Size Matters: Eavesdropping on Sexual Signals

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Marlene Zuk, a professor of biology at UC Riverside, observes a cricket in the lab. Photo credit: Walter Urie.

(PhysOrg.com) -- In the animal kingdom, sexual signals often are manifested as displays of bright coloration or, in the case of crickets, as loud song.

Adult male crickets produce loud song to attract females, but the song, which permeates the environment, can be overheard also by unintended receivers - such as young males unable to produce song due to a mutation they carry.

Until now researchers have not understood how non-singing male crickets use the song of singing males to modify their behavior or physical attributes to their advantage.

Now biologists at the University of California, Riverside have shed light on this mystery.

In the lab, they exposed one set of juvenile male crickets to a silent environment (which mimicked a population without very many singing males) and a second set of young male crickets to a song-rich environment (mimicking a population that contained lots of singing males).

Comparing the two sets of data, they found that male crickets growing up in the presence of abundant male song tend to be larger than male crickets growing up in a silent environment, and invest nearly 10 percent more reproductive tissue mass in their testes.

The researchers also found that male crickets that do not hear song during rearing are more likely to act as 'satellites,' hanging out near singing males and intercepting females on their way for matings.

"Subtle modifications of behavior depending on the environment, not genes, means that even in insects, animals aren't 'programmed' or 'hard-wired' to do what they do," said Marlene Zuk, a professor of biology, whose lab conducted the research.

Study results appeared May 11 in the journal Current Biology.

"Larger is probably better for the crickets because it allows males to better compete against other males in their environment," said Nathan Bailey, the lead author of the research paper, who worked as a postdoctoral researcher in Zuk's lab. "Being flexible according to who is around can be beneficial and help maximize the chance of reproducing."

The new research suggests that sexual signals may play a hitherto under-appreciated role in determining how an animal looks and behaves once it

grows up.

“Sexual signals do more than just attract mates,” Bailey explained. “They can also influence other animals’ development just by virtue of being perceived. The ability to change oneself according to the prevailing social conditions might be adaptive, especially in an environment that is constantly changing.

“On a more global scale, people often think of insects, especially the non-social insects, as mindless automatons, pre-programmed to carry out simple procedures throughout their lives,” he said. “Our research shows quite the opposite, and demonstrates how even small, inconspicuous animals respond to the vagaries of their social environment by capitalizing on conspicuous signals that are intended for a different receiver.”

The research, all of which was done at UCR, was funded by the National Science Foundation, the UCR Academic Senate and the UCR Graduate Division.

“Our findings have caused us to think more about the implications of social experience in insects,” Bailey said. “For example, how do these changes give the crickets an edge in competitive encounters? And do these findings apply to other species of animals—do they respond in the same way to sexual signals?”

Provided by University of California, Riverside