

Electric plant auras

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- 1 PLANTS are not the silent types they lead us to believe. As well as sending out chemical signals to warn others of an approaching predator, it seems they may even communicate with would-be pollinators via electrical signals. As bees fly through the air, they — like all insects — acquire a positive electric charge. Flowers, on the other hand, are grounded and so have a negative charge.
- 2 To see whether bumblebees (*Bombus terrestris*) are able to make use of these signals, Daniel Robert at the University of Bristol, UK, and colleagues made artificial flowers. These looked and smelled identical but some were filled with sucrose and others with quinine, a substance bees don't feed on.
- 3 At first, the bees visited these flowers at random. But when a 30-volt static electric field — typical for a 30-centimetre-tall flower — was applied to the blooms filled with sucrose, the team found that the bees could detect the field from a few centimetres away and visited the charged flowers 81 per cent of the time. The bees reverted to random behaviour when the electricity was switched off.
- 4 The result suggests the bees used the electric field as an indicator of the presence of food, much like they use colour and scent. 37, they foraged at random, showing that they hadn't just learned the location of the sucrose flowers. "That was the first hint that had us jumping up and down," says Robert.
- 5 Next, the team looked at whether the bees were influenced by the shape of the electric field, which is determined by a flower's shape. By varying the shape of the field around artificial flowers that had the same charge, they showed that bees preferred visiting flowers with fields in concentric rings like a bullseye: these were visited 70 per cent of the time compared to only 30 per cent for flowers with a solid circular field.
- 6 The researchers speculate that flowers have evolved different shaped fields in the competition to attract pollinators. "Flowers are a ruthless expression of evolution," says Robert. "They exploit bees."
- 7 The researchers showed that when a bee visits a flower it transfers some of its positive charge, incrementally changing the flower's field. With repeated visits, the charge may alter significantly, which could tell other bees that the nectar supply has been diminished. "Electricity is a way to change cues very quickly: 'I look perfect, I smell nice, but my electrics aren't quite right — come back later!'," Robert says.



- 8 Robert Raguso at Cornell University in Ithaca, New York, agrees that the changing electric field may signal that nectar is running low. "Nectar or pollen can be removed quickly by a pollinator, creating a situation in which the just-visited flower still advertises, dishonestly," he says. The rapid change in electric charge would reduce those out-of-date cues.

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Tekst 8 Electric plant auras

- 1p 35 According to paragraph 1, which of the following can plants send messages to?
- 1 aggressors
 - 2 bees
 - 3 plants
- A 1
B 2
C 3
D 1 and 2
E 1 and 3
F 2 and 3
- 1p 36 What becomes clear from paragraphs 2 and 3?
- A A decline in the nectar that attracts bees has led to experiments with artificial flowers.
 - B Bees make use of electric cues to find pollen and nectar-rich flowers to feed on.
 - C Bumblebees instinctively distinguish between quinine and sucrose.
 - D The perception of sucrose is important to bumblebees when making foraging decisions.
- 1p 37 Which of the following fits the gap in paragraph 4?
- A Attracted to all kind of blooms
 - B Deprived of bee-friendly flowers
 - C Having finished collecting nectar
 - D In the absence of a charge
- 1p 38 What point is made in paragraphs 5 and 6?
- A Artificially charged flowers show bees how to find suitable food sources.
 - B Bumblebees have been demonstrated to prefer mixed fields of flowers.
 - C During its lifecycle a flower adjusts its shape to attract different pollinators.
 - D Foraging bees seem to be partial to specific patterns of electrical signals.
- “those out-of-date cues” (alinea 8)
- 1p 39 Naar welke twee signalen wordt verwezen?

Bronvermelding

Een opsomming van de in dit examen gebruikte bronnen, zoals teksten en afbeeldingen, is te vinden in het bij dit examen behorende correctievoorschrift, dat na afloop van het examen wordt gepubliceerd.