

## Predation on the Indian Bull frog *Hoplobatrachus tigerinus* (Daudin, 1802) (Anura: Dicroglossidae) by the Asian House Shrew *Suncus murinus* (Linnaeus, 1766) (Soricomorpha: Soricidae) from Nepal

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### Abstract

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We present a natural history account of the first record of probable predation on the Indian bull frog, *Hoplobatrachus tigerinus* by the Asian House Shrew, *Suncus murinus* from Morang district, Nepal. The present communication provides an example of a nearly equal-sized predator-prey interaction in a natural ecosystem and provides interesting information on the natural history of these taxa.

**Key words:** Diet, eastern Terai, feeding behavior, natural history, predator-prey interaction

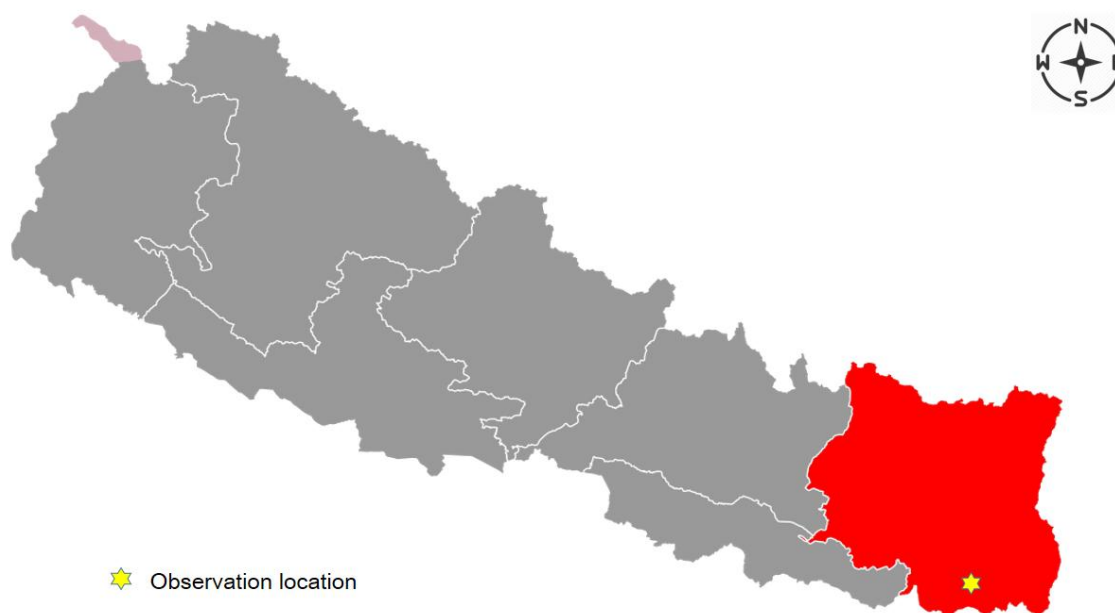
Amphibians play an important role in ecosystems both as predator and prey (Wells, 2007). According to Toledo et al. (2007) 137 anuran species were preyed upon by 136 vertebrate species; the major predators reported were serpents (45%), but mammals constituted more than ten percent. Previous studies have suggested that invasive small mammals, like *Rattus rattus* (Linnaeus) and *Erinaceus europaeus* Linnaeus, are primary predators of indigenous frog populations in New Zealand (Bishop et al., 2013; Egeter et al., 2015). Lodé (1996) documented predatory behavior of the Polecat (*Mustela putorius* Linnaeus) on frogs and toads at their breeding sites in France. However, to date, there is no authenticated predation record on frogs by a shrew species in Nepal. Thus, the present communication is important, in that it describes an opportunistic natural history observation of an Asian house shrew, *Suncus murinus* (Linnaeus) feeding on an Indian bull frog, *Hoplobatrachus tigerinus* (Daudin) for the first time from Nepal.

The Indian bull frog *Hoplobatrachus tigerinus*, is the largest known dicroglossid frog (Snout-tip to cloaca length [SVL] up to 140 mm) of the Terai and Chure regions of Nepal (Bhattarai et al., 2018;

Bhattarai et al., 2020; Gautam and Bhattarai, 2020; Rawat et al., 2020). It is a nocturnal amphibian that lives in holes and among bushes near permanent water bodies (Dutta, 1990; Tripathi, 2018). The Indian bull frog is also an ambush predator mostly feeding on invertebrates, other amphibians, small mammals, birds and snakes (Khan, 1973; Chanda, 2002; Gautam and Bhattarai, 2020).

