

## REPORT ON POORLY KNOWN *Theloderma moloch* (ANNANDALE, 1912) FROM ARUNACHAL PRADESH, NORTHEAST INDIA

Jayanta Kr. Roy,<sup>1,2</sup> Ramie H. Begum,<sup>1</sup> and M. Firoz Ahmed<sup>2</sup>

Submitted November 25, 2016

This report on *Theloderma moloch* from Lower Dibang Valley is a new distribution record of this species from the region. This report also describes microhabitats and environmental features (temperature and relative humidity) and conservation status of *T. moloch* in the area. This record of *T. moloch* is significant as this is a poorly known species and its known habitats are being lost due to deforestation and proposed development projects in the river valleys that would inundate habitats of this species available in the altitudinal range in the tropical habitats.

**Keywords:** *Theloderma moloch*; distribution; new locality record; Northeast India; microhabitat

*Theloderma moloch* (Fig. 1) is an arboreal species of frog (Rhacophoridae) endemic to the Eastern Himalayas (Frost, 1985; Chanda, 1994). The species is listed as Vulnerable (Dutta et al., 2004) with only few reports from Northeast India. Earlier, *T. moloch* has been reported from Eaglenest Wildlife Sanctuary (Athreya, 2006), Abor Hills (Borah and Bordoloi, 2003) with no specific location or information on vouchers, and from Mouling National Park of Arunachal Pradesh based on secondary information (Pawar and Birand, 2001). It was recently reported from Medog, Southeast Tibet (Li et al., 2016) followed by a mention from Namdapha, Arunachal Pradesh, without mentioning any locality (Biju et al., 2016). While this finding and observation on *T. moloch* from Lower Dibang Valley of Arunachal Pradesh is a new distribution record and microhabitat details since it was rediscovered by Li and his team (2016) followed by Annandale (1912). Further, this record of *T. moloch* is very close to the Type locality, Upper Renging in Arunachal Pradesh (Annandale, 1912). This record has further helped in understanding microhabitats and distribution of this poorly known species.

*T. moloch* is grayish brown in color characterized by prominent ridge more or less serrated on dorsal side of

the body (Annandale, 1912; Chanda, 1994). Skin on dorsum bears very prominent ridge-like, more or less serrated warts, which run across shoulder. Upper part of flanks with smaller triangular warts; lower part of flanks (beneath line of insertion of arm to groin) slightly granular. Dorsal part of forelimb, thigh, tibia and tarsus with shorter warts. Throat, breast, underside of arms and thigh smooth, belly and sides coarsely granular. Ventrally almost black. Few small warts around vent. The head is triangular and depressed; tympanum round and distinct. Fingers free with large discs on their tips; tip of fingers truncated. Toes small, three-fourth webbed and the tips with distinct discs (Annandale, 1912; Chanda, 1994).



**Fig. 1.** Dorsolateral view of *Theloderma moloch* (Vulnerable, IUCN Red list 2015), reported from Lower Dibang Valley of Arunachal Pradesh, India.

<sup>1</sup> Department of Life Science and Bioinformatics, Assam University, Diphu Campus, Karbi Anglong, 782460, Assam, India; e-mail: roy.jayantakumar47@gmail.com, ani.ara73@gmail.com; www.assamuniversity.nic.in

<sup>2</sup> Herpetofauna Research and Conservation Division, Aaranyak, 13 Tayab Ali Byelane, Bishnu Rabha Path, Beltola Tinali, Beltola, Guwahati, 781028, Assam, India; e-mail: firoz@aaranyak.org; www.aaranyak.org

We observed that *T. moloch* is associated with primary forest and thick canopy. It has been observed breeding inside trees crevices, both dead and alive trees, having accumulated rainwater water. However, there is little information regarding ecology and reproductive biology of this species. Dutta et al. (2004) suggested that this species breeds in pools surrounded by shrubs. However, our observations did not support that this frogs breeds in open pools surrounded by shrubs. Rather, our observations leads to believe that this species is a specialized breeder that uses tree crevices with accumulated rainwater. Our observations also seconds the observations made by collector of the types of this species, as described by Annandale (1912, p. 19). Both adults and tadpoles were associated with dead trees and “tree holes.” While the adults were uncovered under the log, the tadpoles were discovered while the dead tree was disturbed and water along with tadpoles came out of a tree hole.

