

## OCCURRENCE OF GREEN CASCADE FROG *ODORRANA LIVIDA* (BLYTH, 1856) (ANURA: RANIDAE) IN ARUNACHAL PRADESH, NORTH EAST INDIA

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### Abstract

Until 2016, only two species of *Odorrana* have been reported from Arunachal Pradesh. In 2017, a new species of *Odorrana* was discovered from the State, named *O. arunachalensis*. In this current paper, we are reporting on the occurrence of a fourth species of *Odorrana*, *O. livida* from the state occurring in Lower Subansiri and East Kameng districts. Incidentally, the one of the locations of the occurrence of *O. livida* is the type locality of *O. arunachalensis*. A taxonomic key for the species of genus *Odorrana* occurring in India is also provided.

**Keywords:** *Odorrana arunachalensis*; Taxonomic keys; Amphibian distribution

### INTRODUCTION

Nestled between the Himalayan and the Indo-Burma (Anonymous, 2017) biodiversity hotspot, the North East India comprises to 7 states of which Arunachal Pradesh is one of the states. In fact, roughly, the entire state of Arunachal Pradesh encompasses the Eastern Himalaya. No wonder that the State is home to myriad biodiversity, which has been documented and yet still, yielding species new to science, especially when it comes to the amphibians (Sarkar and Ray, 2006; Mathew and Sen, 2009; Mahony et al., 2013; Saikia et al., 2017).

The genus *Odorrana* includes torrential stream dwelling frogs, and is represented by 58 species (Frost, 2017) globally. Very recently, a new species of *Odorrana*, *O. arunachalensis* was described from the State (Saikia et al., 2017), thereby, taking the total species count of this genus to 59. In India, now, 5 species of *Odorrana* are found (*O. andersonii*, *O. arunachalensis*, *O. chloronota*, *O. livida* and *O. mawphlangensis*). Of these 5 species, *O. arunachalensis* and *O. mawphlangensis* are endemic to India.

While *O. andersonii* and *O. mawphlangensis* were previously reported from Arunachal Pradesh (Sarkar and Ray, 2006) and *O. arunachalensis* recently described from the State, we are reporting a new state record of *O. livida* based upon the morphological studies on 2 specimens collected from Tale Wildlife Sanctuary in Lower Subansiri and Kra Dadi districts of the State.

### METHODOLOGY

As part of extensive field surveys for the ongoing study on the amphibian diversity of Arunachal Pradesh, the first and third authors of the present paper made various collections of representative samples of frog. In one of the surveys, the third author made collection of a single male specimen of *Odorrana* (Fig. 1), which was later identified as *O. livida*. The collection was made on 18<sup>th</sup> September 2016 from Parsen River, Raspathar, outskirts of Tale Wildlife Sanctuary in Lower Subansiri District of the State (Lat.: 27 42.141, Long.: 94 09.965, Alt.: 649 m asl). However, another specimen of this species come across when the authors

were allowed to study the fresh amphibian collections available at the lab of the Zoology Department, Dera Natung Government College (DNGC), Itanagar. The second specimen (fig. 4) was collected on 25<sup>th</sup> August 2017 from Seppa, East Kameng district of the State (Lat.: 27 36. 025, Long.: 93 04. 827, Alt.: 664 m asl).

Both the specimens were preserved in 8% formaldehyde solution and deposited in the museums of Arunachal Pradesh Regional Centre, Zoological Survey of India, Itanagar and the Department of Zoology, DNGC, Itanagar, respectively. The identification was based upon morphological examination and the classification was followed after Frost (2017).

## RESULTS

### Diagnosis

A green cascade frog, body dorso-ventrally compressed. Head slightly broader, snout bluntly rounded. Upper lip white. Tympanum large and distinct. Dorsum uniformly green in colour. Skin smooth with pustules towards the cloaca; flanks mottled in white (Fig. 4). Dorso-lateral folds absent. Relative finger lengths: II<I<IV<III. Toes fully webbed. Finger and toe tips swollen. Inner meta-tarsal tubercle present. Tibio-tarsal articulation crosses snout when the hind leg is brought along the body. Ventrums with a few dark spots in the upper portion, rest whitish (Fig. 3).

