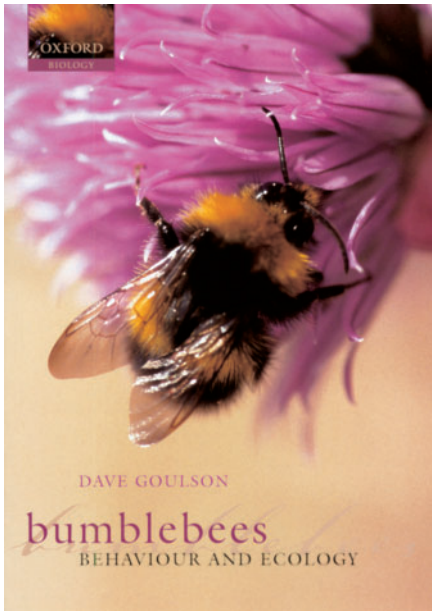
Book Review

BUMBLEBEES, WHY DO WE NEED THEM?



Bumblebees – Behaviour and Ecology

By Dave Goulson

Oxford University Press (2003)
pp. 246. ISBN 0 19 852607 5 (pbk)
£29.95

In his book 'Bumblebees, Behaviour and Ecology', Dave Goulson is an excellent advocate for one of our best loved insects; the humble bumblebee. In 175 pages of text, followed by an extensive bibliography, he will inspire many with his fascination and admiration for the bumblebee, while informing us of their enormous relevance in many of the planet's ecosystems and human economies.

The first twelve chapters of the book give an up to date summary of the most relevant aspects of bumblebee biology, covering recent developments in experimental research on bumblebees that provided new insights and understandings into the insect's ecology while covering aspects of the insect's navigation, communication and their reproductive biology. Many of these new findings are presented in their relevant biological contexts. For example, it has only recently been shown, that bumblebees perform a sort of rudimentary 'dance' for communication, where successful foragers stimulate nest mates to leave the nest and search for food. Goulson also covers many of the more 'classical' aspects of bumblebee biology, such as thermoregulation and foraging strategies. Outlining how thermoregulation allows the bumblebee to occupy ecological niches denied to other insects, he explains that they can warm their bodies to high working temperatures, even at rather low ambient temperatures, allowing them to collect pollen and nectar earlier in the morning and later in the evening than other insects. The ability to thermoregulate has also allowed them to expand their geographical range, inhabiting colder northern ecosystems and high altitude regions that the honeybee cannot exploit. Goulson also discusses how scientists combined behavioural and neurobiological studies to show that bumblebees optimize their flight speed in search of nectar sources that meet the correct cognitive ability to detect and discriminate colourful blossoms seen against any background colour. This is an impressive example of the mutually beneficial evolution of flower size and colour with the cognitive abilities of bumblebees. Providing a detailed and easy to follow explanation of theoretical models for foraging efficiency, Goulson describes the tools used by bumble bee biologists investigating foraging efficiency, and compares predictions from these models against the test stand of empirical data. One such theory, the 'marginal value theorem' predicts how many flowers a bumblebee should visit in patches of different size, and suggests that the proportion of blossoms visited should decrease with increasing patch size. Goulson shows how the empirical data show exactly this.

The last three chapters lead us through details of the bumblebees' role as a pollinator, as well as describing conservation strategies to protect the insects when threatened, and conversely, the negative effects on ecosystems where bumblebees have been introduced. Goulson explains how bumblebees can access to flowers that exclude other insects due to their tongue morphology, allowing bumblebees to efficiently gather pollen from the flower's anthers on their hairy body surface, which is excellent for pollen transport from flower to flower. The conservation strategies described by Goulson are mostly aimed at farming practice, giving clear recommendations for the best time to cut grass, when grazing should take place and which bee-pollinated crops should be grown to encourage bumblebee populations. Although the bumblebee is a significant insect in many ecosystems, they can prove to be destructive when introduced into other environments. Distributed by human activity around the globe, bumblebees can

compete with native insects, as well as transmitting new parasites and pathogens to unprepared native species. The impact of bumblebees in other environments should be studied and considered more seriously before further distribution takes place. The take home message from these final chapters is clear; humans need bumblebees more than many of us would have appreciated before reading this book.

Dave Goulson also defends bumblebees, which are often neglected in comparison with a champion pollinator, the honeybee. He compares both pollinators directly and concludes that bumblebees can be as successful as, and under certain circumstances even better than, honeybees. Bumblebees outperform bees in bad weather conditions and their morphology is better adapted to certain plants than the honeybees. In fact, the bumblebee is the best pollinator for many economically significant crops such are red clover, cranberry, alfalfa, watermelon and cucumber. Goulson concludes that conservation of wild populations of bumblebees is essential if they are to be encouraged to pollinate many agriculturally relevant crops more intensively.

Containing a block of 16 beautiful colour plates, the book, reads very well and will be extremely beneficial to a wide audience, ranging from students of biology to nature conservationists and agronomists.

10.1242/jeb.01326

Jürgen Tautz
Universität Würzburg
tautz@biozentrum.uni-wuerzburg.de