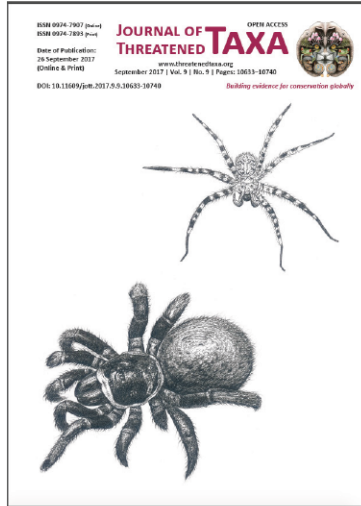


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SHORT COMMUNICATION

A SECOND RECORD OF THE EASTERN SPADEFOOT TOAD (AMPHIBIA: ANURA: MEGOPHRYIDAE: *LEPTOBRACHIUM BOMPU* SONDHI & OHLER, 2011) WITH A NOTE ON ITS MORPHOLOGICAL VARIATIONS AND NATURAL HISTORY

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A SECOND RECORD OF THE EASTERN SPADEFOOT TOAD (AMPHIBIA: ANURA: MEGOPHRYIDAE: *LEPTOBRACHIUM BOMPU* SONDHI & OHLER, 2011) WITH A NOTE ON ITS MORPHOLOGICAL VARIATIONS AND NATURAL HISTORY

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Abstract: A single male specimen of *Leptobrachium bompu* was collected from Talle Valley Wildlife Sanctuary, Lower Subansiri District, Arunachal Pradesh in 2015. This is the first report of this species after its original description in 2011 based on a male specimen. The present collection locality is about 200km from the type locality. Additional notes on morphological variations have added to the much-needed study on the intra-specific variation of the species.

Keywords: Arunachal Pradesh, eastern Himalaya, intra-specific variation, *Leptobrachium bompu*, Talle Valley Wildlife Sanctuary.

The megophryid genus *Leptobrachium* Tschudi (1838) was established with *hasselti* as the type species. This genus is represented by three species in India - *L. smithi*, *L. rakhinensis* and *L. bompu* (Frost, 2016). Earlier, *L. hasselti* was reported by Pillai & Chanda (1979) as being distributed in Meghalaya, India, with a subsequent report from Meghalaya by Chanda (1994). Matsui et al. (1999) described *L. smithi* after analyzing the red/scarlet eyed *Leptobrachium* from Thailand, which were previously confused with *L. pullum* or *L. hasselti*. Two years after the description of *L. smithi*, Sengupta et al. (2001) had put the previously reported *L. hasselti* in India [Pillai

& Chanda (1979) and Chanda (1994)] under *L. smithi*. Wogan (2012) contradicted Sengupta et al. (2001) and put the previously reported *L. hasselti* [Pillai & Chanda (1979) and Chanda (1994)] as *L. rakhinensis*. Dutta et al. (2013) has refuted the claim of Wogan (2012) after comparing the morphological characters of the population of *L. smithi* collected from northeastern India. Mathew & Sen (2009) reported that the specimen of *L. smithi* deposited at Zoological Survey of India, Shillong by Sengupta agrees with the description given by Pillai & Chanda (1979) for the *Leptobrachium* specimens reported.

Supporting Sengupta et al. (2001), Das & Chanda (2004) kept the range extension of *L. smithi* to Thailand, Myanmar and India (northeastern India). The postulation made by Wogan (2012) that the previously reported *L. hasselti* from India as *L. rakhinensis* on the basis of the Rakhine Hills of Myanmar being continuous with the Chittagong Hills of Bangladesh and the adjacent hills of northeastern India, is flawed. Until specific reports confirming that *L. rakhinensis* is available in India and Bangladesh, we restrict the range of this species to

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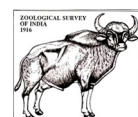
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Myanmar. We, therefore, allot all the red/scarlet eyed *Leptobrachium* in India under *L. smithi*, while *L. hasselti* no longer belongs to the faunal list of India.

The only other species under *Leptobrachium* in India without any confusion regarding its distribution and identification is *L. bompu*, which was described in 2011 by Sondhi and Ohler from a single, male specimen collected from Bompou, Eaglenest Wildlife Sanctuary, West Kameng District, Arunachal Pradesh. Many years have passed but there has been no other record of this frog till the second author of this paper collected the specimen dealt with in the present communication. This specimen (one male) identified as *L. bompu* was collected on the night of the 12 April 2015, from the vicinity of Pange Forest IB, Talle Valley Wildlife Sanctuary, Lower Subansiri District of Arunachal Pradesh. An aerial distance of about 200km separates this location from the type locality of the species.

