

Book review: *The Buzz about Bees*

Honey-makers' Hidden Habits

Since Karl von Frisch identified honeybees' mechanisms of communication and translated the meaning of the waggle dance 60 years ago, *Apis mellifera* has disclosed plenty of extra secrets. Von Frisch's kindred spirit, behavioural physiologist Jürgen Tautz, revisits a forgotten superorganism.

Have you ever wondered how honeybees figure out whether a flower contains nectar? Are they even capable of doing this? It's a mission impossible. When a hard-working *Apis mellifera* arrives at a given plant that is covered with hundreds of blossoms and swarming with hundreds of fellow bees, the tiny insect has only a marginal chance of visiting a well-stocked flower first. In most cases, a workmate will have snapped up the nectar earlier. So must a bee traipse round every flower, one by one? That would be an enormous waste of time and energy.

Of course it mustn't. Bees are guided by secret messages...

...that the previous visitors leave behind on flowers, to inform those that follow. [...] Foragers that take the last drop of nectar mark the flower with a chemical "empty" signal. The chemical signal fades about as quickly as it takes the flower to replenish the nectar store.

Bees are mysterious creatures. But Jürgen Tautz and his colleagues at the University of Würzburg, Germany, have uncovered a couple of their secrets. In *The Buzz about Bees. Biology of a Superorganism*, Tautz provides a profound insight into the daily life of the hairy honey maker and overcomes plenty of common prejudices about bees.

Bee research: lengthy history

Tautz has prominent forebears. The first to cast light onto secret bee messages was the Austrian ethologist Karl von Frisch, awarded a Nobel prize in 1973. In the first half of the 20th century, von Frisch (and his German scholar Martin Lindauer after him) identified the communication mechanisms of bees and showed their sensitiveness to ultraviolet and polarized light. Advanced in years, both published classic works such as *The Dancing Bees* (von Frisch, 1966) and *Communication Among Social Bees* (Lindauer, 1971).



The Buzz about Bees has the potential to become a classic as well. Jürgen Tautz has added new chapters to the history of honeybee research. Take the common catchphrase "busy as a bee" as an example. Tautz describes in his book how collector bees ("foragers") sleep at night in a similar way to humans – a phenomenon that researchers from the TU Darmstadt discovered in 2004 (*Journal of Sleep Research* 13 (2), p. 145). Indeed, individual bees are not only busy or tired – they even can be lazy (as well as *industrious, peaceful, aggressive, warmth-seeking, cold-preferring*

etc.). Tautz asserts that the foraging intensity of different individual bees is not the same,

There are lazy foragers that are content with a mediocre one to three foraging trips a day. There are also true honeybee workaholics that achieve ten or more foraging flights per day.

Every bee has its own personality

Insects have different personalities! The Tautz group revealed this by fixing tiny RFID microchips to the back of the thorax of bees at birth. By so doing they can monitor each individual over its entire life and study factors that influence a bee's behaviour.

The book offers additional astonishing findings about bees that even Karl von Frisch and Martin Lindauer didn't know:

- ▶ bees do not use energy consumption as a measure of flight distance, but rather a visual trip recorder that uses only the green receptor cells;

- ▶ bees talk in curious languages. They "toot", they "quack", they "buzz" and they "beep";

- ▶ bees are able to build comb cells aboard a Space Shuttle at zero gravity that are exactly the same as those made on Earth;

- ▶ bees can be crooks, offering "bribes", "false papers" and "hot kisses" if necessary;

- ▶ bees use state-of-the-art communication technology, and;

- ▶ bees pursue exotic jobs, such as "heater", "thermostat", "filling station" and "water collector" (and these jobs are dependent on the temperature at which they were raised).

Never eat bananas near a beehive!

In addition, the book delivers useful advice for everyday life by explaining why it's highly dangerous to eat ripe bananas near a beehive.


This is a marvellous book with almost 300 marvellous bee photos (all of them taken by co-author Helga Heilmann, a member of the Tautz group). As his personal "take-home" message, Tautz revives the 19th century term "bien", meaning that a bee colony is a single "superorganism" equivalent to a vertebrate animal. Tautz takes this concept to the extreme when proposing that a honeybee colony is equivalent to a mammal, *with a very low rate of reproduction, with producing nourishment for the offspring in special glands, with body temperatures at about 35°C, and with a highly developed capacity for learning.*

Well, that's open to discussion (and it's not something likely to cause the scientific world to implode). Another thing, however, is for sure: *The honeybee is the third most valuable domestic animal* (after cattle and pigs). In all, 68 percent of flowering plants worldwide (170,000 species) are pollinated by honeybees and as many as 90 percent of fruit tree flowers are dependent on honeybees. And this huge number of plants is pollinated by just nine species in total (in Europe and Africa by just one)!

In that light, making honey is just a fringe benefit of a much wider and more important service to humankind. We should thank them.

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Jürgen Tautz (with photographs by Helga Heilmann): *The Buzz about Bees. Biology of a Superorganism*. Springer, 2008, 284 pages, €32.05.



After 200 years of research,
Apis mellifera remains mysterious.
This book reveals many of its secrets.