Sugar ants 'know when they're lost'

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(Phys.org)—Australian sugar ants know their surroundings so well that putting them in a different place can immediately trigger a 'lost' reaction, new research shows.

Scientists at Australia's Vision Centre have found that an ant's habitat can determine how it navigates through its environment.

"As ants travel from their nest to food sources, they use various ways and clues to ensure that they always know the way home," says Eliza Middleton from The Vision Centre and The Australian National University. "One of them is recognising familiar landmarks along their route.

"They also count their steps to measure distances and use a 'compass' to monitor the position of the sun and the pattern of polarised light in the sky. A combination of these methods leads to path integration – a fundamental way used by ants and bees to always know the direct way home."

To determine how foraging sugar ants navigate, the researchers captured ants that were heading back to their nest and released them at a local and a remote site.

"The local site was within the ants' foraging range and the remote site was completely unfamiliar – both were filled with landmarks," Ms Middleton says. "We then tracked them for seven minutes.

"Previous research has shown that when ants are lost, they'll use what they learned from path integration and go along the imagined route to where the nest should be, even if it isn't actually there.

"We expected sugar ants at the remote location to do the same, since there weren't any familiar landmarks, which meant that they had to fall back on path integration."

However, sugar ants that were released at the remote location walked around in circles for the full seven minutes that they were tracked. On the other hand, ants that were released at the local site successfully found their way home – some headed along the 'imagined' route, but managed to adjust their path on their way.

"It shows that ants at the local site used both path integration and landmark recognition to find their nest," Ms Middleton says. "As for ants at the remote site, their immediate switch to 'search mode' – walking around in circles – showed they knew they were lost, and that they completely ignored any path integration information.

"So sugar ants will use path integration to some degree in familiar locations, but completely disregard it when they're lost. They are the first ant species that we know of to behave in this way.

"It's possible that the ants were completely overwhelmed by their new environment – the surrounding landmarks were so different that they immediately tried to search for something familiar.

"It means that sugar ants are so reliant on landmarks that a different landmark-rich environment can suppress their use of path integration."

Ms Middleton says that this behaviour is not necessarily species-specific, but may be a result of foraging experience in a certain environment:

"Ants can use visual cues – such as landmarks – or path integration to go around, but whichever they pick as their primary method depends on where they live. Sugar ants behave this way because they live in the suburbs with lots of buildings, and in densely forested natural environments.

"If you capture desert ants that live in dense, landmark-rich habitats and release them in an unfamiliar environment, chances are they will rely little on path integration to get home too."

More information: The group's conference poster "Homing strategies of the solitary foraging Banded Sugar ant, Camponotus consobrinus" by Eliza JT Middleton, Jochen Zeil and Ajay Narendra was presented at the Tenth International Congress of Neuroethology. See: bit.ly/ThREg8

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