A Buzz in the Meadow

By Dave Goulson. 2014. Random House Canada, 320 Front Street West, Suite 1400, Toronto, ON, Canada, M5V 3B6. 266 pages, 18.99 CAD, Paper.

In 2003, the author, a Professor of Biological Sciences at the University of Sussex, UK, purchased an old farm (*Chez Nauche*) along with 13 hectares of meadow in rural France. His intention was to develop a wildlife sanctuary, in particular a haven for bumblebees which have been a focus of his research and conservation efforts for over 20 years.

A Buzz in the Meadow is a diverse collection of stories based on the *Chez Nauche* property that aims first and foremost to inspire readers to a greater appreciation of the World's smaller creatures, especially insects and their relatives, but also including a few other invertebrates and small vertebrates.

The first part of the book (Tales from the Meadow), taking up about half its length, introduces readers to *Chez Nauche* and the meadow, and to the foundations of what Goulson terms 'The Insect Empire', a lay summary of early arthropod evolution and the subsequent success and spread of the Insecta. Later chapters in this first part then follow a similar pattern. An insect or group of insects common at *Chez Nauche* is selected, with some aspect of their biology being described. This then leads to a discussion of some broader fundamental biological question. For example, Chapter 4 (Mating Wheels and Sexual Cannibalism) starts by describing the curious manner in which sperm transfer is achieved in Odonata (dragonflies and damselflies), and the idea that it may have arisen as a means by which the male avoids becoming prey for his larger, perhaps hungry, partner. Goulson then expands this discussion into a more general one on courtship and mating in predatory insects (a male's preference for sex rather than self-sacrifice – at least until he has inseminated the female).

Having laid the groundwork to some of the inhabitants of *Chez Nauche*, in Part II (The Rich Tapestry of Life) Goulson moves on to discuss some aspects of the meadow as an ecosystem, focusing on pollination, a process that illustrates par excellence the myriad interactions among insects and plants and one on which the author has done a significant amount of research.

In the first of the three chapters in this part, Goulson summarises the complex relationship between flower structure and an insect's search for nectar and pollen: is the structure such that it will attract a range of insect species, or is the structure so designed that only a few species are attracted (and are able to effect pollination)? Included in this chapter is a discussion on some relatively new research showing that flowers may not only offer a nutritive reward but also a thermal one, the flowers trapping heat much as in a greenhouse, so that their temperature may be many degrees above ambient. An advantage to the plant is that the higher temperature may volatilise scents that attract potential pollinators, while for the insect visitors, especially those like bumblebees that forage at cool temperatures, the flower provides a place to rest and have a warm drink!

The previous discussion provides a background for Goulson's next chapter (Robbing Rattle) in which he considers the insect-plant interactions in an ancient flower-filled meadow, and how such meadows have for the most part disappeared due to agricultural practices, in particular fertiliser application which enhances growth of grasses that crowd out flowers. This leads nicely into the role of a conspicuous plant of meadows, Yellow Rattle (*Rhinanthus minor*), a parasitic plant whose roots attach to those of grasses, drawing out nutrients for its own use. As a result, the grasses become weakened, allowing meadow flowers to re-establish. Rattle is pollinated by a number of long-tongued bumblebee species whose decline in number can be at least partially attributed to a decrease in the availability of Yellow Rattle. The chapter title, incidentally, refers to the stealing of nectar from the rattle by some bumblebees that cut a hole at the base of the flower to access the nectary rather than entering the flower by the normal route.

The three chapters in Part III (Unravelling the Tapestry) show Goulson's strong conservationist leanings. The first (The Disappearing Bees) is an excellent account of how agricultural practices have led to a decline in numbers of both native bees and honeybees (as well as many butterflies and birds), despite governments pouring large amounts of cash into projects designed to correct the trend. Colony Collapse Disorder and the pros and cons of neonicotinoid insecticides are also discussed. This is followed by a chapter on the implications of conserving small 'islands' of native ecosystem, especially as related to genetic drift and inbreeding. In the book's final chapter, Goulson takes the situation on Easter Island, originally forested and with a rich endemic fauna but now treeless and denuded of most native animals, as reflective of what is happening to biodiversity on a global scale. The author's take-home message appears to be that despite our intelligence and knowledge of what's happening to the environment, we seem unwilling to do much about it. He urges much greater efforts towards conservation of biodiversity – not just thinking about rhinos, snow leopards, polar bears and whales, but also bees, beetles, flies, flowers, and all other small creatures.

Goulson is an excellent writer, enthusiastic and able to explain complex biological concepts in a readily understandable way. He also interposes a number of witty 'asides' to enlighten his discussions. This was an enjoyable book to read, and I thoroughly recommend it to field naturalists both professional and amateur.

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