



ENTOMOLOGY

Hidden Kingdom: The Insect Life of Costa Rica. By Piotr Naskrecki. 2017. Cornell University Press. (ISBN: 9781501704710). 216 pp. Paperback, \$34.95.

When reflecting on life in the tropics, many people visualize majestic, beautifully colored birds flying among the trees. But Toucan play this game. As this book reveals, there are also majestic, beautifully colored insects, the most abundant life form in tropical habitats, hiding among the trees.

Costa Rica is a nation of insects. Entomologists have described more than a million individual insect species, and there may be up to 30 million undiscovered species, many of which may inhabit the tropics. Author Piotr Naskrecki maintains that “there is no more fascinating, beneficial, diverse, and breathtakingly beautiful group of organisms than insects.” This book is a touching testimony to the truth of his thinking.

Insects have a kind of love/hate relationship with flowering plants. Evolutionary records display a burst of plant and insect varieties about 130 million years ago. Coevolution has resulted in many flowering plants, including native Costa Rican plants, depending on insects to assist in their

reproduction. While the insects are important for plant reproduction, the plants have evolved many ways to repel those that would feed on them. It is interesting that when a plant species evolves a substance or structure deadly to insects, the insect genes generate new ways of overcoming plant defenses. This back-and-forth process increases speciation rates in both plants and insects.

While Costa Rican insects belong to the same groups found in other parts of the world, there are countless unique differences in diversity, morphology, behavior, life cycles, and food sources. One chapter of the book features a useful catalog of insect orders, as well as related groups such as arachnids, centipedes, millipedes, and crustaceans. Each section provides descriptive biological attributes, information on the group’s prevalence in Costa Rica, and photographs of group representatives. Readers will enjoy the striking rainbow of colors displayed by creatures such as the bright green rhinoceros katydid; the multicolored lantern bug; the brilliant yellow, orange, and black tiger moth; the gold and turquoise shield bug; and the glistening blue morpho butterfly, as well as many others. The colorful patterns of some insects warn predators with the message “Stay away or I may hurt you.”

Consider some of the nuggets that make this book difficult to put down. Most insects are not dangerous to humans and try to avoid us. Some have defense mechanisms, but the real dangers of many insects are pathogens that they may transmit to humans. For example, bot flies are parasitic to humans. The females lay their eggs on mosquitoes, which then drop the bot fly larvae on humans, resulting in the larvae crawling into the tunnels made by the mosquito mouthparts. The larvae consume human skin and then drop from the host to the soil to complete their metamorphosis. Whip scorpions demonstrate elaborate courtship rituals involving slow dancing, tender caressing, and hand holding. The acoustic

activity of insects fills the forests with a variety of sounds (clicks, chirps, crackling, buzzing, etc.), used to attract mates, scare off predators, and fend off rivals. Depending on the sounds’ frequencies, though, to human ears some insect sounds are truly the sounds of silence. Insects are believed to use light from the moon and stars for navigating at night. Wing scales of butterflies and moths are defense structures, making the wings slippery and thus making it difficult for predators to get a grip on the body. Considerable social activity is common in some insect species. In termite societies, each member has a role that lasts its entire life. Paper wasp colonies, consisting only of females, also show a division of labor, with only one member (the “foundress”) being capable of laying eggs. Leafcutter ant colony members are gardeners, growing fungi for the adults and larvae. Many tropical insects are “masters of deception,” disappearing during the daytime because they are “accomplished mimics.” They hide well among plant leaves, mosses, twigs, decaying wood, and lichens. The mimicry is so perfect that one biologist cut off part of a katydid’s body to prove that it had real lichens on it. It didn’t.

Though a paperback, this is a large, high-quality volume that might qualify as a coffee-table book. Every page details interesting facts and contains strikingly attractive photographs of insects and their kin, showing features that would be missed on casual viewing of the insects themselves. The book contains a comprehensive index. College, high school, and middle school students, as well as the general public, are likely to find *Hidden Kingdom* fascinating and informative.



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