

Bees 'read sky' to find home

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This honeybee pollen forager is being released 3km from her hive. The RFID chip on her back enables researchers to measure the bees' exact flight times and homing success. Credit: Mario Pahl.

(PhysOrg.com) -- Bees remember landmarks and read information from the sky to find their way home from an amazing 11 kilometres away and over several days' travel, a new study from The Australian National University shows.

Vision scientists have found more reasons for the honeybee's incredible knack of navigating cross-country – these creatures often rely on the position of the sun, the polarisation of light in the [sky](#), the panorama view of the horizon and landmarks including towers, mountains or lakes.

Led by Professor ShaoWu Zhang from the ARC Centre of Excellence in Vision Science and ANU, the research team released bees in Canberra,

where the landmarks include Black Mountain, Mount Ainslie, Red Hill and Lake Burley Griffin.

“We found that from four kilometres onwards, honeybees coming from the eastern direction return to their hives sooner than bees from the north, west and south,” said Professor Zhang. “Also, when we released these bees from seven kilometres and above, only those from the east can successfully find their way back.

“This is because bees released from the east can see Black Mountain in the opposite direction. It also helps if they are released in the early afternoon, when the sun is situated in the west, too. When they fly towards Black Mountain, familiar local features can guide them back to the hive.”

In the study, the team caught foragers as they returned to their hives and displaced them in a black box. The bees were then released in novel spots at various distances up to 13 kilometres in the north, east, south and west.

“In their forage trips, one way that honeybees use to find their way home is by storing distance and directional information when they venture out,” said Professor Zhang. “In other words, they try to go back the way they came.

“Catching them as soon as they reach their hives and placing them in a black box sets their pre-calculated information back to zero, so the bees are deprived of any directional information in relation to the hive. By doing this, we can confirm that they are relying solely on knowledge that they have gathered about the landscape to travel home.”

The team also used new technology to track the bee’s journey. They placed Radio Frequency Identification (RFID) tags on each bee and left

a receiver at the hive entrance. The system recorded the exact arrival time of the individually targeted bees, including the late arrivals, ensuring accurate results without having a researcher keep watch for hours on end.

“[Bees](#) released from longer distances did not reach their hives until two to three days later,” he says. “What took us by surprise was the bee’s ability to retain their knowledge of the landscape and directions for several days.

“It’s fascinating that the honeybee has a brain the size of a small seed, but it still can keep so much information, and has so many creative ways to survive.”

More information: The research was carried out in collaboration with the ‘BEE group’ at Würzburg University, Germany, led by Professor Jürgen Tautz. The study *Large Scale Homing in Honeybees* by Mario Pahl, et al., was published last week in *PloS ONE*. It is available at bit.ly/in4XIr

Provided by Australian National University

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