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DETAILED STUDY ON *PHILAUTUS GARO* (BOULENGER, 1919) (AMPHIBIA: ANURA: RHACOPHORIDAE) – AN EXTREMELY RARE AND ENDEMIC SPECIES OF NORTH-EAST INDIA

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ABSTRACT

The three species of frogs under the Genus *Philautus* reported from Meghalaya are *Philautus kempiae*, *P. namdaphaensis* and *P. garo*. While *P. kempiae* is endemic to Meghalaya, *P. namdaphaensis* has also been reported from Arunachal Pradesh, and *P. garo* from Assam and Nagaland. All these three species are decidedly rare as they are not encountered in the field generally. This could be one of the contributing factors for the dearth of information or any studies related to these species. The present paper deals with a detailed morphological study on 6 specimens of *P. garo.*

INTRODUCTION

Genus *Philautus* is represented by 9 species in India (Frost, 2015), of which 3 are found in North East India (Mathew & Sen, 2010). These are *P. garo, P. kempiae* and *P. namdaphaensis.* Among these three species, *P. garo* and *P. kempiae* were described by Boulenger (1919), each from a single specimen, collected from the Garo Hills of Assam (now Meghalaya). However, both the species are so elusive that nothing much is known about them (Chanda, 2002).

Philautus garo was described from Tura, in Meghalaya. As per Chanda *et.al.* (2000), the holotype is located in ZSI, Kolkata (Registration Number - ZSIC 19187). After more than 80 years of its discovery, Choudhury *et al.* (2002) and Ao *et.al*. (2003) had reported *P. garo* from Assam and Nagaland, respectively, but without any photographs nor proper/detailed description. As such, Mathew & Sen (2010) had raised doubt about the authenticity of these claims, and hence they kept the distributional range of this species to within Meghalaya. It is, perhaps, on the basis of these records [Choudhury *et.al.* (2002) and Ao *et al*. (2003)] that in Frost (2015) the distribution of this species includes Assam and Nagaland. In recent years, Mathew & Sen (2009) gave a more detailed description of *P. garo* from a single specimen (V/A/ERS/808) collected from Shillong, Meghalaya along with photographs. However, owing to the elusiveness of the species, sufficient numbers of specimens were not available for making any comparative (or variation) studies on this species until this study.

In October, 2015, the authors came across 6 specimens of *P. garo* (Plate I and II, Fig. 1-6), collected from two localities in the suburbs of Shillong, Meghalaya. In the context of the above confusion and obscure data, the authors have decided to give a detailed description of the same. Besides, the specimen deposited in the National Zoological Collection of Zoological Survey of India, Shillong, on which the description by Mathew & Sen (Plate-III, Fig. 7) was based, has been studied for comparison.

ABBREVIATIONS

SVL	Snout - Vent length
HL	Head length (from posterior corner of mandible to tip of snout)
HW	Head width
EL	Eye length
EN	Distance between anterior corner of eye to nostril
NS	Distance from nostril to tip of snout
SL	Distance from anterior corner of eye to tip of snout
IN	Internarial distance
IUE	Maximum distance between upper eyelids
IFE	Distance between anterior corner of eyes
IBE	Distance between posterior corner of eyes
LFL	Length of forelimb from axil to the tip of the 3rd finger
LHL	Length of hindlimb from the vent to the tip of the 4th toe
TL	Tibia length
FL	Femur length
TTA	Tibio-tarsal articulation measured by stretching the hind limb towards the head along the side of the body
V/A/NERC/ZSI	Vertebrate / Amphibian / North Eastern Regional Centre/ Zoological Survey of India

GENERAL DESCRIPTION

Material Examined: Three specimens of *P. garo* (V/A/NERC/ZSI/1214) were collected from Sangmeiñ, 7th Mile, Upper Shillong, East Khasi Hills, Meghalaya on 3rd October, 2015, and another three specimens (V/A/NERC/ZSI/1215) were collected from Bañiun, 8th Mile, Upper Shillong, East Khasi Hills, Meghalaya on 7th October, 2015, by Mr Silbaster Swell and Mr Teibor Marweiñ. All the collections were made during night.

