

How flick knife thumbs help Japan's rare fighting frogs

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Credit: N. Iwai

Combat-ready spikes which shoot from fingers sounds like the weaponry of a comic book hero, but a Japanese scientist has found exactly this in a rare breed of frog. The discovery, which is published in the *Journal of Zoology*, reveals how the Otton frog uses spikes which protrude from a false thumb for both combat and mating.

The study, conducted by Dr Noriko Iwai from the University of Tokyo, focused on the Otton [frog](#) (*Babina subaspera*), whose habitat is the Amami islands of Southern Japan. Unlike most other [frogs](#) the Otton has an extra digit-like structure, a trait it shares with the five-fingered *Hypsiboas rosenbergi* frogs of [Latin America](#).

"Why these 'fifth fingers' exist in some species remains an evolutionary mystery, but the extra digit of the Otton is in fact a pseudo-thumb," said Dr Iwai. "The digit encases a sharp spine which can project out of the skin, which [fieldwork](#) demonstrates is used for combat and mating."

Dr Iwai has studied the rare frogs since 2004 in order to understand the species' distribution, breeding habits and range; all factors which will contribute to any conservation strategy. Once she began exploring how the Ottos use their pseudo-thumbs Dr Iwai discovered that while both males and females had the spike, it was only used by males.

Males were found to have larger pseudo-thumbs than the females and Dr Iwai believes that the spikes evolved for anchoring to the female, known as amplexus, the Latin for embrace, during mating.

"While the pseudo-thumb may have evolved for mating, it is clear that they're now used for combat," said Dr Iwai. "The males demonstrated a jabbing response with the thumb when they were picked up, and the many scars on the male spines provided evidence of fighting."

The conditions on the Amami islands make combat, and the need for [weaponry](#), a key factor for the frogs' mating success. Individuals fight over places to build nests, while the chances of a male finding a mate each night are rare, thus the ability to fight off competitors may be crucial.

Perhaps unfortunately, the comic book hero image is slightly dented by

the frogs' fighting style. Rather than dueling with thumb spikes the males wrestle each other in an embrace, jabbing at each other with the spines. This fighting style helps confirm the theory that the [spines](#) were original used for embracing mates.

"More research is needed to look at how the pseudo-thumb evolved and how it came to be used for fighting," concluded Dr Iwai. "The thumbs use as a weapon, and the danger of the frogs harming themselves with it, makes the Otton pseudo-thumb an intriguing contribution to the study of hand morphology."

More information: Noriko Iwai, 'Morphology, function, and evolution of the pseud thumb in the Otton frog', *Journal of Zoology*, October, 2012, [DOI: 10.1111/j.1469-7998.2012.00971.x](https://doi.org/10.1111/j.1469-7998.2012.00971.x)

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