We also observed this species calling at two locations (Elopa: 28°16'42.81" N 95°44'16.49" E, and Chisindo: 28°14'13.45" N 95°46'1.97" E) at altitudes 780 and

910 m, respectively. The microhabitat observed at both the sites was similar. The observed male individual was continuously calling from a tree crevice filled with rain water. The tree was uprooted and fallen nearly horizontal to the ground although leaning on other tree (Fig. 2: at Elopa). We observed three individuals at Elopa that include two males and one unknown sex and one male at Chisindo in May and July (2013), respectively.

Both the sites were characterized by tall and thick canopy cover (87.4 – 92.3%) with low understory vegetation. The ambient temperature and relative humidity recorded from Elopa and Chisindo sites were 19.2°C and 76% and 20.9°C; 78%, respectively. These records, even though few, adds to our limited ecological knowledge about breeding habitat and specific microhabitats of *T. moloch*. Degradation of primary forest due to logging and developmental projects (such as proposed hydroelectric project in the area) that would submerge similar habitats is likely to contribute to further loss of population of this species in the area. It is important to study the breeding habits and understand its distribution pattern of this



**Fig. 2.** The tree crevice where we found *T. moloch* male calling at Chisindo Lower Dibang Valley of Arunachal Pradesh, India: A, uprooted tree fallen almost horizontal on the ground in slope; B, the tree crevice where we found the calling male).

species in the region that would assist conservation planning and recovery of this species in future.

**Acknowledgments.** The authors are thankful to the Rufford Small Grant Foundation and the Turtle Conservation Fund for financial support. We also thank Gapo, Rigon and Jibi Pulu for their assistance and local guidance in the field. The Authors are grateful to their respective institutions for support.

## REFERENCES

- Annandale N.** (1912), "Zoological results of the Abor expedition, 1911 – 1912. I. Amphibia," *Rec. Indian Mus.*, **8**, 7 – 36.
- Athreya R.** (2006), *Eaglenest Biodiversity Project (2003 – 2006): Conservation Resources for Eaglenest Wildlife Sanctuary*, Kaati Trust, Pune, web-version.
- Biju S. D., Senevirathne G., Garg S., Mahony S., Kamei R. G., Thomas A., Shouche Y., Raxworthy C. J., Meegaskumbura M., and van Boclaer I.** (2016), "*Franckixalus*, a new Rhacophorid genus of tree hole breeding frogs with oophagous tadpoles," *PLoS ONE*, **11**(1), e0145727; doi: 10.1371/journal.pone.0145727.
- Borah M. M. and Bordoloi S.** (2003), "Altitudinal distribution pattern of Amphibian fauna of Arunachal Pradesh with special reference to Dehang Debang Biosphere Reserve, Arunachal Pradesh, India," *Himalayan Biosphere Reserve Bull.*, **5**(1 – 2), 51 – 55.
- Chanda S. K.** (1994), "Anuran (Amphibia) fauna of northeast India," *Mem. Zool. Survey India*, **18**, 1 – 143.
- Dutta S., Bordoloi S. and Borah M. M.** (2004), "*Theloderma moloch*," The IUCN Red List of Threatened Species 2004: e.T58805A11841755. URL; doi: 10.2305/IUCN.UK.2004.RLTS.T58805A11841755.en.
- Frost D. R.** (1985), *Amphibian Species of the World: a Taxonomic and Geographic Reference*, Association of Systematic Collections, Lawrence, KS.
- Li C., Hou M., Yu G., Yan F., Li B., Jiang K., Li P., and Orlov N. L.** (2016), "Rediscovery of *Theloderma moloch* (Amphibia: Anura: Rhacophoridae) from Southeast Tibet, China after 102 years," *Russ. J. Herpetol.*, **23**(1), 41 – 54.
- Pawar S. and Birand A.** (2001), *A Survey of Amphibians, Reptiles, and Birds in Northeast India*, CERC Technical Report, Mysore, Vol. 6, pp. 1 – 118.