Diagnosis: Head is broader than long, nostril is closer to snout. Inter-narial space less than inter-orbital. Supratympanic fold is distinct and lighter in colour; tympanum depressed and fairly distinct. Vomerine teeth absent. Tongue slightly notched.

Dorsum is smooth. A dark triangular patch between the eyes. A dark hour-glass shaped band runs from behind the eyes towards the groin over the dorsum as a mid-dorsal band that trifurcates posteriorly, one band each continues towards the groin and ends as a big, black, squarish spot in a whitish blotch, respectively, while the main band continues towards the vent. Flanks light to dark yellowish. A yellowish triangular patch from the eyes to the snout present, either light or dark in colour. Ventral surface is granular, dirty white, uniformly speckled with black dots.

Forelimbs short; upper arms pale with orange tinge; banded with black or dark grey from the wrists to the hand; fingers free, the digits ending in swollen white or orange discs. 1st finger longer than 2nd. Hind limbs slender, deeper shade of orange and with dark bands. Toes minutely webbed, the digits ending in white or orange swollen discs. Finger and toe discs with circum marginal grooves. TTA reaching eyes. Inner metatarsal tubercles distinct, outer metatarsal tubercles absent.

Measurements: The measurements were taken using digital calliper (in millimetres).

	Specimen 1	Specimen 2	Specimen 3	Specimen 4	Specimen 5	Specimen 6
SVL	18.52	12.96	12.97	14.95	12.78	13.43
HL	5.71	4.36	4.56	5.25	4.42	4.78
HW	6.81	5.22	4.97	6.48	4.60	5.54

SL	2.93	2.37	2.19	1.98	2.42	1.89
IUE	3.44	2.00	1.90	2.33	1.89	2.42
IN	1.73	1.59	1.64	1.75	1.67	1.46
EL	3.33	2.05	1.99	2.30	2.26	2.22
IFE	3.63	2.41	2.82	3.48	2.64	3.09
IBE	6.03	4.60	4.58	5.62	4.47	5.12
EN	1.24	1.16	0.94	1.19	1.15	1.11
NS	1.11	0.77	0.94	1.08	0.71	0.78
LFL	12.79	11.75	12.13	11.60	9.36	8.96
LHL	28.70	24.37	24.07	26.71	21.24	21.55
TL	8.20	6.02	6.08	8.21	6.65	6.66
FL	8.84	6.48	6.19	7.77	6.13	6.44
DISC COLOR	White	White & Orange	Orange	White & Orange	White & Orange	White & Orange

DISCUSSION

All the specimens, including the one studied by Mathew & Sen (V/A/ERS/808) lacked vomerine teeth. However, nothing was mentioned about its presence or absence in any of the previous descriptions by any author.

In the original description by Boulenger (1919), the nostril was equidistant from the eyes and the tip of the snout, while in the description by Mathew & Sen, the nostril was nearer to the eyes. However, while re-examining the specimen of Mathew & Sen, we found that the nostril was nearer to the snout tip, contradicting their morphometric data. The same consistency was found in the 6 specimens that we have studied, with only specimen no. 3 matching with Boulenger's description.

The dark hour-glass band on the dorsum, as described by Boulenger is consistent in all the 6 specimens. As per Mathew & Sen, the dorsal band bifurcates towards the groin region, leaving the main band and continues towards the vent. However, they didn't mention about any whitish blotch where the bifurcated bands end, while in 4 specimens (with the exception of specimen no.2 & no.3), they end into a whitish blotch, respectively. When we re-examined the specimen (V/A/ERS/ZSI/808), we didn't find any pale blotches in that region. This could be another intra-specific variation.

While nothing was mentioned about the colour of the ventral surface by Boulenger, Mathew & Sen described the ventrum speckled with brown. We have found that the ventrum is blackish with white dots.

