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First record of intraspecific kleptoparasitism as a foraging strategy in anurans: Observed in the Matheran leaping-frog (*Indirana leithii*) from Maharashtra, India

CITATION. Amberkar, P. (2023) First record of intraspecific kleptoparasitism as a foraging strategy in anurans: Observed in the Matheran leaping-frog (*Indirana leithii*) from Maharashtra, India. *Hamadryad: 40, 50–53.*

KEYWORDS. Amphibians, intraspecific interactions, Matheran, Ranixalidae, Western Ghats

Kleptoparasitism is a form of resource acquisition in which an individual steals an already procured resource from another individual. Although this strategy has largely been documented in the form of food theft (Clay and Rothschild 1957; Iyengar 2008), ornithologists have expanded the definition of kleptoparasitism to include the theft of other resources such as nest material (VanderWerf 1998) and nesting sites (Kappes 1997). When an individual exhibits this behaviour towards a conspecific, it is termed as intraspecific kleptoparasitism. On the contrary, when an individual exhibits this behaviour towards an individual of another species this is termed as interspecific kleptoparasitism. Individuals who find and capture their own food are crucial to the survival of the kleptoparasite. The kleptoparasites are termed as 'scroungers' who depend on the 'producers' (Nishimura 2010). Kleptoparasitism as a foraging strategy has been observed in many vertebrate taxa, including birds (Brockmann and Barnard 1979), mammals (Gorman et al. 1998; Cusack et al. 2017), fishes (Wallace and Snyder 1988), and reptiles (Platt et al. 2007). Although, kleptoparasitic behaviour for other resources like female mates and perch site has been observed in anurans (Wells 2007; Modak et al. 2018), it has been observed as a foraging strategy only in captivity (Boice and Williams 1971). I present the first observation of intraspecific kleptoparasitism as a foraging strategy in the Matheran leaping-frog, *Indirana leithii* Boulenger, 1888 from Matheran, Raigad district, Maharashtra, India at the species' type locality.

Figure 1. Two individuals of *Indirana leithii* with an earthworm in their mouths

Figure 2. One individual flipping over the other individual

Indirana leithii is a species of terrestrial amphibians endemic to the Northern Western Ghats, in the states of Maharashtra and Gujarat, India (Modak et al. 2014). The type locality, Matheran, is a plateau (800 m asl), in Raigad district, Maharashtra. The vegetation on this plateau is semi-evergreen with high rainfall during the monsoon season and low temperatures relative to its surroundings. The individuals of *I. leithii* breed between June and September, and are abundant around small streams, forest floor, and human settlements in the type locality. Individuals of this species tend to congregate during the breeding season (up to 10 individuals at a site; Modak et al. 2018). Because of this aggregation during the breeding season, individuals tend to be agnostic towards each other. Males of *I. leithii* tend to exhibit kleptoparasitic behaviour towards conspecific males where they try to push out the male already in amplexus (Modak et al. 2018). Furthermore, attempted cannibalism has also been reported between individuals of the species (Kulkarni et al. 2020).

On 13th October 2019 at 23:00 h (IST), I observed intraspecific kleptoparasitism in *I. leithii* in Mathern, Raigad district, Maharashtra, India (19.0025 N, 73.2839 E). I found two adult individuals of *I. leithii* on the ground with either end of an earthworm (*Lumbricus* sp.) in their mouths (Figure 1). Both individuals attempted to pull the earthworm from each other's jaws by tugging from either end and thus causing the other individual to flip over. The flipping and tossing continued for another 5 minutes before one individual finally gave up and let the earthworm go. The victorious individual continued eating the earthworm while the other lay on its back for another 5 minutes, and then continued foraging (Figure 2). The two frogs were found adjacent to a drain with 15–20 individuals of *I. leithii*. The other individuals were actively moving and foraging.

The current observation is, to the best of my knowledge, the first record of kleptoparasitism as a foraging strategy in anurans in the wild. The choice of kleptoparasitism over other foraging strategies depends on various factors including competitive differences among individuals, the spatial distribution of prey and host, the abundance of prey, size of the prey, handling time of the prey, and group size of host (Iyengar 2008). The observed kleptoparasitic behaviour in this species can be an outcome of the high abundance of *I. leithii* at Matheran and the aggregation of individuals at the site (Modak et al. 2018). Since the earthworm was larger in size

compared to the two individuals, there was an increase in the handling time of the prey. This could be the other reason for the scrounger to exhibit this behaviour. To this end, I provide a unique account of the interactions between two individuals in the wild. My observations provide insights into anuran behaviour in an extremely rare social circumstance.

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Declaration. There is no conflict of interest with other studies.

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Observations on arthropod predation of uropeltid snakes (Squamata: Uropeltidae) from the Western Ghats, India

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The family Uropeltidae constitute a group of 65 species of poorly-known, small-sized snakes (usually <60 cm in total length), mostly restricted to the wet forests of peninsular India and Sri Lanka (Pyron et al. 2016; Uetz et al. 2023). Currently, the family has seven genera, all of which occur in India (Cyriac and Kodandaramaiah 2017; Sampaio et al. 2023). All members of the family are fossorial and have small, highly ossified, generally pointed heads and elongated bodies that allow them to burrow into the soil (Cyriac and Kodandaramaiah 2021). Many species also have a highly modified tail that terminates in a bony structure covered by one or more highly keratinised scales (Huntley et al. 2021). Owing to their secretive habits, these snakes are rarely encountered and very little is known about their ecology, behaviour, natural history and predator-prey interactions.

Although these snakes spend most of their time underground, they occasionally emerge to the surface and get predated upon by aboveground predators (Rajendran 1985; Cyriac and Kodandaramaiah 2019). Most observations of predation events on uropeltid snakes indicate that birds, such as jungle fowls, domestic chickens, peafowls, house crows, and thrushes are the main predators of these snakes (Rajendran 1985; Kumara and Chaitra 2001; Chandramouli and Ganesh 2010). Studies have suggested that the short, rounded, highly keratinized shielded tail in many uropeltid snakes mimic the snake's head (cephalic mimicry) and diverts the attacks of avian predators towards the highly protected tail (Gans 1986; Cyriac and Kodandaramaiah 2019). Experiments have also suggested that the conspicuous colourations in many uropeltid snakes function as warning signals advertising their long handling times associated with diverted attacks towards the tail, reducing avian predation rates (Cyriac and Kodandaramaiah 2019). However, little information is available on other non-avian predators of uropeltid snakes, and how these snakes respond to such predation events.

Apart from birds, mammals and snakes are reported to feed on uropeltid snakes. Rajendran (1985) reported that Wild Boars (*Sus cristatus*) and mongooses (*Urva* spp.) may feed on uropeltid snakes. Remains of a *Uropeltis* sp. was also recorded from the scat of an Asiatic Wild Dog (*Cuon alpinus*) (Krishnakumar et al. 2019). Uropeltids have also been found in the diet of a few snakes such as the Ceylon Krait, *Bungarus ceylonicus*, Spectacled Cobra, *Naja Naja*, Striped Coral Snake, *Calliophis nigrescens* and Vine snakes, *Ahaetulla* sp. (Slowinski 1994; Mukherjee and Bhupathy 2004; Lobo 2006; Datanwala and Durso 2020; Kalki and Weiss 2020). Apart from these records, there are no other observations on uropeltid predators. Here, we report multiple instances of predation by two species of ants and one observation of predation by centipede on three species of uropeltid snakes.

Ant predation on uropeltid snakes. On 11th September 2019, DK observed a swarm of Procession Ants (*Leptogenys* sp.) attacking a live