Since this is the second record of this species after it was first described in 2011, we wanted to study and compare our specimen with the holotype so as to ascertain the intra-specific variation, if any. As per the original description, the holotype was deposited at the State Forest Research Institute (SFRI), Itanagar, Arunachal Pradesh. A photograph of the holotype was taken; however, for comparing, the original description of *L. bompu* by Sondhi & Ohler (2011) was used as the condition of the holotype currently was not found suitable for the same; it being dry and shriveled, probably due to poor maintenance of the type at the depository.

METHODS

The specimen was preserved in spirit after taking photographs in live condition. All measurements were done with a Mitutoyo™ digital caliper, under a binocular microscope. All the measurements used by Sondhi & Ohler (2011) have been taken for comparison. The abbreviations and the list of measurements used are provided in Table 1. The dissection of the specimen was carried out to ascertain its sex, which was found to be a male.

Material examined

One adult, male (V/A/NERC/ZSI/1257) collected by Bikramjit Sinha from the vicinity of Pange Forest IB, Talle Valley Wildlife Sanctuary, Lower Subansiri District, Arunachal Pradesh on the night of 12.iv.2015 (27.54686580582588 N & 93.8950449293335 E, altitude 1,926m); deposited at North Eastern Regional Centre, Zoological Survey of India, Shillong (Fig. 1; Image 1).

Diagnosis

A medium sized frog; body tapering towards the groin; head wider than long, flat; canthus rostralis distinct; snout rounded, minutely projecting over the lower jaw; nostril closer to eye; interorbital space flat; tympanum indistinct; distinct supra tympanic fold from posterior eye corner to limb joint; vomerine ridge absent; tongue large; pupil vertical, oval, black in colour; iris grayish-blue in colour; pineal ocellus absent; axillary gland posterior to the junction of arm joint. Forelimbs slender;

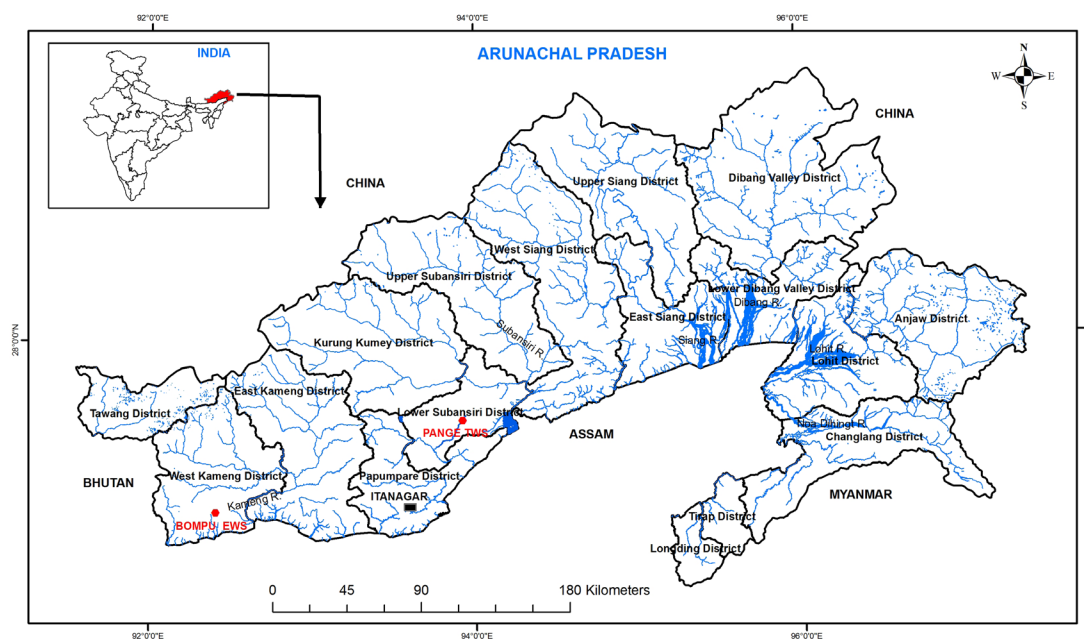


Figure 1. Map of Arunachal Pradesh showing type locality and the new locality of *L. bompu*

Table 1. Measurements of the specimen of *Leptobrachium bompui*.

