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Frugivory by the tadpoles of Terai tree frog *Polypedates teraiensis* (Dubois, 1987) from Nepal

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Abstract

The dietary habits of tadpoles of the Nepalese anurans have not been well studied. Here, we present an opportunistic observation of tadpoles of the Terai tree frog, *Polypedates teraiensis* feeding on rotten pumpkin (*Cucurbita moschata*). We suggest further detailed study on the feeding habits of tadpoles in the changing climate in Nepal as they could be used as model organisms to understand their trophic roles and to predict the ecological consequences of their potential loss.

Key words: Direct observation, food habits, food web, tree frog, amphibians

Anuran tadpoles are important components of aquatic food webs as they serve both as prey and predator and transfer nutrients and energy (Whiles et al., 2006; Capps et al., 2015; Montaña et al., 2019). The feeding habits of anuran tadpoles are generally understudied (Altig et al., 2007). The studies based on stomach gut content analysis have differentiated tadpoles as either microphagous, herbivores, or detritivores (Altig et al., 2007; Whiles and Altig, 2009) indicating different ecological roles of tadpoles in the natural environment (Montaña et al., 2019).

In Nepal, the feeding habits of amphibians have been poorly studied (Khatiwada et al., 2016; Sapkota, 2018). Here, we provide an opportunistic record of tadpoles of *Polypedates teraiensis* (Dubois, 1987) feeding on pumpkin, *Cucurbita moschata* (Duchesne), based on direct observation.

On the 24th of July, 2020, during a regular herpetological survey in Morang district, Nepal, we observed some tadpoles feeding on a pumpkin at Belbari Municipality, Bhaunne (26°39'32.4"N, 87°27'58.7"E). The observation site was a temporary puddle at the northern side of the east-west National Highway. The puddle was a shallow depression that appeared to have been made from mud excavated during road construction.

The puddle was on the edge of a community forest and human settlement. The southern side of the highway is a human settlement and construction site of the proposed Shirjana International Park. We observed that the puddle was a temporary dumping site, that contained organic and inorganic waste (Fig. 1).

We observed a school of tadpoles amassed on a rotten pumpkin (*Cucurbita moschata*) along the edge of the puddle. On closer inspection, we observed the tadpoles feeding on it. We collected two tadpole specimens from the school to confirm the species. We followed Altig and McDiarmid (1999) for morphometric measurement (in mm); oral apparatus and labial tooth row formula was followed based on Altig (1970).

The characters measured are: total length (TTL)- measured from tip of the snout to the tail tip; tail length (TaL); body length (BL)- from tip of snout to the point where the axis of the tail myotomes meets the body wall; internarial distance (IND)- (center to center); interorbital distance (IOD); tail muscle height at body-tail junction (TMH); tail muscle width (TMW); eye diameter (ED); distance of naris (center) from snout (SN); oral disk width (ODW); maximum body width (BW). For species identification, we followed the keys of Chakravarty et al. (2011).

Figure 1: Breeding habitat of *Polypedates teraiensis* at Bhaunne, Morang District, Nepal where tadpoles were observed feeding on a pumpkin.

