



First Record of Kin-Cannibalism in Fornasini's Spiny Reed Frog, *Afrixalus fornasini* (Anura: Hyperolidae), Tadpoles

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Fornasini's Spiny Reed Frog, *Afrixalus fornasini* (Bianconi 1849), a savanna-dwelling species in the family Hyperolidae, is widely distributed from northern Kenya along the eastern African coast south to the cape in South Africa (Schiøtz 1999; Channing and Rödel 2019). Like other *Afrixalus*, commonly known as leaf-folding frogs, *A. fornasini* deposits its eggs approximately 1 m above water. Single rows of eggs are laid into the leaf axillae of grasses or reeds, which in most species, are subsequently folded and glued together to form a protective tube (Wager 1965). Clutch sizes vary from less than ten to about 100 among species; those of *A. fornasini* have been reported to range from 30–80 eggs (Minter et al. 2004; Channing and Rödel 2019).

After observing several mating pairs of *Afrixalus fornasini* while catching hyperolid frogs for a parasite study in KwaZulu-Natal, South Africa, on 20 December 2024, we accidentally collected fresh eggs when picking reeds. The breeding site was a well vegetated water drainage catchment (-30.275138, 30.739346), within the Renishaw Hills Lifestyle Village. We discovered a single folded egg tube, about 6–7 cm in length, on the reed the next day and subsequently placed it in a small plastic container filled with 1 cm of water with the eggs just above the water's surface. When the first tadpoles fell into the water six days later, the tube was submerged to allow the other tadpoles to hatch. The tube contained a total of about 50 eggs, of which only about 40 had developed into tadpoles. Ten showed no signs of life.

The 30 survivors were transferred into an aquarium measuring 40 x 25 x 25 cm, equipped with a sandy substrate, some plants, a small air-lift filter, and a heater. Water, set to 24 °C and a pH of 6.5, was changed (50%) weekly. Tadpoles were fed every second day with either live daphnia and mosquito larvae or specific protein-rich fish food pellets. Despite steady feeding, tadpoles soon exhibited considerable size differences (1.5–3 cm) while at Gosner stage 25. On 28

January 2025, we observed a medium-sized tadpole (~2.5 cm) feeding on the tail tip of a slightly smaller conspecific, which was still moving. During that time, food pellets were available in the tank. Other than the missing tail tip, no injuries or other impairments were evident in the prey. Approximately two hours later, the tail was almost fully missing (Fig. 1) and the victim was no longer moving. By the next morning, neither the dead tadpole nor any remains could be found.

Adult *Afrixalus fornasini* are known to prey on eggs and developing larvae of other species of frogs (*Chiromantis* sp., *Hyperolius* sp.) but also engage in heterocannibalism on eggs of conspecifics (Drewes and Altig 1996). However, cannibalistic behavior in tadpoles, especially of their own kin, has not been recorded. Van Dijk (1972) described *Afrixalus* tadpoles as pelagic and mostly filter-feeding. Nevertheless, two species, namely *A. vibekensis* as well as *A. vittiger* have been observed preying on other tadpoles (Schiøtz 1967; Channing et al. 2012). In contrast to *A. fornasini*, the tadpoles of those two species have a less pointed snout, but all three

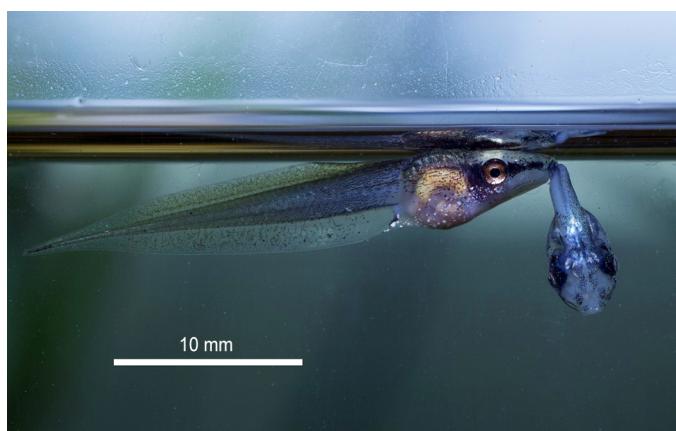


Figure 1. A Fornasini's Spiny Reed Frog (*Afrixalus fornasini*) tadpole preying on a conspecific. Both predator and prey are in Gosner stage 25. Photograph by Frederic Griesbaum.

have well developed keratinized jaws (Channing et al. 2012). All, however, lack strong teeth in the jaw sheaths, which are typical of carnivorous tadpoles (McDiarmid and Altig 1999). Nevertheless, Minter et al. (2004) stated that *A. fornasini* tadpoles are carnivorous and specialized on mosquito larvae.

Tadpole cannibalism is also known from many other anuran taxa, including ranids (Petraska and Thomas 1995), bufonids (Heinen and Abdella 2005), and dendrobatids (Caldwell and de Araújo 1996), and is particularly associated with limited resources (e.g., semi-closed phytotelmata) or ephemerality of breeding habitat (Crump 1983). Some Spadefoot Toads (Scaphiopodidae) can develop specific cannibalistic and non-cannibalistic phenotypes within a clutch (Pomeroy 1981; Pfennig 1990), and Pfennig et al. (1993) suggested that this trait is meant as a signal to conspecifics or even kin to avoid the cannibals. However, the morphogenesis of these phenotypes as well as the cannibalistic behavior itself is reduced in kin-dominated rearing groups and more pronounced in mixed-brood groups (Pfennig and Collins 1993; Pfennig and Frankino 1997). The cannibals might gain significant evolutionary advantages that include enhanced growth rates following a high-quality, easily accessible food source, or reduced competition for limited resources (Crump 1990; Pfennig and Collins 1993). However, cannibalism also results in a population-level fitness reduction due to the loss of genetically similar individuals and hence should not be evolutionarily favored. Hence, what is balancing the trade-off between self-interest and kin selection in the reported case is unclear.

We were thus surprised that this behavior was employed in the present case. Given that the tadpoles were siblings, the water conditions were stable during the entire rearing period, and, in particular, sufficient food was available, the question arises as to what triggered this behavior. We suggest the relatively high density was most likely responsible. Because our observation was made under captive conditions, we cannot determine if *A. fornasini* engages in cannibalism, specifically kin-cannibalism, in nature.

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