Variables (in mm)	Our specimen	Holotype	Variables (in mm)	Our specimen	Holotype
EL	6.42	6.5	IUE	5.8	5.4
EN	2.97	4.8	MBE	4.17	5.0
FFTF	8.73	9.6	MFE	10.0	11.0
FL	18.55	24.4	MN	13.1	13.5
FLL	12.32	12.2	MTFF	7.1	1.8
FOL	17.45	19.8	MTTF	6.75	4.3
FTL	8.2	8.7	NS	3.75	5.5
Fw3	0.87	1.2	SL	7.48	7.6
HAL	10.75	12.8	SVL	42.6	47.0
HL	15.62	16.9	TFL	7.57	6.4
HW	18.15	18.8	TFOL	24.94	27.3
IBE	15.4	14.0	TFTF	9.1	10.4
IFE	8.1	6.3	TL	17.86	20.9
IMT	2.25	3.0	TW	4.36	5.7
IN	4.39	4.7	Tw4	0.93	1.3
ITL	2.31	3.4	UEW	3.92	3.9

Abbreviations: SVL: snout vent length; EL: eye length; EN: anterior eye corner to nostril distance; HL: head length; HW: head width; IBE: distance between posterior eye corners; IFE: distance between anterior eye corners; IN: internarial distance; IUE: maximum distance between upper eyelids; MBE: posterior mandible corner to posterior eye corner distance; MFE: distance from posterior mandible corner to anterior eye corner; MN: distance from posterior corner of mandible to nostril; NS: snout tip-nostril distance; SL: Snout Length; UEW: maximum width of the upper eyelid; FLL: forelimb length between elbow to base of outer palmer tubercle; HAL: hand length from base of outer palmer tubercle to the tip of the third finger; TFL: length of third finger (distal part of articulation between proximal phalanges and metacarpal bone of the third finger); Fw3: width of third finger at mid length; FFTF: distance from maximum incurvation of web between fourth and fifth toe to tip of fourth toe; FL: femur length from vent to knee; FOL: Foot length from base of inner metatarsal tubercle to the tip of the fourth toe; FTL: fourth toe length (between distal part to the articulation between proximal phalange and metatarsal bone of the fourth toe); IMT: length of inner metatarsal tubercle; ITL: length of the inner toe; MTFF: distance between distal edge of metatarsal tubercle to maximum incurvation of the web between fourth and fifth toe; TFOL: length of tarsus and foot from the base of tarsus to the tip of fourth toe; TFTF: distance between maximum incurvation of web between third and fourth toe to tip of fourth toe; TL: length of tibia; TW: maximum width of tibia; Tw4: width of the fourth toe, at mid length.

two unequal, rounded palmer tubercles, inner slightly bigger than the outer; relative length of finger II<I<IV<III; without web; finger tips rounded, without grooves. Hind limbs short, heels do not meet when the hind limbs are folded at right angle to the body; tibiotarsal articulation reaching tympanic region; tibia length (17.86mm) more than 40% of snout vent length (42.6mm); femoral glands elongated, nearer to knee; webbing not complete; tips of toes rounded, without grooves; inner metatarsal tubercle elongated, almost equal to the inner toe; outer metatarsal tubercle absent. Dorsum with black blotches, and covered with ridges forming reticulated pattern giving it a wrinkled appearance (Image 1); ventrum is granular with small warts (Image 2).

Natural History

The present specimen was collected from Pange on the western side of the Talle Valley Wildlife Sanctuary during the dusk hours (18:00–20:00 hr) April 12, 2015. It was raining the whole day and the weather was moist and humid. The frog was not conspicuous, in fact it was difficult to locate the specimen amidst moist litter.

This species generally inhabits damp and moist areas, preferably near hill streams. The frog moves slowly, a bit lazy as is evident from its slow movement when disturbed; walks rather than hops. A similar observation was made on *L. smithi* by one of the authors of this paper (BS), at Riwai, Meghalaya in 2016. Pange is characterized by mixed tropical evergreen forests. Some of the associated herpetofauna recorded from the habitat of *L. bompui* are *Rhacophorus rhodopus*, *R. burmanus*, *Amolops viridimaculatus*, *Nasutixalus jerdonii*, *Sphenomorphus maculatus*, *Japalura* sp., and *Ptyas nigromarginata*.

Variation

There are a few minor variations from the original description, observed in the present specimen. The snout slightly projects over the lower jaw.

In their original description of the holotype, Sondhi & Ohler (2011) erroneously mentioned 'a single, round, prominent palmer tubercle' while the photographs they have provided clearly shows the presence of two equal palmer tubercles (fig. 2C, pg. 32). While putting this species under the genus *Leptobrachium*, however, they



Image 1. *Leptobrachium bompou* (in life) showing the wrinkled dorsum



Image 2. *Leptobrachium bompou* showing unequal palmer tubercles



Image 3. Habitat of *Leptobrachium bompou* at Pange, Talle Valley Wildlife Sanctuary



Image 4. Holotype of *Leptobrachium bompou* at SFRI, Itanagar, KA0001/200905

have correctly mentioned the presence of two equal sized palmer tubercles; a characteristic of the genus, so probably the former statement is more likely a typo error. Since our specimen is the only other specimen of the species besides the holotype, it is thought worthy to submit it to a thorough examination; and in doing so we have noticed that in our specimen the inner palmer tubercle is slightly bigger than the outer palmer tubercle or subequal (Image 2). A similar observation was also made by Matsui et al. (1999), while describing the holotype of *Leptobrachium smithi* where the inner palmer tubercle is bigger than the outer palmer tubercle.

