Bee 'Shouts' Warn Intruders That A Food Source Will Be Defended

July 8, 2014

Image Credit: matsilvan/Thinkstock.com

[Watch the Video: Stingless Bees Fight Over Food Source]

April Flowers for redOrbit.com – Your Universe Online

If you were foraging for food in a highly competitive environment and you found a very lucrative source, how would you communicate this prize to your teammates without giving it away to your competitors? This is the situation bees find themselves in quite often.

Scientists believe that many animals, faced with eavesdroppers, have developed "whispers" to prevent revealing the location or quality of their resources. In Brazil, however, some species of bees have learned to "shout." These shouts warn would-be interlopers that their prime source of food will be fiercely defended. The UC San Diego-led study, published in *Current Biology*, reveal that this bold and risky communication strategy is remarkably successful.

"It's a signal with honest aspects and the possibility of lies," explains James Nieh, a professor of biology at UC San Diego. "It tells nestmates where to find good food and hints at a larger occupying force."

Nieh collaborated with PhD student Elinor Lichtenberg from his laboratory, who is currently a postdoctoral researcher at Washington State University.

According to Lichtenberg, these counterintuitive bee shouts indicate that eavesdroppers are able to alter the evolution of animal signals in previously unthought-of ways.

"Our study provides a new way of looking at how eavesdroppers affect the evolution of animal communication signals," she adds. "Until now, it was thought that eavesdroppers select against conspicuous signals, for example by more easily finding and eating prey that sings loudly. But our results show that eavesdroppers can help select for the same conspicuous signals that are easiest for intended recipients to detect and understand."

Related Articles

- Bumblebee Queens Travel Far And Away Before Starting New Homes
- Monarch Butterflies Rely In Part On Magnetic Compass For Navigation
- Researchers Look At Endangered Indiana Bat Social Networks To Aid In Habitat Management
- Winter Road Salt Is Wreaking Havoc On Summer Butterflies
- Monarch Butterflies Threatened Due To North American Habitat Loss
- Flower Blasts Pollen At Birds
- Foul Fumes Can Ruin Dinner For Hungry Moths
- White House Establishes Task Force To Deal With Declining Honey Bee Populations
- Dancing Bees Show Researchers The Way To The Best Environmental Schemes
- UK Honeybees Threatened By Bloodsucking Mite

Nieh's research has focused on the evolution of communication strategies among bees. He says that "eavesdropping is part of the information web, the signals and cues that surround animals and play a key role in shaping ecosystems."

In the case of bees and other pollinators, he says, "a network of signals and cues shapes pollination, informing animals about where and when food is available. Researchers have in general thought about eavesdropping as a force that makes signals less conspicuous, leading to the evolution of 'whispers' to counter spying. However, we show that eavesdropping can also lead to 'shouts.' In this stingless bee system, with aggressive colonies jockeying for limited resources, more conspicuous food-recruitment signals indicate a higher likelihood that a resource will be harder to wrest away."

Stingless bees — including two species from the genus *Trigona* that are able to entice their nestmates to food sources with chemically distinct pheromones — were the focus of the new study. These species all compete with one another for similar food sources. For example, *Trigona spinipes* foragers will mark new food sources, which are then detected by *Trigona hyalinata* spies. The *T. hyalinata* bees will displace the *T. spinipes* if they can recruit enough nestmates.

Lichtenberg developed a controlled field study that allowed her to observe the eavesdropping behavior. She found that the sites which have been frequently visited by one species, which is communicated by the larger number of pheromones, will be avoided by the eavesdropping species. Sites with lesser pheromones, however, attract the eavesdropping species. By recruiting more of their nestmates or engaging in a battle with the previous claimants, the eavesdroppers would be able to take over the highly visited sites. The risks and energy costs to the eavesdroppers, however, seems to make these strategies not worth the trouble.

The research team used economic models to mimic the eavesdropping bees' decision-making. They ran three model scenarios: *T. hyalinata* eavesdropping on *T. spinipes*; *T. spinipes* eavesdropping on T. *hyalinata*; and the non-aggressive *Melipona rufiventris* eavesdropping on *T. spinipes*. The team found that all three scenarios' outcomes matched the eavesdropping behavior measured in this study and in previous work by the team.

"Assembling such a group in the nest after having found a food source through eavesdropping uses time and energy the eavesdropper could otherwise spend looking for an unoccupied food source," explains Lichtenberg. "If the eavesdropper brings too small a group to an occupied food source and cannot win access to it, she and the bees accompanying her have essentially wasted energy. For attacks between colonies of the same species, there is also a risk that the conflict will escalate to physical interactions in which large numbers of bees may die."

"Our study is one of the first to investigate what drives the behavior of eavesdroppers collecting information from competitors within the same trophic level, which use the same food resources as the eavesdropper," she adds. "Previous eavesdropping research has mainly focused on individuals seeking mates, predators looking for prey or prey trying to avoid being eaten. In those cases, eavesdroppers' expected behavior is clear. This is not true for eavesdropping on competitors."

Lichtenberg explains that the study findings are not just relevant to the evolution of communication strategies in the animal kingdom, but suggests how such strategies might also affect the ecology of plant communities.

"Such strategies affect not only the individuals directly involved, but also broader ecological interactions between the food-gatherers and their food," Lichtenberg says. "This is particularly important for animals such as the bees I studied, because their movements determine plant pollination."

—

Source: April Flowers for redOrbit.com - Your Universe Online

Topics: Pollinators, Pollination, Plant reproduction, Environment, Forage, Trigona, Animal communication, Ant, Pheromone, Stingless bee, Trigona spinipes, Symbiosis, Hymenoptera, Biology, Bees, food, Elinor Lichtenberg

Related Videos

- Stingless Bees Fighting Over A Food Source
- More Bad News For Bees
- Where Have All The Monarchs Gone?
- What's The New Buzz On Saving Honeybees?
- Pollen On The Menu For Orb-Weaver Spiders
- Mushrooms Create Their Own Wind
- STEREO Solar Conjunction
- OCO-2 To Shed Light On Global Carbon Cycle
- Goddard Goes To Mars
- Waggle Dance Performed by a Sleep-deprived...

Related Images

- Mosses Use Explosive Cannons to Spread Spores (Image 2)
- Hummingbirds and Climate Change (Image 3)
- Gene Expression Changes in Honeybees
- 01 Pollen
- 02 Pollen
- 31formicidae40extra
- 32Megachilidae50
- Monarch butterfly gathering nectar
- Honeybees in hive
- Where is the Carbon Going?
- You Can Manage Only What You Can Measure
- Orbiting Carbon Observatory-2 Satellite at Launch Pad

Related Reference Library