and sporadic, and are sometimes deposited on a page without the evaluation and integration they warrant. For example, GORDON notes that brains of worker desert ants, *Cataglyphis*, renowned for their navigational ability, show axonal pruning, but does not further add

that pruning is most delayed in the mushroom body collar region, where it is postponed until the ant has had extensive visual experience. This appears to enable adaptive flexibility and may explain the neural basis for age-dependent behavior, a point stressed by the authors of this research. More generally, neurobiological and sociogenetic processes (including epigenetic effects) likely underscore the amazing behavioral flexibility of individual ants and their colonies, but neural and molecular scaffolding is not sufficiently constructed for readers to appreciate proximate cause. Similarly, the mechanism by which encounters might provide input into molecular change could be exceptionally insightful, and while GORDON hints in footnotes at intriguing results, the opportunity to clarify mechanisms and their relation to plasticity is missed. What is the relevance of such findings to the broader theme of colony behavior and self organization? Here, the question of intended audience may be critical to understanding the author's choices.

Issues identified in *Ants at work* and repeated in *Ant encounters* include mischaracterization of models of caste and social organization and overblown dust-jacket commentary. Brief description of the models, which appropriately feature genetics and evolutionary ecology, is acceptable historical counterpoint to note their limitations. However, work in this area (and beyond) has indeed addressed questions of flexibility in task performance as well as evolutionary and ecological concerns. A more ecumenical presentation would have been beneficial here, as multiple levels of analysis are required to fully appreciate the workings of ant societies. We are now in a post-genomic era during which rapid progress on the molecular mechanisms of division of labor (or task allocation) and other elements of social structure will likely be revealed. Readers could be so informed.

These quibbles aside, in an ever-questioning tone, and with heuristic advantage, GORDON effectively titrates discussions of what we know about the social workings of ants with cautions of what we still fail to understand. The take-home message at the end of the book, however, gave me pause: "... ants bump into each other as they travel through an unpredictable world, and their inept reactions to these encounters produce millions of colonies that are making millions more." This seems to suggest that specialization and efficiency are unimportant to fitness, points that should be clearly made and fully explained if so intended. As GORDON notes, the study of ant societies requires integrative analyses rooted in ecology. Here we can all agree. After completing the book, I felt the claims often made in journal article introductions and grant proposals are justified: that much of ant behavior is poorly understood. *Ant encounters* helps identify directions that could be taken to improve our knowledge.