Scientist finds rapidly adapting fanged frogs

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A team led by McMaster biologist Ben Evans has documented the rapid adaptation of new fanged frog species on the island of Sulawesi, Indonesia. Nine of the thirteen types of frogs had not previously been described by science. Credit: Rafe M. Brown.

(PhysOrg.com) -- Scientists led by biologist Ben Evans of McMaster University have documented the rapid adaptation of new fanged frog species on the island of Sulawesi, Indonesia.

The team found 13 species of fanged frog - so named for the bony, tooth-like protrusions in their mouths - on the island, nine of which had not previously been described by science. The frogs all have differing attributes, according to the particular areas they inhabit. Unexpectedly, however, the single island of Sulawesi was found to have the same number of fanged frog species as the entire Philippine archipelago to the north.

"We would expect to find more species on the archipelago because it's so much larger, but that's not the case," said Evans, an associate professor of biology who has been studying the frogs since 2000.

Why such diversity in such a small place? There's less competition on Sulawesi, the researchers say.

Fanged frogs in the Philippines have to compete with another type of frog, Platymantis. Platymantis never made the hop over to Sulawesi, leaving the fanged frogs free to spread out into new habitat niches, to which they eventually adapted, creating new species. The rapid evolution of these frogs - in less than 15 million years - is a striking example of adaptive radiation, a concept Charles Darwin famously recorded in Galapagos finches.

"Darwin found that the finches had evolved changes to the shapes of their beaks, allowing them to access different food sources," said Evans. "With the frogs, we found that they have made a number of adaptations including in body size, amount of webbing in their feet and how they raise their young - all of which matched the demands of their particular ecological niches."

One type of fanged frog has adapted to terrestrial living by laying its eggs on tree leaves, where its young go through the early stages of life completely within a thick, jelly-like egg capsule. Another type has grown to become approximately 10 centimetres in body length (medium-sized fanged frogs are about half that size) to facilitate life in fast-moving water.

"The frogs' adaptations are great examples of 'ecological opportunity', of a species changing its body and life history to better exploit its habitat," said Evans. "Our research on them will help us to better understand the mechanisms of speciation - of how new species arise over time." The

work could also affect conservation efforts on Sulawesi.

"Rather than species diversity being evenly distributed across Sulawesi, we found at least seven 'pockets' of diversity on the island with high concentrations of unique species," said Evans. "The knowledge we gain from work like this will hopefully allow officials to prioritize conservation efforts across the island."

In 2009 the Ontario government gave Evans an Early Researcher Award, meant to help up-and-coming researchers build their teams of undergraduate and graduate students, post-doctoral fellows, research assistants, associates and technicians.

The research appears in the *American Naturalist.*

Provided by McMaster University