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## NOTE

### A FROG THAT EATS FOAM: PREDATION ON THE NEST OF *POLYPEDATES* SP. (RHACOPHORIDAE) BY *EUPHLYCTIS* SP. (DICROGLOSSIDAE)

Pranoy Kishore Borah, Avrajjal Ghosh, Bikash Sahoo & Aniruddha Datta-Roy

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## A frog that eats foam: predation on the nest of *Polypedates* sp. (Rhacophoridae) by *Euphlyctis* sp. (Dicroglossidae)

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Predation is one of the most widespread foraging behaviour prevalent in the animal kingdom (Curio 1976; Taylor 1984). Amphibians, with respect to predation, generally prefer waiting for prey while being stationary as a method for foraging (i.e., ambush predation) (Duellman & Trueb 1986). It is to be noted here that visual detection is the primary method with which anurans spot prey (Freed 1988).

At least six families of amphibians are known to produce foam nests for egg laying, namely: Hylidae, Hyperoliidae, Leptodactylidae, Microhylidae, Myobatrachidae, and Rhacophoridae (Haddad et al. 1990; Andreone et al. 2005; Haddad & Prado 2005). Various hypothetical functions have been attributed to foam nests of frogs. These include inhibition to the growth of tadpoles (Pisano & Del Rio 1968), resistance to desiccation (Ryan 1985; Downie 1988), improvement towards the supply of respiratory gases (Seymour & Lovebridge 1994), regulation of temperature (Downie 1988), predator defense (Downie 1988, 1990), as a source of food (Tanaka & Nishihira 1987), and also growth acceleration (Prado et al. 2005). Predation on foam nest has previously been reported, where non-anuran species have been seen to predate on these

nests in various conditions (Villa et al. 1982; Lingnau & Di-Bernardo 2006).

In this note we report a predation behaviour on the foam nest of one species of anuran (*Polypedates* sp.) by another species (*Euphlyctis* sp.).

Observations: An individual of *Euphlyctis* sp. was observed feeding on a foam nest of *Polypedates* sp. on 14 March 2020 at 09.42h (Image 1). The observation was made on top of Barunei Hills, in the Khurda District of the state of Odisha in India (20.157°N & 85.643°E, 227m). The weather was clear and sunny with an ambient temperature of 32°C. It was an opportunistic observation made while inspecting amphibians in an ephemeral pool of water inside a small cave on top of a stunted hill. The pit was observed to harbour a community of three species of anurans—*Euphlyctis* sp., *Polypedates* sp. and a *Duttaphrynus* sp. We observed an individual of *Euphlyctis* eating, with gulping motion, from one of the foam nests of the *Polypedates* sp. that was at the side of the water pool on a rock substratum, intermittently. The observation was captured in video and photographs were created using the snapshot from the videos for visual reference. The image and video files were submitted to the Lee Kong Chian Natural

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Image 1. A—Cave on top of the stunted hill top, a habitat shot | B—Inside of the cave | C—The community of amphibian species shown | D—*Eyphlyctis* sp. | E—*Eyphlyctis* in the act of eating the foam nest. © Pranoy Kishore Borah & Avrajjal Ghosh.

**Table 1. Accession numbers of files deposited in Lee Kong Chian Natural History Museum, Zoological Reference Collection, National University of Singapore.**

File type	Accession number
Video files	ZRC(IMG) 1.195a
	ZRC(IMG) 1.195b
	ZRC(IMG) 1.195c
	ZRC(IMG) 1.195d
	ZRC(IMG) 1.195e
	ZRC(IMG) 1.195f
Snapshots from the videos	ZRC(IMG) 1.194a
	ZRC(IMG) 1.194b
	ZRC(IMG) 1.194c
	ZRC(IMG) 1.194d
	ZRC(IMG) 1.194e
Images	ZRC(IMG) 1.196a
	ZRC(IMG) 1.196b
	ZRC(IMG) 1.196c
	ZRC(IMG) 1.196d
	ZRC(IMG) 1.196e
	ZRC(IMG) 1.196f
	ZRC(IMG) 1.196g
	ZRC(IMG) 1.196h
	ZRC(IMG) 1.196i
	ZRC(IMG) 1.196j
	ZRC(IMG) 1.196k

History Museum of the National University of Singapore digital repository for reference. The accession numbers are provided in Table 1 given below. The video files have also been deposited into figshare repository (<https://figshare.com/> with the following DOI: <https://doi.org/10.6084/m9.figshare.12720617>). After recording the aforementioned behaviour, the frog was left undisturbed. Identification of the observed individuals was conducted till genus level as it was in a field setting and no morphometrics and meristic data were collected for comparison. Hence, in that respect, it would be difficult to identify the organisms up to the species level.

