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Book Review

The Bee, A Natural History, by Noah Wilson-Rich (2014, Princeton University Press. ISBN: 9780691161358. US\$27.95)

Upon receiving “The Bee, A Natural History”, by Noah Wilson Rich, I was drawn in by the title and the beautiful rust and grey front cover featuring a nearly 3-D photo of a honey bee. I immediately felt twinges of excitement—this is the book I have always wanted to have available for my university course, Apiculture and Honey Bee Biology—and disappointment—I did not write it! The “bee”—singular—accompanied by the high-resolution photo, suggested that this book focused on the world’s best understood insect that my course is centered around, *Apis mellifera*. I began to leaf through it, seeing most of the topics that I center my lectures around: bee diversity, bee senses, colony life cycle, swarming, common pests and diseases, stings and venom allergy, pollination biology, colony collapse disorder, effects of pesticides.... All with such beautiful photos and diagrams. Some topics are welcome new additions: immunology, bees in amber, a discussion of regulation of bee activities involving both juvenile hormone and vitellogenin, thermoregulation and “fever”. My interest was peaked.

Unfortunately, as I started to read the text, I became quickly disillusioned. Most of the information is presented clearly and concisely, and provides a quick and sometimes very intriguing summary of the topic at hand. But I found large gaps between what could have been and what was presented. Some facts about honeybees that I find so amazing are lacking. For example, the title page for Chapter 2 has a spectacular close-up photo of bee wings, but with no figure legend. The hamuli that enable the hind and forewings to connect and work as one unit are readily visible, but there is nothing to point to this amazing structure, although they are mentioned in the text on the next page. On that same page dealing with “anatomy of a honey bee”, the antennal cleaner of the foreleg and the corbicula (pollen basket) of the hind leg are mentioned, but the structures are not depicted. “The mechanics of bee flight” (p. 31) discusses why bees should not be able to fly and the evidence from high-speed photos that the wing shape is not static, which is all of interest, but what about long-standing knowledge of how the indirect flight muscles warp the shape of the thorax to enable the wings to move up and down? I researched swarming behavior of honeybees for my PhD degree and had a strong interest in seeing how the author dealt with the complex behaviors associated with colony reproduction. I was greatly disappointed—the topic that takes me 3 full lectures to cover was superficially handled in two short paragraphs. These examples give some idea of why overall this book disappointed me.

Additionally, I am always skeptical of books when I read “facts” that are incorrect. As examples, it is stated (p. 31) “bees rely on nectar for carbohydrates and pollen for protein.” That is partially true, but bees also require fats, minerals and vitamins, also obtained from pollen. Haplodiploidy is shared only with other members of the order Hymenoptera? Not true—it is the sex determination system in scale insects, thrips, and some mites, Hemiptera and bark beetles. The description on p. 38 of juvenile hormone levels through the development of a bee larva to adult is superficial; the diagram is overly simplistic and consequently incorrect. The sentence on p. 38 about the triggering of swarming by a lack of queen mandibular pheromone is only partially true—much more important is the inadequate distribution of QMP (and possibly other pheromones) from the queen to other bees within the colony by “messenger bees” that stimulates swarming. To the best of my knowledge, diploid drone larvae are cannibalized by workers shortly after hatching and consequently triploid honey bees never occur naturally (p. 35—the rest of this entry deals with *Polistes* paper wasps!).

Given the beautiful photo of a honey bee on the cover, I had the impression that Wilson-Rich's book would be centered upon that species. It made sense that other taxa of bees were mentioned on the first few pages, to frame the discussion of where honey bees fit in within the 20,000+ species of bees. However, non-*Apis* bees continue to be discussed at various points, like mention of the bumblebee genome (p. 37), mating systems of bees (p. 44), social systems (pp. 52-53), dominance hierarchies and queen-worker plasticity (pp. 56-57), photos of *Anthophora* (pp. 68-69), nesting (pp. 72-73) and parenting (pp. 82-83). Most surprising was the "Directory of Bees" that gives accounts for 40 individual species, five honey bee species and fully 40 pages dedicated to species accounts of solitary bees, bumblebees, and stingless bees. For such a short book (213 pages, not including some references and the index), neither *Apis* or non-*Apis* bees are covered adequately to satisfy specialists of either group.

For the novice who has an interest in bees, this book presents a remarkable breadth of topics and provides an entry point to their fascinating biology. For example, the section on beekeeping gives equal coverage to basic honey bee management; keeping solitary bees; ancient hive designs; Langstroth hives used by commercial beekeepers throughout the world; observation hives; recordkeeping; urban beekeeping; natural beekeeping; and integrated management. For a beginning beekeeper, this offers an unbiased introduction to options available to them in their approach to their new activity. It truly is a visually stunning book, with beautiful close-up photos that honor the beauty and diversity of bees. It has pointed me towards several topics about which I need to update my personal knowledge. While I won't be using this book for my university course, it represents an interesting and different approach to the topic of bees and is a visually appealing addition to my personal library.

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