Also, our specimen has fewer markings on the limbs than the holotype based on the live condition photographs provided by Sondhi & Ohler (2011) and Sondhi (2015). The tibiotarsal articulation in the original description reached the posterior eye corner, while in our specimen it reached the tympanic region only. The tibia

length is more than 40% of the snout vent length (SVL) as per the original description, which is consistent with our specimen as well; the only difference is that the tibia of our specimen (41.9% of SVL) is shorter vis-à-vis the snout vent length than the holotype (44.5%). The inner metatarsal tubercle (IMT 3.0mm) is 0.9 times the length of the inner toe (ITL 3.4mm) as per the original description; whereas in our specimen, the IMT (2.25mm) is 0.97 times the ITL (2.31mm).

Other minor variations observed in our specimen vis-à-vis the original description of the holotype are: both IBE (15.4) and IFE (8.1) are longer in our specimen despite the fact that SVL (42.6) and HW (18.15) are lesser than the holotype described. IUE (5.8) is also bigger, despite a smaller HL (15.62). The third finger length (TFL) is longer than the holotype TFL length.

The most interesting observation are the MTFF and MTF, where the distance from distal edge of metatarsal tubercle to the maximum incurvation of web between

4th & 5th toes and 3rd & 4th toes, is measured, respectively. While our measurements are larger than the original description, and MTF (7.1mm) being greater than MTF (6.75mm); the measurement of MTF (1.8mm) in the holotype is surprisingly much less than the MTF (4.3mm). We suspect it could be a typo error made in the original publication.

The above mentioned intra-specific variations may be attributed to the geographical isolation of the population, separated by a distance of about 200km from the type locality of this species from the collection location of the specimen reported in this paper.

Range

The distribution range of this species has increased from its type locality of Bompou, located in West Kameng District to Pange, located in Lower Subansiri District of the state; an aerial distance of about 200km separating both the places, traversing two districts - East Kameng District and Papumpare District of the state of Arunachal Pradesh, northeastern India (Fig. 1).

DISCUSSION

The specimen was collected from a location with similar geographical landscape to the type locality (Image 3), other than the fact that both the places are in Arunachal Pradesh, northeastern India. The altitude of Pange (from where the specimen was collected) was 1,926m, marginally less than the altitude of the collection location of the holotype (1,940m). No further specimen was encountered in the successive surveys by the second author during November 2015 and September 2016. Another single specimen was collected by the second author during a heavy downpour on 19 June 2017 at around 10.00hr about 5km south-west of Pange. This implies the population of *L. bompou* is very less and can be located only during monsoon owing to increased activity.

Dissection of the specimen revealed the specimen to be a male. Our specimen, with an SVL of 42.6mm was smaller than the male specimen (holotype) of the original description (47.00mm); it may be inferred from here that the SVL of the males of *L. bompou* ranges from 42.6–47.00 mm.

The importance of a range of morphometric data in taxonomic work is immense for subsequent workers to identify a species properly. As per Sondhi and Ohler (2011), the first author made the collection of a single specimen of *L. bompou* and released two specimens without taking any morphometric data or recording any physical descriptions. This was a loss to science as the first author wasted the chance to register the range of

physical variations, as well as losing the potential types (paratypes) for *L. bompou*; not to mention the intraspecific variations. In this context, the morphometric data of the present specimen assumes significance as it gives much needed variations for subsequent workers.

Sondhi & Ohler (2011) compared the mensural and meristic data for adults of their *L. bompou* holotype with 21 congeneric species (excluding species with horny spines on upper lips in adult males) where the SVL (Snout Vent Length) range of males and females were compared. Of that list, *L. bompou*, along with *L. buchardi*, *L. hainanense* and *L. huashen* are still without any record of the opposite sex. The search for the female of *L. bompou* still continues!

Comparative material

Leptobranchium bompou, KA0001/200905, Bompou, Eaglenest Wildlife Sanctuary, West Kameng District, Arunachal Pradesh, deposited at the State Forest Research Institute, Itanagar (Image 4). Other data from Sondhi & Ohler (2011).

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