Discussion: Scavenging has been reported in some species of anurans (Nishikawa & Ochi 2016; Gazdar et al. 2019). Besides predation and scavenging, oophagy and cannibalistic behaviour have also been reported from some species (Crump 1983, 1992; Rajput et al. 2011; Mahapatra et al. 2017). Predation on anuran foam nest has been reported from arthropods and snakes (Villa et al. 1982; Menin & Giaretta 2003); however, this behaviour has not been reported from anurans till date. Generally, amphibians are considered to be opportunistic in their feeding habits, in contrast, empirical studies have suggested that some species may be selective (Duellman & Trueb 1986). Feeding mechanisms in adult anurans involves a flick of the lingual region where the postero-dorsal surface becomes antero-ventral surface

of the fully extended tongue (Regal & Gans 1976). In this recorded observation, however, we notice a gulping mechanism of feeding on the foam nest without the use of the lingual region.

Anurans are key components in an ecosystem serving both as predator and prey thus linking a variety of trophic levels and maintaining the trophic structure in the ecosystems (Duellman & Trueb 1986). Similar observations and further focus on these behaviours would help us understand the diversity in the range of foraging behaviour in amphibians. This will in turn help us acknowledge ecosystem dynamics in terms of interaction of trophic levels as well as interrelationships among different families of amphibians with respect to predator and prey relationships.

## References

- Andreone, F., M. Vences, D.R. Vieites, F. Glaw & A. Meyer (2005). Recurrent ecological adaptations revealed through a molecular analysis of the secretive cophyline frogs of Madagascar. *Molecular Phylogenetics and Evolution* 34(2): 315–322. <https://doi.org/10.1016/j.ympev.2004.10.013>
- Crump, M.L. (1992). Cannibalism in amphibians, pp. 256–276. In: Elgar, M.A. & B.J. Crespi (eds.). *Cannibalism: Ecology and Evolution among Diverse Taxa*. Oxford University Press, Oxford, 361pp.
- Crump, M.L. (1983). Opportunistic cannibalism by amphibian larvae in temporary aquatic environments. *The American Naturalist* 121(2): 281–289. <https://doi.org/10.1086/284058>
- Curio, E. (1976). *The ethology of predation* (Vol. 7). Springer-Verlag, New York, 260pp.
- Downie, J.R. (1988). Functions of the foam in the foam-nesting leptodactylid *Physalaemus pustulosus*. *Herpetological Journal* 1(7): 302–307.
- Downie, J.R. (1990). Functions of the foam-nesting leptodactylids: anti-predator effects of *Physalaemus pustulosus* foam. *Herpetological Journal* 1(11): 501–503.
- Duellman, W.E. & L. Trueb (1986). *Biology of amphibians*. The John Hopkins University Press, London, 670pp.
- Freed, A.N. (1988). The Use of Visual Cues for Prey Selection by Foraging Treefrogs (*Hyla cinerea*). *Herpetologica* 44(1): 18–24. <https://doi.org/10.2307/3892194>
- Gazdar, R., K. Banerjee & G.T. D'Costa (2019). *Minervarya* sp. (Amphibia: Family Dicroglossidae) Tadpoles Feeding on a Dead Toad. *Journal of the Bombay Natural History Society* 116: 121–122. <https://doi.org/10.17087/jbnhs%2F2019%2Fv116%2F144439>
- Haddad, C.F. & C.P. Prado (2005). Reproductive modes in frogs and their unexpected diversity in the Atlantic Forest of Brazil. *BioScience* 55(3): 207–217. [https://doi.org/10.1641/0006-3568\(2005\)055\[0207:RMIFAT\]2.0.CO;2](https://doi.org/10.1641/0006-3568(2005)055[0207:RMIFAT]2.0.CO;2)
- Haddad, C.B., J.P. Pombal & M. Gordo (1990). Foam nesting in a hyliid frog (Amphibia, Anura). *Journal of Herpetology* 24(2): 225–226.
- Lingnau, R. & M. Di-Bernardo (2006). Predation on foam nests of two leptodactylid frogs by *Solenopsis* sp. (Hymenoptera, Formicidae) and *Liophis miliaris* (Serpentes, Colubridae). *Biociências* (On-line), 14(2).
- Mahapatra, S., S.K. Dutta & G. Sahoo (2017). Opportunistic predatory behaviour in *Duttaphrynus melanostictus* (Schneider, 1799) tadpoles. *Current Science* 112(8): 1755–1759.
- Menin, M. & A.A. Giaretta (2003). Predation on foam nests of leptodactylid frogs (Anura: Leptodactylidae) by larvae of *Beckeriella niger* (Diptera: Ephydriidae). *Journal of Zoology* 261(3): 239–243. <https://doi.org/10.1017/S0952836903004138>



