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INSIDE JEB

Vibrations guide thornbug treehoppers in pursuit of love

Umbonia crassicornis thornbugs on *Albizia julibrissin*. Photo credit: Jeremy Gibson.

Cunningly disguised as thorns to avoid the unwanted attention of predators, thornbug treehoppers (*Umbonia crassicornis*) lead a sedentary existence. Sucking sap from the shrubs that they inhabit, the insects grow up in large family clusters until the youngsters strike out to find a mate. 'Males fly from shrub to shrub, producing vibratory courtship signals, pausing to listen, then flying on to the next shrub if they receive no reply from a female', says Jeremy Gibson, from the University of Strathclyde, UK. However, after homing in on an amorous female's shrub, the pressure is on to locate her as female thornbug treehoppers mate only once with the first male to arrive. Embarking on a duet in a bid to become united, the would-be lovers shiver their abdomens and the vibrations are carried down their legs and into the plant. However, Gibson and his graduate advisor Rex Cocroft, from the University of Missouri, USA, were unsure how thornbug treehopper males interpret the responses of their inamoratas in the pursuit of love.

Arranging thornbug treehopper blind dates on young false tamarind trees (*Lysiloma latisiliquum*), Gibson recorded the vibrations generated by the duetting insects as the vibrations travelled through the shrub while filming the male's progress toward his intended. Then Gibson abducted the male, tricking the female into continuing her serenade while measuring the minute vibrations that she generated and the motion of the plant stem at the locations where the male had paused, to build a picture of the vibration features that had guided him.

At the outset of each search, Gibson and Cocroft found that the males covered longer distances (up to 34 cm) before pausing for periods of 1.3–14.2 s as they vibrated their abdomens and then waited to feel the females' responses before going on their way again. The male pursuers also located the objects of their affection more speedily and accurately when the females were located high in the tree, taking more wrong turns when lower down on the trunk. In addition, the males were able to determine the direction from which the vibrations approached – by sensing whether the vibration arrived at the front or rear legs first – and their accuracy improved when the vibrations travelled more slowly through the thinner twigs and as the vibrations became stronger when the male neared the female.

It was also clear that the vibrations generated by the females became increasingly distorted the further they travelled through the shrub to reach the expectant males, prompting admirers to travel further between check points in order to improve their chances of making the right choice when next they paused. And sometimes the males continued walking even while serenading, pausing only to pay attention to the female's responses, possibly allowing the male to speed up his search in a bid to reach his lady love ahead of competing suitors.

However, Gibson and Cocroft point out that the challenges facing vibration-guided amorous male thornbug treehoppers are likely to be even more testing in the rowdy real world – where the insects must also contend with buffeting wind, rain and the cacophony of competitors and predators – and the scientists are keen to learn more about the sensory strategies that the insects employ to ensure success.

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