

Inner Workings: Breaking down bees' dances

Helen H. Shen
Science Writer

Worker bees in the United Kingdom have taken a new job—collecting data for researchers at the University of Sussex. Margaret Couvillon and her colleagues have devised an environmental monitoring system that uses foraging honey bees and their “waggle” dances to measure land quality. The technique

could help scientists assess the ecological effects of different land use schemes, they say.

Since 1994, the European Union has spent more than €41 billion in incentives that encourage farming techniques designed to protect the environment. However, evaluating the environmental impacts of different land-use

strategies under this program has proven difficult. Traditional land surveys, which involve covering large areas on foot and cataloguing plants and animals by hand, can be time-consuming and costly.

Couvillon and a team led by Francis Ratnieks turned to honey bees for help. “We let the bees do the hard work for us,” says Couvillon. “They can really survey huge areas of land and provide biologically relevant information.” The insects are long-distance foragers, sometimes sampling nectar and pollen up to 10 km from their hive. Honey bee preferences for particular spots could point to areas rich in wildflowers and other plants important for insect pollinators, she says.

When foraging bees find rich sources of food, they return to the hive and communicate the bounty’s location by wagging their bodies. The angle of a bee’s head signals the direction of the spot, and the duration of a bee’s dance signals distance from the hive. Since the 1980s, scientists have used the waggle dance to map the distributions of bee foraging sites (1).

In a recent study, Couvillon applied the technique to monitor how different land-use schemes affect honey bee habits (2). The team analyzed 5,484 waggle dances recorded from three hives maintained at the University of Sussex.

Across a foraging range of 94 km², the bees preferred rural locations with the most restrictive standards for land use, including a nature reserve in the area. At the same time, the insects showed a preference against organically managed farmlands surrounding the hive—a possible response to some organic farming techniques that require frequent mowing and that could prevent nectar-rich plants from blooming, says Couvillon.

Honey bee preferences are only one measure of environmental health, but it is one of great relevance for humans, notes Couvillon. “Honeybees contribute enormous amounts to the world economy every year, but their numbers have been in decline in the past 100 years,” she says. “It would be a very bleak diet for humans if we lost the pollinators.” Finding the insect’s preferred foraging areas could help indicate land-use techniques that support the health of honey bees, and potentially other animals, too, suggests Couvillon.



Margaret Couvillon uses a protractor to measure the angle of a honey bee’s waggle dance, as the insect’s movements play frame by frame on a computer monitor. Image courtesy of Roger Schürch (University of Sussex, United Kingdom).

1 Visscher PK, Seeley TD (1982) Foraging strategy of honeybee colonies in a temperate deciduous forest. *Ecology* 63(6):1790–1801.
2 Couvillon MJ, Schürch R, Ratnieks FL (2014) Dancing bees communicate a foraging preference for rural lands in high-level agri-environment schemes. *Curr Biol* 24(11):1212–1215.