- Nishikawa, K. & S. Ochi (2016). A Case of Scavenging Behavior by the Japanese Rice Frog, *Fejervarya kawamurai* (Amphibia: Anura: Dicroglossidae). *Current Herpetology* 35(2): 132–134. <https://doi.org/10.5358/hsj.35.132>
- Pisano, A. & A.G. Del Rio (1968). New biological properties in the foamy jelly of amphibians. *Archivio Zoologico Italiano* 53: 189–201.
- Prado, C., L.F. Toledo, J. Zina & C.F. Haddad (2005). Trophic eggs in the foam nests of *Leptodactylus labyrinthicus* (Anura, Leptodactylidae): an experimental approach. *The Herpetological Journal* 15(4): 279–284.
- Rajput, A.P., B.A. Shanbhag & S.K. Saidapur (2011). Absence of kin discrimination in cannibalistic Anuran tadpoles of the frog *Hoplobatrachus tigerinus* (Daudin). *Indian Journal of Experimental Biology* 49: 362–365.
- Regal, P.J. & C. Gans (1976). Functional Aspects of the Evolution of Frog Tongues. *Evolution* 30(4): 718–734.
- Ryan, M. J. (1985). *The túngara frog: a study in sexual selection and communication*. University of Chicago Press.
- Seymour, R.S. & J.P. Loveridge (1994). Embryonic and larval respiration in the arboreal foam nests of the African frog *Chiromantis xerampelina*. *Journal of Experimental Biology* 197(1): 31–46.
- Tanaka, S. & M. Nishihira (1987). Foam nest as a potential food source for anuran larvae: A preliminary experiment. *Journal of Ethology* 5(1): 86–88. <https://doi.org/10.1007/BF02347899>
- Taylor, R.J. (1984). *Predation*. Chapman and Hall, New York, 166pp.
- Villa, J., R.W. McDiarmid & J.M. Gallardo (1982). Arthropod predators of leptodactylid frog foam nests. *Brenesia* 19–20: 577–589.



### Erratum

**Marler, T.E. & A.J. Lindstrom (2020).** Leaf nutrients of two *Cycas* L. species contrast among in situ and ex situ locations. *Journal of Threatened Taxa* 12(13): 16831–16839. <https://doi.org/10.11609/jott.6205.12.13.16831-16839>

**Table 2.** Green leaf nitrogen concentration ( $\text{mg}\cdot\text{g}^{-1}$ ) of *Cycas micronesica* and *Cycas nongnoochiae* plants in various locations. Ex situ sites included Chonburi, Thailand (curated by Nong Nooch Tropical Botanical Garden) and Angeles City, Philippines (curated by University of Guam).

Header should read:

Cycas Genotype	Site	In situ	Ex situ	t	p
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## Addendum

### Erratum and addenda to the article 'A history of primatology in India'

– Mewa Singh, Mridula Singh, Honnavalli N. Kumara, Dilip Chetry & Santanu Mahato, Pp. 17060–17062

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