



First field report of *Trimerodytes percarinatus* (Boulenger, 1899) (Reptilia: Squamata: Natricidae) from India with notes on its natural history

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Keywords. Arunachal Pradesh, distribution, Natricinae, new country record, *Sinonatrix pericarnata*, water snake

Citation: Mallik AK, Chowdhury S, Bhatt BB, Captain A. 2019. First field report of *Trimerodytes percarinatus* (Boulenger, 1899) (Reptilia: Squamata: Natricidae) from India with notes on its natural history. *Amphibian & Reptile Conservation* 13(2) [General Section]: 299–303 (e214).

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Received: 6 November 2018; **Accepted:** 5 August 2019; **Published:** 24 December 2019

The Asian snake genus *Trimerodytes* Cope, 1895 belongs to the family Natricidae and consists of four species, namely *Trimerodytes annularis* (Hallowell, 1856), *Trimerodytes percarinatus* (Boulenger, 1899), *Trimerodytes aequifasciatus* (Barbour, 1908), and *Trimerodytes yunnanensis* (Rao and Yang, 1998). *Trimerodytes percarinatus* (Boulenger, 1899) is a nocturnal snake commonly known as the Eastern Water Snake or Chinese Keelback Water Snake. This species inhabits water passages in forested hilly country (100–2,000 m asl) and generally feeds on fish, crayfish, crustaceans, frogs, and their larvae (Pope 1935; Smith 1943). Pope (1935) also recorded its presence in irrigated fields near a forest in Kuatun, China. Currently, *Trimerodytes percarinatus* has two recognized subspecies, *Trimerodytes percarinatus percarinatus* (Boulenger, 1899) and *Trimerodytes percarinatus suriki* (Maki, 1931).

Trimerodytes percarinatus was originally described as *Tropidonotus percarinatus* by Boulenger in 1899, from Kuatun, Foochow, in the north-west of the Province of Fokien (=Fujian), China at an altitude of 3,000–4,000 ft or more (Zhao and Adler 1993). Subsequently, it was placed within the genus *Natrix* by Mell (1931) and later assigned to the genus *Sinonatrix* by Rossman and Eberle (1977). Based on a recent phylogenetic study, it is placed within the genus *Trimerodytes* (Ren et al. 2019).

This species is distributed in north-eastern India (Arunachal Pradesh), Myanmar, Thailand, Laos, Vietnam, south-eastern China, and Taiwan at elevations ranging from 90–2,000 m (Pope 1935; Smith 1943; Taylor 1965; Zhao and Adler 1993; Stuart and Heatwole 2008; Nguyen et al. 2009; Boundy et al. 2014). Captain

and Patel (1998) first reported the existence of the genus *Trimerodytes* in India, represented by this species, *T. percarinatus*, based on an uncatalogued museum specimen housed previously at Deban Forest Camp and now at the Namdapha Tiger Reserve Field Museum in Miao, India. For the next two decades since then, though studies documenting the herpetofauna of Arunachal Pradesh have been conducted, this species has not been recorded (Athreya et al. 1998; Borang et al. 2005; David and Mathew 2005; Agarwal et al. 2010). Here, we report the first field record of *Trimerodytes percarinatus* (Boulenger, 1899) from India with notes on its natural history.

This species was recorded on two occasions in Namdapha Tiger Reserve, Arunachal Pradesh, India. This national park harbors a rich biodiversity and is part of one of the world's biodiversity hotspots (Indo-Myanmar). The first individual (Fig. 1) was encountered at 27°28'58"N, 96°24'14"E and an elevation of 515 m asl, at approximately 2200 h on 17 June 2011. It was found inside a small ditch filled with water (~1 ft deep) near the road edge, with its head out of the water and it was foraging actively. The second individual was recorded at approximately 1730 h on 18 June 2011. It was foraging in a water passage near the edge of a road. A *Fowlea* cf. *piscator* was also seen foraging in the same water body. The first individual was captured for morphological measurements and photographs, and was later released into the wild. A detailed description of the specimen is given in Table 1, and follows the methods from Vogel et al. (2004). Comparisons between the left and right sides of the head, and associated habitat where the snake was encountered, are also presented (Figs. 2–4).