### Taxonomic key for *Odorrana* of India

A taxonomic key is provided to identify all the 5 *Odorrana* species occurring in India.

1. Dorso-ventrally compressed (green cascade frog), head broader with a distinct inter-orbital band . . . . . *O. arunachalensis*  
Dorso-ventrally compressed frog, head broader without an inter-orbital band . . . 2

2. Dorsum completely green . . . . . 3  
Dorsum partly green, brownish towards the vent region . . . . . 4
3. Dorsum uniformed green (dusky plumbeous in preserved condition), pustules towards the cloaca; flanks mottled white . . . . . *O. livida*  
Dorsum smooth and green (brown in preserved condition) with darker sides; flanks granular. . . . . *O. chloronota*
4. Tibiotarsal articulation reaches snout; outer meta-tarsal tubercle present; no dorso-lateral fold; dorsum dark brownish in preserved condition . . . . . *O. andersonii*  
Tibiotarsal articulation reaches beyond snout; outer meta-tarsal tubercle absent, incomplete dorso-lateral folds; dorsum bluish black in preserved condition . . . . .  
. . . . . *O. mawphlangensis*

## DISCUSSION

The taxonomic history of *O. livida* is interesting. Prior to 2003, *O. chloronota* was regarded as a junior synonym of *O. livida*, due to their overlapping morphological similarities. While *O. livida* was described from Myanmar in 1856, *O. chloronota* was described from India (Darjeeling) in 1876 (Frost, 2017). Bain et al., (2003) removed *O. chloronota* from the synonymy of *O. livida* and provided the differentiating morphological characters, besides erecting many new taxa under the genus. Although Bain et al., (2003) remarked that the distribution localities of *O. livida* is obscure and needs further studies, they nevertheless, restricted its distribution to its neotype locality in Dawna Mountains in Myanmar. Mathew and Sen (2010) remarked that the Indian population of green dorsum

*Odorrana* can be separated into both *O. livida* and *O. chloronota* based upon the differentiating characters as per Bain et. al. (2003) and provided its range of occurrence in Assam, Manipur, Meghalaya, Mizoram, Nagaland and West Bengal in the Country.

With this current paper, the range of occurrence of *O. chloronota* is extended into Arunachal Pradesh.

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#### REFERENCES

- Anonymous, 2017.** The Biodiversity Hotspots. Available: <http://www.cepf.net/resources/hotspots/pages/default.aspx>, (Accessed on 29.05.2017)
- Bain, R.H., Lathrop, A., Murphy, R.W., Orlov, N.L., Ho, C.T., 2003.** Cryptic species of a cascade frog from Southeast Asia: taxonomic revisions and descriptions of six new species. American Museum Novitates. 3417, 1-60.
- Frost, D.R., 2017.** Amphibian species of the world: An online reference, Version 6.0, American Museum of Natural History, New York, USA. Available: <http://reserch.amnh.org/herpetology/amphibia/index.html>, (Accessed on 09.12.2017)
- Mahony, S., Teeling, E.C., Biju, S.D., 2013.** Three new species of horned frogs, *Megophrys* (Amphibia: Megophryidae) from Northeast India, with a resolution to the identity of *Megophrys boettgeri* populations reported from the region. Zootaxa. 3722(2), 143-169.
- Mathew, R., Sen, N., 2009.** Studies on the little known amphibian species of North East India. Records of the Zoological Survey of India, Occasional Paper No. 293, 53-56.
- Mathew, R., Sen, N., 2010.** Pictorial Guide to the Amphibians of North East India. Zoological Survey of India, Kolkata, pp. 1-144.
- Saikia, B., Sinha, B., Kharkongor, I.J., 2017.** *Odorrana arunachalensis*- A new species of green cascade frog from Talley Valley Wildlife Sanctuary, Arunachal Pradesh, India. Journal of Bioresources, 4(2), Accepted.
- Sarkar, A.K., Ray, S., 2006.** Amphibia. In Alfred, J.R.B., (Eds.) Fauna of Arunachal Pradesh, State Fauna Series. Zoological Survey of India, Kolkata. 13(1), 285-316.