*Suncus murinus* is a nocturnal, omnivorous, small mammal (head and body length is about 90–160 mm and tail length about 45–110 mm), which dwells and breeds in subterranean holes and is commonly found in Terai or the plain areas of Nepal (Hodgson, 1845; Baral and Shah, 2008; Wilson and Mittermeier, 2018). *Suncus murinus* usually lives near villages, towns, houses and buildings, live-stock farms and warehouses (Wilson and Mittermeier, 2018). It primarily feeds on grains, fruits, insects, other invertebrates and vertebrates such as frogs and snakes (Wilson and Mittermeier, 2018).

On the 24th of July 2020, around 0215 hours, while returning from a herpetological survey in Pathari-Shanishchare, Morang district, Nepal (Fig. 1), the first author heard a distress call of a frog in his home yard.



**Figure 1:** Observed location of *Suncus murinus* feeding on *Hoplobatrachus tigerinus* in Morang, Nepal.

Upon locating the call it was observed that an adult *Suncus murinus* had grabbed an adult *Hoplobatrachus tigerinus* by its right hind limb. The predator had already punctured the thigh and groin region of the prey and the bullfrog was jerking the left leg in an attempt to escape (Fig. 2). The struggling prey failed to escape because the predator had already chewed the right thigh of the prey (Fig. 2A). The camera flash and torch light distracted the predator and it moved almost 1.5 m away from the prey, but once the prey attempted to move, the predator again seized the prey and grasped the snout and held the prey by its limbs (Fig. 2B). After feeding more on the hind limb, the broken femur bone of the frog was clearly visible (Fig. 2C). The frog was exhausted and immobilized. When the author again dimmed the light the shrew pulled the frog by its snout and entered under a pile of firewood (Fig. 2 D, E). The entire predation incident lasted for about five minutes. Next morning, the same observer approached the place but could not see any left-over portion of the prey around the firewood pile.

*Suncus murinus* is the most common shrew species (Baral and Shah, 2008) among the thirteen species of shrews in Nepal (Thapa, 2014). *Suncus murinus* is found from the lowlands at 60 m elevation up to the Mid-Hills (ca. 2850 m a.s.l.) of Nepal.

However, the present observation site is in the lowlands (ca. 150 m a.s.l.) of the Terai region and *Suncus murinus* is the only reported shrew species from this locality (Baral and Shah, 2008). A recent biodiversity assessment in Pathari-Sanishchare Municipality by Gautam (2019) showed that there are 14 species of frogs in this locality.

Although *Suncus murinus* is considered as an omnivore, gut content analysis studies have reported that insects are the primary food items in the diet along with other dietary items such as leaves, seeds, grains, nuts, and fruits (Advani and Rana, 1981; Prakash and Singh, 1999; Lathiya et al., 2008; Khanam et al., 2017; Wilson and Mittermeier, 2018). Laboratory experiments on food choice for this species revealed that it consumed insects, worms, meat (e.g. beef), rodents and small frogs (Balakrishnan, 1977).

In general predation tactics correlate with predator-prey size relationships (Toledo et al. 2007; Wells, 2007) and it has been documented that larger body-sized predators have a greater capacity to select, hunt, kill and ingest prey species (Formanowicz et al., 1981). However, the present findings, from a natural ecosystem (in an anthropogenic habitat) in Nepal are interesting because the predator, *Suncus murinus*, is an insectivore that hunted an almost equal-sized frog (*Hoplobatrachus tigerinus*) as prey.

This fortuitous and opportunistically observed natural history incident from Nepal should warrant further detailed studies on the dietary habits and trophic interactions of *Suncus murinus* and *Hoplobatrachus tigerinus*, because both species co-occur in the region.



**Figure 2:** Observations on *Suncus murinus* feeding on *Hoplobatrachus tigerinus*: the shrew chewing on the frog (A), the shrew grabbing the frog and further chewing (B), when disturbed by the light the shrew left the prey (C), the shrew started dragging the frog towards a hideout under some wood (D and E).

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## Conflict of interest

The authors declare that there are no conflicting issues related to this short communication.

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