When singing mice choose a mate, a skillful song gets the gal

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Like rock stars of the rodent world, the flashiest performers of a Central American mouse species get the most attention from the ladies, a University of Florida study shows.

Neotropical singing mice woo their mates with high-pitched vocal trills, and a bravura performance attracts more interest from females, according to a study published online this week in the journal Animal Behaviour by doctoral candidate Bret Pasch and colleagues in the department of biology at the University of Florida.

The males' prowess could give female mice clues to a potential mate's physical quality. This may even extend to humans, where studies have shown that men's dancing may influence women's impressions of their quality as a mate. A 2005 Rutgers University study showed that women could identify men with better body symmetry — an indicator of developmental stability — just by watching their dance moves, even when rendered by motion-capture cameras so the men's body shapes were not visible.

"Elaborate courtship displays require fine coordination of the nervous, neuromuscular and cardiac systems. There is increasing evidence that females evaluate male skills during these displays to determine their overall vigor," Pasch said.

When it comes to singing, it's easy enough to identify characteristics that make a human excel — an exceptional range, or the ability to hold a high

note, for example — but mice have different criteria. "What makes a great performance is how rapidly males can repeat notes while maintaining a large range of frequencies of each note," Pasch said. "Female preference seems to be based on how well males perform songs."

In the study, Pasch and his team demonstrated that, like birds, the Alston's singing mouse, or Scotinomys teguina, has biomechanical limitations to its trills: The faster it trills, the lower the range of frequencies in each note. Conversely, singing with high frequency bandwidths limits the speed with which it can repeat notes.

Pasch uses a textbook analogy: handclapping. The slower you clap, the louder each clap can be because you have time to pull your hands apart to generate power. As one claps faster, there is less time to generate power. Beyond a certain rate, one cannot clap both loudly and quickly.

The similarity to birds surprised Jeffrey Podos, a biologist specializing in vocal behavior at the University of Massachusetts Amherst.

"Mice and birds sing using completely different vocal mechanisms, and so the similarity in song patterns is very much unexpected," he explained. "It will be interesting to try to identify similarities in vocal mechanics between birds and mice that could explain the convergent pattern."

In the second component of the study, Pasch and his team demonstrated that male sex hormones, also called androgens, affect how well mice can sing. By neutering the male mice, then giving synthetic hormones to some of them, the researchers showed that mice without hormones weren't able to perform as well as their counterparts.

The mice who didn't receive hormone replacement had slower trill rates,

and their notes covered a smaller range of frequencies. The researchers suspect that androgens may act on the jaw musculature and diaphragm to influence the rate of mouth movement and force of respiration. The role of androgens in modulating song performance has not been previously studied, Pasch said.

In the third part of the study, Pasch and his team — former UF researchers Andreas S. George and Steven M. Phelps, now at the University of Texas at Austin, and Polly Campbell, now at the University of Arizona — showed that female mice preferred better singers. By taking a normal mouse song and manipulating it electronically to pack in more notes per second, the authors created a song they predicted would appeal to females more than the song at normal speed. They then isolated female mice in a two-way test chamber, where a speaker at one end played the normal song and the other played the enhanced song with the higher trill rate.

"We found that females approached more quickly and spent more time near the speaker playing the faster trill," Pasch said. "This suggests that females have the capacity to distinguish slight variations in male motor performance and use that information to guide their behavior."

Female preference for more difficult songs is notable, Podos said, because it has never before been documented in mammals.

Provided by University of Florida