Bugged: The Insects Who Rule the World and the People Obsessed with Them

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I wish everyone were as excited about entomology as David MacNeal is. Well, maybe I wish everyone were almost as excited about it. In MacNeal’s book, Bugged: The Insects Who Rule the World and the People Obsessed with Them, he takes us on an enthusiastic tour of entomological topics, from bed bug treatments to preparing cricket cuisine for your supper. It’s a whirlwind exploration as much of entomologists as it is of arthropods themselves.

MacNeal, most notably a contributor for WIRED, presents his case for appreciating our exoskeletoned allies through a series of “wow” facts (“for every one of us there are 1.4 billion insects,”) gross-out stories (there’s a whole chapter on body farms), and interviews with researchers and entomological everymen. His commitment to his investigation is considerable: he interviews folks from Japan to Georgia, New York to Greece, and at times delves into the historical roots of common bug themes.

As professional entomologists, you will not be surprised by the information in this book. You will probably get a headache rolling your eyes over the author’s fervor and often irreverent word choice. You might even get your back up a little over the anecdotes he chooses to share. (I, as a myrmecologist, nearly put the book down for good after a stretch in the introduction in which MacNeal recounts a “humorous” imagining of an “insect Armageddon,” in which ants could “burrow through our nostrils and suffocate us.”) But MacNeal is no entomologist, and it’s interesting to explore the perspective of someone on the outside trying to connect with those of us in here. It’s a commendable and formidable task. Besides, it’s nice to read what our colleagues are up to outside their peer-reviewed publications.

MacNeal gets the essence of entomology’s fun engine, like a child smashing logs and pulling out bess beetles and giant millipedes to poke with sticks. But he misses entomology’s actual power, its intricate connectedness, the beauty and the quiet importance of these immovable (wait—he does number them: 10 quintillion) creatures toiling with exquisite and unceasing precision. When he notes that “we tend to overlook the economic positives bugs provide,” he goes on to detail the museum and zoo industry, overlooking insects’ gargantuan positive economic impact on fields from agriculture to human health. He also falls into the overused and wholly unnecessary “bugs-are-important-because-they-might-be-the-next-cure-for-cancer” trap. (There’s actually a chapter called “You Just Squashed the Cure for Cancer”) We can forgive him these indiscretions, sort of. It’s good that he’s interested, and the book has its uses.

This volume is perfect for a middle or high schooler who shows an interest in bugs (though the expletives peppered throughout the text might offend some parents). I imagine MacNeal’s storytelling, sense of humor, and subject choices would be appealing to this group, and just might steer them in the direction of entomology as an adventurous vocation. It would also make an appropriate gift for the friend who insists you’re an “etymologist” or the relative who repeatedly asks what it is exactly that you do for a living (although it misses the whole “stand in the field and count aphids on hot summer days” or, in my case, “watch ants trailing office park tree trunks for hours on end” aspects of the business). It’s an easy enough read that one could take it on an airplane and get through it halfway across the country, and it covers enough ground that readers get a taste for entomology’s breadth. In short, Bugged could make a good gift for a general reader—and, to be fair, this is MacNeal’s target audience—but entomologists may consider skipping it.

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Pheromone Communication in Moths: Evolution, Behavior, and Application
Jeremy D. Allison and Ring T. Cardé (eds.)
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Moths are everywhere and seem so familiar: adults fly to our outside lights in the dark, pupae we find in our stored grain, caterpillars hang from trees in front of us on our hike or chew on our favorite vegetable in the garden. We may collect the large and colorful species (Luna moth or Atlas moth, for example) or we may even keep a colony or two in our lab to study them. But how do they “talk” to each other and avoid miscommunication (attempting to mate with the wrong species)? Moths constitute the majority of the species within Lepidoptera, which is, as Löfqvist et al. note in Chapter 4, “the insect order for which we have the most extensive knowledge of volatile sex pheromones and the roles and mechanisms of pheromonal communication.” This new book looks at moth communication from many different angles—evolutionary biology, chemistry, biochemistry, behavioral biology, and pest management—true to
the interdisciplinary nature of the subject. Should the reader decide to become familiar with the history and basic concepts, I recommend focusing on Part One, which provides a comprehensive introduction, setting the stage for the rest of the book. Naturally for a book with chapters authored by different scientists from different fields, the degree of detail varies from chapter to chapter. Chemistry and biosynthesis enthusiasts with a knack for phylogeny and evolutionary thinking will especially like Chapter 4, “Evolutionary Patterns of Pheromone Diversity in Lepidoptera,” and those keen on neurophysiology will enjoy reading Chapter 10, “Moth Sex Pheromone Olfaction: Flux and Flexibility in the Coordinated Confluences of Visual and Olfactory Pathways.” It is very helpful that terminology and compound coding are well standardized across chapters (with any deviations indicated), and the book contains excellent figures and tables for clarity. Part Two showcases studies focused on individual species (such as *Ostrinia nubilalis* in Chapter 15 or *Utetheisa ornatrix* in Chapter 17) or groups (such as small ermine moths in Chapter 13 or heliothine moths in Chapter 21). These sections allow the reader to learn about specific examples of the different models of pheromone evolution in moths, the possible mechanisms that lead to reproductive isolation and speciation, and the different inheritance patterns of signal distribution and male preference functions.

It is intriguing, for example, that the chemical structures of most common female sex pheromones are restricted to even-numbered chains of 10 to 18 carbons, a few double bonds, and only a few oxygen-containing functional groups, yet the combination of the underlying enzymatic reactions leads to a fascinating diversity of these signals. Equally fascinating is that some of the co-occurring small ermine moth species, for example, do not hybridize even if they share female sex pheromone components, indicating other isolating mechanisms.

One of the strengths of the book is that the state of the art of field application (that is, using pheromones for trapping and pest management) is discussed in detail in Part Three. The need to control moth pests has driven basic research and, to some extent, determined which species have received greater attention for investigation. In turn, the increasing ability to identify additional (often minor) pheromone components feeds back into the improvement of trapping efficacy.

The history of moth pheromonal communication studies parallels the history of chemical ecology from the very beginning, with the first identification of a pheromone, bombykol, in 1959, but the story is far from over. Only for about 1–2% of the described lepidopteran species do we have chemical identification of the female-produced sex attractant components, and we lack comparative phylogenetic studies for male-produced pheromones. Many of us tend to focus on a certain part of the pheromone mosaic. This book carefully assembles the existing pieces, putting them into an evolutionary perspective and pointing out the gaps in our knowledge that urge us to investigate further.