Variation among the 6 specimens: Specimen no. 1, no. 2 and no. 3 collected from Sangmeiñ have lighter yellowish head and flanks. However, specimen no. 4, no. 5 and no. 6, collected from Bañiun have darker yellowish head and flanks. Specimen no. 2 and no. 3 have lighter dorsal band than the rest. In fact, in specimen no. 3 the bifurcation of the dorsal band is incomplete.

Distribution: Meghalaya, Assam and Nagaland.

REMARKS

Since, the above specimens, including the one described by Mathew & Sen, lacked vomerine teeth, are with large gular pouch, nocturnal and relatively small SVL between 12 to 19 mm, which matches with the diagnosis of genus *Raorchestes* (Biju *et. al.*, 2010), hence this species warrants

its transfer from genus *Philautus* to genus *Raorchestes*.

SUMMARY

The present paper dealt with 6 specimens of *P. garo* collected from Upper Shillong located in the suburbs of Shillong, Meghalaya. As per Frost (2016), the previous reports of this species were from an elevation of 90-500 meters above sea level, and as the elevation of Upper Shillong is more than 1700 meters above sea level, therefore the altitudinal distribution of *P. garo* needs to be revised as per the findings of this paper. The current distribution of this species is reported from very restricted pockets of the North Eastern States of Assam, Meghalaya and Nagaland, making it a highly endemic and extremely valuable species of India, which is worth conserving. IUCN has rightly listed this species as Vulnerable (Ohler, *et. al.* 2004), owing to the fact that species that are highly endemic and with restricted range of distribution are very susceptible to extinction posed by habitat lost, fragmentation and degradation. These perceived threats are real and looming large day by day due to pressures that the region is facing from rapid urbanization and other anthropogenic and developmental activities.