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Fig. 1 Full body picture of *Trimerodytes percarinatus* from Namdapha, India.

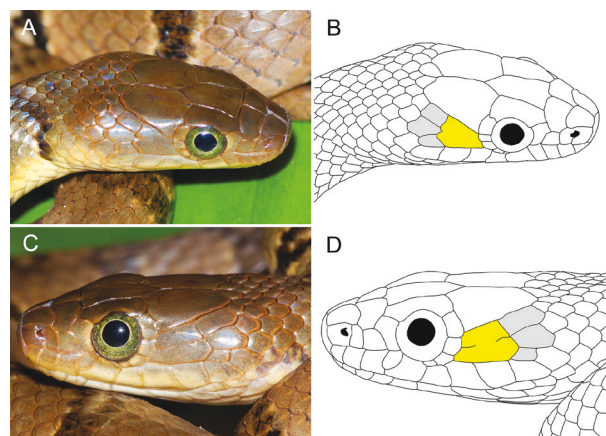


Fig. 2 Comparison between right and left sides of the head of *Trimerodytes percarinatus* from Namdapha, India.



Fig. 3 Habitat of *Trimerodytes percarinatus* at Namdapha, India.

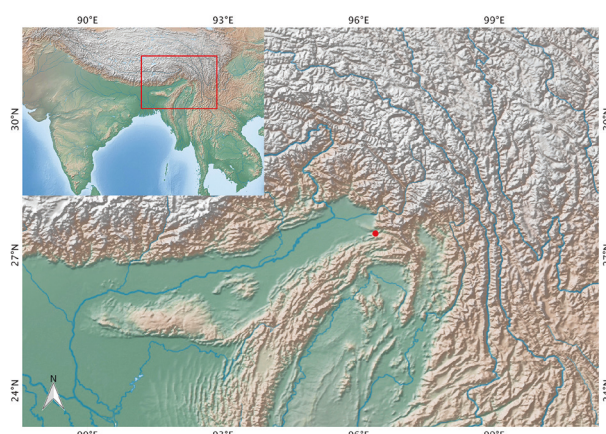


Fig. 4 Location of first field sighting of *Trimerodytes percarinatus* in Namdapha Tiger Reserve, Arunachal Pradesh, India.

Morphometric data for this specimen fall within the range of *Trimerodytes percarinatus* as defined in the available literature (Pope 1935; Smith 1943). These observations provide two additional records of *Trimerodytes percarinatus* from India and the first field report from the country, though the sightings were in more or less the same place (“Deban”) associated with the earlier specimen (see Captain and Patel 1998). This work, as well as other literature on this genus including new range records of other congeners from Indochina (Vogel et al. 2004; Pauwels et al. 2009; Le et al. 2015), points out our incomplete understanding of the distribution of this genus as a whole. Further work is required to determine the actual distribution range of this species in India, to understand its morphological and genetic variation across populations, and to add to our knowledge of its natural history.

Acknowledgements.—We would like to thank the State Forest Department of Arunachal Pradesh for providing permission (No. CWL/G/13(17)/06-07/PT/3838-46) to Kartik Shanker and Ashok Kumar Mallik, Centre for Ecological Sciences, Indian Institute of Science, Bangalore, to carry out the fieldwork and collect samples

in protected areas of Arunachal Pradesh. We thank Kartik Shanker for his valuable input to our manuscript, and for providing financial and logistic support during our fieldwork. Also, many thanks to the Field Director, Assistant Field Director Dr. Aporesh Gupta-Choudhury, and other forest staff from Deban guest house, Namdapha Tiger Reserve, for their hospitality during the fieldwork.

