

Frog sex in the city: Urban tungara frogs are sexier than forest frogs

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A fringe-lipped bat eating a captured frog. Credit: Alex Baugh

By 2050, almost 70 percent of the world's population will live in urban environments, according to the United Nations. But as cities spread, wild animals will also have to adapt. In *Nature Ecology and Evolution*, researchers working at the Smithsonian Tropical Research Institute (STRI) report that male tungara frogs in Panama City put on sexier

mating displays than frogs living in nearby tropical forests.

"Tungara frogs sound a bit like pinball machines," said Wouter Halfwerk, assistant professor at Vrije University in Amsterdam, and visiting scientist at STRI. "To their simple tun sound, they can add extra elements like the sound, gara, to make complex calls: tun gara gara—hence their name.

Some people call tiny tungara frogs the acoustic equivalents of peacocks. They are nothing to look at, but just like male peacocks have fancy tails to attract females, tungara frogs add extra sounds to their calls to lure females in."

But female frogs are not the only ones paying attention to male tungaras' love songs. Predatory bats and parasitic flies use the same frog mating calls to locate a meal. So, the frogs do not add extra garas when they know that predators are present.

In Panama City, tungara frogs live in diverse [urban environments](#): from ditches and puddles in neighborhoods close to tropical [forest](#) to drains among downtown skyscrapers. How do [city](#) frogs compare with forest frogs when they call to attract females?

In their first experiment, Halfwerk's team played recordings of male tungara [frog](#) calls in 22 urban and forest locations and recorded the number of approaching females, predators and parasites using remote, infrared-sensitive cameras.

In the city, fewer females responded per calling male. Perhaps fewer females were available or males had to work harder to attract their attention. Also, the recorded calls did not attract any bats, and only a few flies, suggesting that predators are less of a threat in the city.

To find out if urban males adjust their calls, they recorded up to a hundred calling males at the same sites and discovered that urban males call at higher rates using more complex and conspicuous calls than frogs in the forest. Forty females chose between speakers playing the call of an urban or a forest male. Three out of four females preferred urban male calls.



Tungara frogs sound like pinball machines. They start with the sound TUN, and can add several GARAS to make the sound TUN GARA GARA. Frogs living in the city make more calls, and more complex calls (more GARAS), than frogs living near the tropical forest. Credit: Marcos Guerra, STRI

Finally, they asked how fast frogs adjust their calls. When they took

frogs from the forest to the city and city frogs to the forest, they discovered that urban males in the forest immediately change to simpler calls, matching the forest males, whereas forest males in the city do not immediately make more complex calls. The driving factor of these changes in male calls seems to be more competition for females and fewer predators and parasites in the city.

"Just as we change our [social relationships](#) in cities, animals are changing their relationships and their behavior in the radically altered biological communities we are creating across the globe," said Rachel Page, staff scientist at STRI and co-author.

More information: Wouter Halfwerk et al, Adaptive changes in sexual signalling in response to urbanization, *Nature Ecology & Evolution* (2018). [DOI: 10.1038/s41559-018-0751-8](https://doi.org/10.1038/s41559-018-0751-8)

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