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Singing Bat Detectors

The aerial dogfights between bats and night-flying insects have led to an array of predator-prey interactions. Bats use echolocation to find and attack, while insects evolved ultrasonic hearing to monitor echolocation calls in time for evasive maneuvers.

Gleaning bats, however, are a different story. They snatch their prey off plants, rocks and other surfaces and use quieter echolocation calls that are difficult for insects to hear. And most gleaners rely on prey-generated sounds, such as rustling noises or calling songs, to locate prey. How does that affect the interactions between predator and prey?

That suggests a potentially effective defense against gleaning bats: the insects need to know when to shut up. If insects can hear the approach of a gleaning bat, they might be able to silence themselves in time to prevent the attack.

That was the subject of Hannah ter Hofstede studied this lethal contest in Ontario, Canada, as part of her Ph.D. research at the University of Toronto. (She's who's now at the University of Bristol School of Biological Sciences in the United Kingdom.) The work followed on earlier research by Paul Faure of McMaster University in Canada and Ronald Hoy of Cornell University in the United States. They found that conehead katydids stopped singing in response to pulses of ultrasound.

Male katydids produce a calling song to attract females by rubbing their forewings together. Katydids also have ears that are sensitive to ultrasound – the high-frequency sounds, mostly beyond human hearing – that bats use for echolocation.

Ter Hofstede captured several northern myotis (*Myotis septentrionalis*), which are gleaning bats, and caught conehead katydids in the fields. She released several katydids and one northern myotis into an enclosed flight room, then sat back with a night-vision scope to monitor the results.

The bat perched on a wall near the ceiling, as a katydid sat barely 12 inches (30 centimeters) away. Neither predator nor prey seemed aware of the other. Then the katydid began to sing – a fatal mistake. The bat quickly landed on the katydid and ate it.

Over the next two years, ter Hofstede tested more than 60 northern myotis for their responses to katydidcalling songs – using either live katydids or recorded songs. About a third of the bats hovered in front of or landed on the katydid or the loudspeaker.

The next question was whether the katydids had a defense strategy. Ter Hofstede recorded the "search" and "attack" echolocation calls of northern myotis and played them to katydids that were singing in cages. Sure enough, the katydids consistently stopped singing.

Further experiments suggest that the bats have no counter-tactic to deal with silent katydids. Simply shutting up is an effective katydid defense against these gleaning bats.

BCI members can read the full report on Hannah ter Hofstedeâ€™s research in the Fall issue of BATS magazine.

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