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Table 1. Characteristics of one specimen of *Trimerodytes percarinatus* from Namdapha, Arunachal Pradesh, India, compared with descriptions in Pope (1935) and Smith (1943).

Characters	This study	Pope (1935)	Smith (1943)
Dorsal scale rows	19:19:17, keeled	19	19
Ventrals	153	138–143	133–157
Subcaudals	69/70	70–79 (males), 67–73 (females)	68–85
Anal	Divided	Divided	–
Snout-vent length (mm)	433 (male)	515–567 (males); 620–730 (females)	720 (male); 940 (female)
Tail length (mm)	131	130	190 (male); 270 (female)
Head length (mm)	22.1	–	–
Horizontal eye diameter (mm)	3.9	–	–
Vertical eye diameter (mm)	3.9	–	–
Eye to nasal distance (mm)	4.0	–	–
Eye-snout distance (mm)	6.8	–	–
Inter-nasal distance (mm)	4.8	–	–
Prefrontal (mm)	2.6	–	–
Parietal (mm)	7.3	–	–
Length of supraocular (mm)	5.3	–	–
Width of supraocular (mm)	2.7	–	–

Trimerodytes percarinatus in India

Table 1 (continued). Characteristics of one specimen of *Trimerodytes percarinatus* from Namdapha, Arunachal Pradesh, India, compared with descriptions in Pope (1935) and Smith (1943).

Characters	This study	Pope (1935)	Smith (1943)
Supralabials	8 (left), 4 th touching eye / 9 (right), 4 th and 5 th touching eye	9 (rarely 8 or 10), 4 th and 5 th entering the eye	9, 4 th and 5 th touching eye
Infralabials	10 (on left and right); 1 st –5 th touch anterior genials (chin shields); 5 th and 6 th touch posterior genials – which are longer than anterior genials	5 lower labials in contact with anterior chin shields that are shorter than posterior	–
Preoculars	1 (+1 presubocular) / 1	single	1
Postoculars	3 (+1 postsubocular / 3 (+2 postsuboculars)	4 (occasionally 3 or 5)	–
Supraocular	1 / 1	–	–
Temporals	1 (2 fused scales) + 3 / 1 (2 fused scales) + 3	3 (occasionally 2 or 4) / 3 (occasionally 2, rarely 4)	2+3 (rarely 3+3)
Cross bands (on body)	30	–	–
Nostril	Directed upward	–	Directed slightly upward
Nasal	Partially divided	Completely divided	–
Internasal	Narrowed anteriorly, longer than the prefrontal	Narrowed anteriorly, longer than broad, and longer than prefrontal	Distinctly narrowed anteriorly, usually longer than the prefrontal
Prefrontal	Broader than long	Shorter than internasal	–
Frontal	Long and pointed posteriorly	As long as broad, as long as its distance from the end of snout, shorter than parietals	–
Coloration	Dorsum greyish brown with uniform cross-bars, dorsolateral portion light yellow in color, venter whitish with uniform paired and unpaired bars along with light yellowish ventrolateral	Dorsum greyish olive, sides with light-edged black vertical bars; venter uniform yellowish white anteriorly, spotted and speckled with blackish posteriorly; lower surface of tails dark grey in color along with black spots	Young: dorsum grey or dark olive green, color descending on the dorsolateral side as V shaped bars, the interval between bars and lower portion yellowish; Adults: dorsum greyish or olivaceous with uniform or with dark reticulation or dark cross-bars, venter whitish, with or without dark cross-bars



Ashok Kumar Mallik received his Doctorate degree in 2018 from the Centre for Ecological Sciences, Indian Institute of Science, Bangalore, India. Ashok's research interests include systematics, taxonomy, hybrid zones and speciation, population genomics, and evolutionary ecology of reptiles and amphibians. He is working on the systematics and biogeography of a few genera of colubrid and viperid snakes in Peninsular India.



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Ashok Captain is a renowned Indian herpetologist who is interested in and dabbles with the traditional taxonomy of snake species that occur in India.