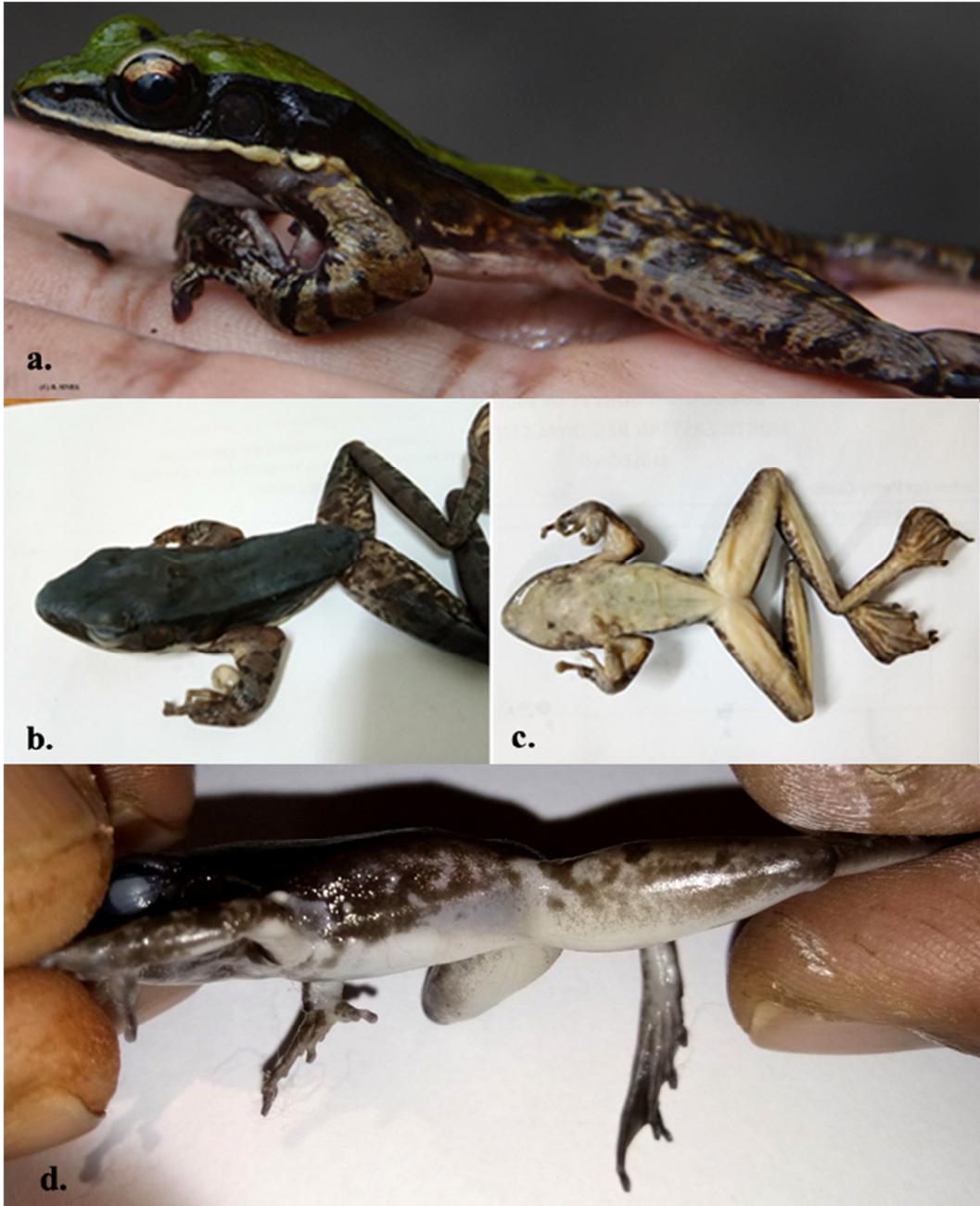


Figure 1: *Odorrana livida* (a. in live condition, b. dorsal view, c. ventral view, d. lateral view)