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PLATE I

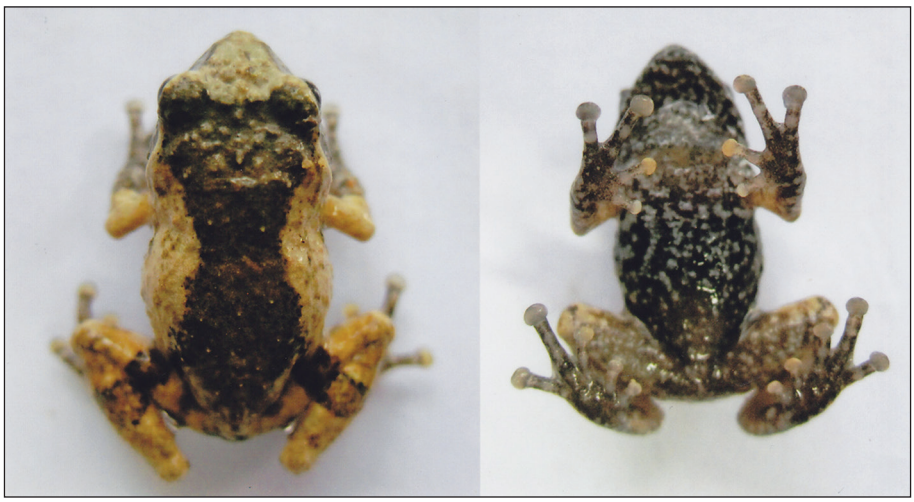

Fig. 1. *Philautus garo,* Specimen no. 1, showing the dorsal & ventral views

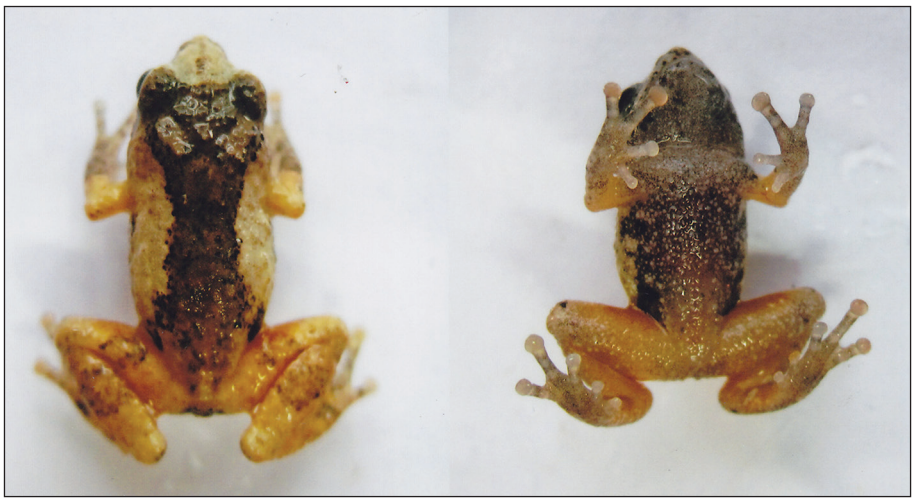

Fig. 2. *Philautus garo,* Specimen no. 2, showing the dorsal & ventral views

Fig. 3. *Philautus garo,* Specimen no. 3, showing the dorsal & ventral views

PLATE II

Fig. 4. *Philautus garo,* Specimen no. 4, showing the dorsal & ventral views

Fig. 5. *Philautus garo,* Specimen no. 5, showing the dorsal & ventral views

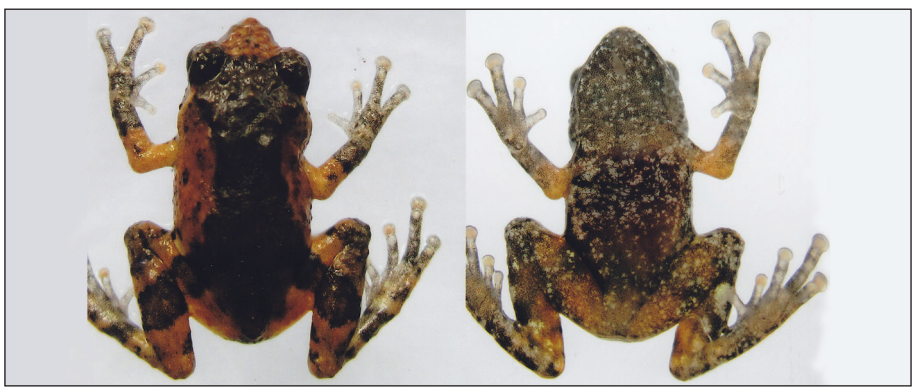

Fig. 6. *Philautus garo,* Specimen no. 6, showing the dorsal & ventral views

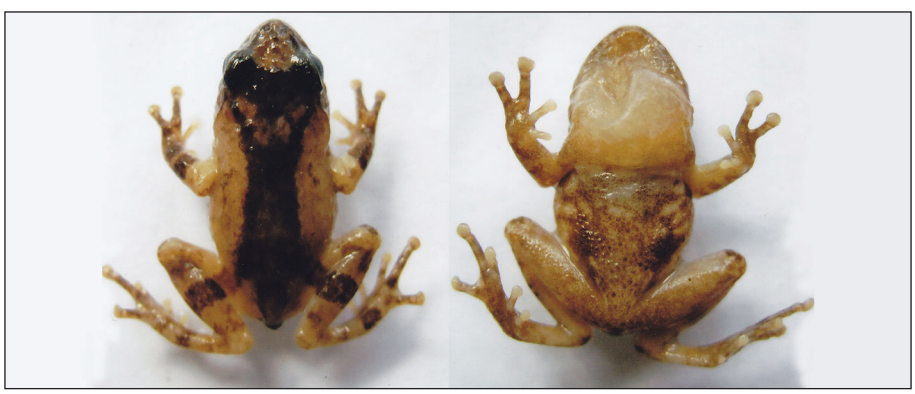

Fig. 7. *Philautus garo,* (V/A/ERS/808) showing the dorsal & ventral views