Bees like it hot

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A &acutehot bee&acute on a flower, taken with a heat sensitive infrared camera. J. Tautz, M Kleinhenz & B. Bujok @ BEEgroup Würzburg

Research from Queen Mary, University of London has shown that bees prefer to visit warm flowers, and can learn to use colour to predict floral temperature before landing.

In the hunt for their next meal, it's long been thought that bees head for the flowers that contain the most nectar or pollen. But as bees need to invest energy in maintaining their body temperature, a flower's temperature might be seen as another reward.

Writing in the journal *Nature*, Queen Mary's Professor Lars Chittka and his collaborators from the University of Cambridge (Adrian G. Dyer, Heather M. Whitney, Sarah E.J. Arnold, and Beverley Glover) have shown that in a world where flowers of different species differ in temperature, bees might cleverly pick the ones that offer warmer nectar

- and they can learn to identify such warm flower species by learning these species' flower colours.

Chittka and his team tested whether the bees could use flower colour to identify warmer flowers. In a ‘foraging bout’ the bees were offered a choice of four purple artificial flowers and four slightly cooler pink flowers, placed in random positions.

58 per cent of the bees chose the warmer, purple flowers. And when the colours were switched and the pink blooms held the warmer nectar, 61.6 per cent of the bees preferred the pink flowers.

Chittka explains: “What the bees appear to be doing is a bit like us drinking a hot drink on a cold day. If you need to warm up, you can produce your own heat, at the expense of some of your energy reserves - or you can consume a warm drink, and save on investing your own energy,” he said.

“The interesting thing is that bees don't just prefer the warmer drinks - they also learn to predict the flower temperature from the flower colour.” The results show that floral temperature can serve as an additional reward for pollinating insects in a context where there are also nutritional rewards available.

Flowers have a variety of tricks by which they warm themselves: some species are thermogenic, i.e. they can produce their own heat; others make use of the absorption of solar radiation, either passively or through a range of structural adaptations.

The findings may have importance for the evolution of specific floral structures and for the connection between floral sensory cues, floral temperature and pollinator behaviour.

Source: Queen Mary, University of London

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