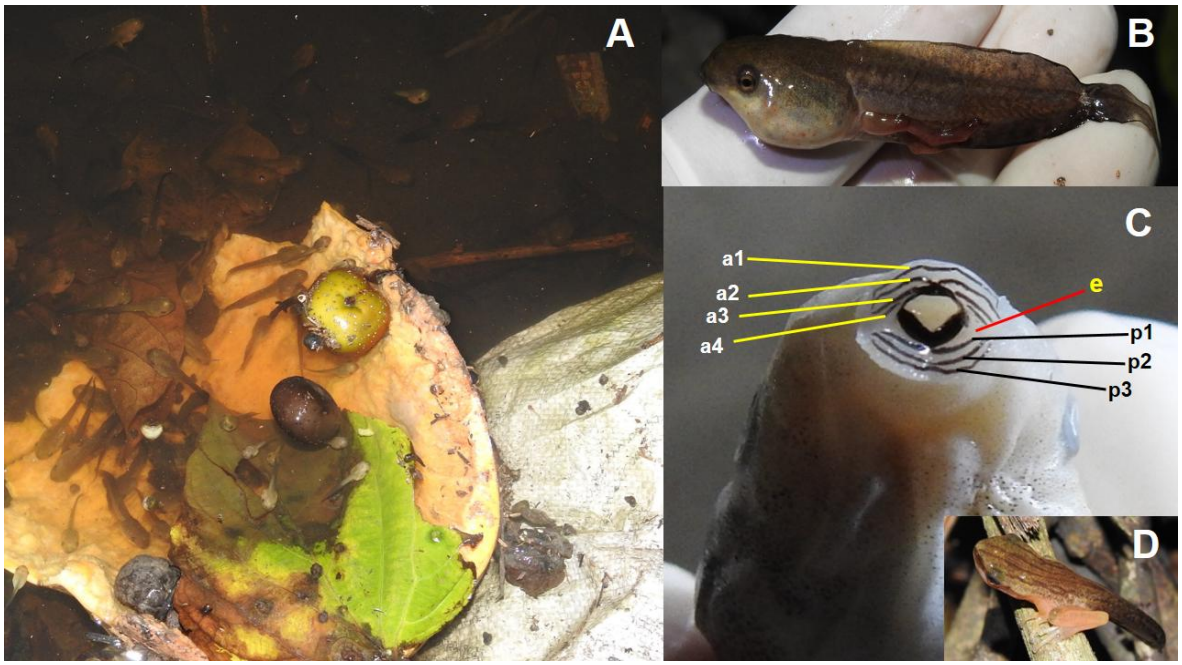

Figure 2: Observation on *Polypedates teraiensis*: tadpoles feeding on a pumpkin (A); sample tadpole (B); oral apparatus of tadpole; a1- a4; anterior tooth rows; e- emargination of oral disc; p1-p3; posterior tooth rows (C); and froglet of *Polypedates teraiensis* (D).

We confirmed that the schools of tadpoles were Terai tree frogs *Polypedates teraiensis* (Dubois, 1987) feeding on the pumpkin at the temporary dumping site (Fig. 2). The characters of the collected specimens corresponded to those in Chakravarty et al. (2011) with the upper and lower jaw sheaths developed but serrations of the jaw sheaths not distinct; and the dorsal side highly pigmented, lighter on the ventral side and end of the tail. The morphometry of the collected specimens is presented in Table 1.

Table1: Morphometric measurements of tadpoles of *Polypedates teraiensis* (in millimeter) observed feeding on a pumpkin from Bhaunne, Belbari Municipality, Morang district, Nepal.

Characteristic	Specimen I	Specimen II
TTL	54	50
TaL	36	34
BL	18	16
TMH	5	5.3
TMW	3.7	4
ODW	3.5	3.4
IND	2.8	3
IOD	7	8
ED	3	2.5
SN	2.2	2.1
BW	10.5	10

Based on oral structure patterns; we identified that the tadpoles had already completed developmental stages up to stage 25. Our observation corresponds to the findings of Lalramdinfeli (2017) who reported in a gut content analysis of *Polypedates teraiensis* tadpoles, that they start feeding from stage 25 onwards, remain herbivorous up to stage 46 and after that start feeding on a carnivorous diet. The study concluded that the major diet composition (ca. 50%) of these tadpoles constituted plant species of the Chlorophyceae (Lalramdinfeli, 2017). Our observation of tadpoles feeding on a pumpkin is additional diet information on *P. teraiensis* tadpoles. This is the first reported natural history observation on this species from Nepal.

Polypedates teraiensis breeds during the monsoon from April to August in temporary pools and puddles (Tamuly and Dey, 2014). Tree frogs are known as diet specialists (Araujo-Vieira et al., 2018), however, the dietary habits of tadpoles are also determined by temperature regimes (Carreira et al., 2016; Carreira, 2017). Therefore, we advocate for future studies on the ecology and behavior of anuran tadpoles in the changing climate of Nepal.

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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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