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SHORT COMMUNICATION

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New record of the keelback *Rhabdophis leonardi* in Manipur with a discussion of the status of the species in India

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One of the neglected species of Indian herpetofauna is *Rhabdophis leonardi*. It was not included in the 2018 Checklist of Reptiles in India published by the Zoological Survey of India (Aengals et al., 2018), and India is not listed within the range of *R. leonardi* in the Reptile Database (Uetz et al., 2024a). Several recent papers on *R. leonardi* restrict its discussed range to southwest China and adjacent Myanmar (Zhu et al., 2022; Yang et al., 2023). However, the presence of *R. leonardi* in India has been established by Nguyen & David (2023), they found that snakes from Nagaland initially identified as *Rhabdophis nuchalis* in fact fit the description of *R. leonardi*, and proposed that only *R. leonardi*, not *R. nuchalis*, should be considered a resident Indian snake. Their finding suggests that researchers may have sighted *R. leonardi* elsewhere in India but misidentified it.

From 23 to 26 April 2023, the author undertook an informal walking survey of the roads in and around Phuba Thapham, Senapati District, Manipur. This village, situated 27 km north-east of the district headquarters in Senapati, is surrounded primarily by rice paddies, further enveloped by community forest lands from which most of the primary forest has been logged. Due in part to the remote location of the village and limited development of the roads in the region, no previous reptile research is known to have been undertaken in the region. Further details on the limited history of reptile research in Manipur can be found in Hakim (2023).

At 09:32 h on 26 April 2023, the author and his companions encountered a dead juvenile *Rhabdophis* on an unpaved road uphill from Phuba Thapham at 25° 23’27.54’’ N, 94° 15’33.66’’ E, at an altitude 1845 m. The area in which the snake was found is a border zone between rice paddies and heavily disturbed forest. The snake (Fig. 1) superficially appeared to be a match for *Rhabdophis himalayanus*, a slender greyish keelback with a thin orange-yellow collar. However, Xiong Feng Li (pers. comm.) noted upon viewing the photos that the specimen had 6 supralabials and 7 infralabials, placing it into the *R. leonardi/nuchalis* species complex rather than *R. himalayanus/Rhabdophis bindi*, which have 8 supralabials and 10–11 infralabials.

Further analysis of the voucher photographs demonstrated that this specimen matches the diagnostics for *R. leonardi* (Nguyen & David, 2023) in having 6 supralabials, 3rd and 4th in contact with the eye, with an oblique black band across the suture between 4th and 5th supralabials; 7/8 infralabials, first 4 in contact with anterior chinshields and 4th to 6th in contact with posterior chinshields; 2 supranasals; 2 prefrontals; 1 frontal; 2 parietal; loreal present; 1 preocular; 1 superocular; 3 postoculars (1 is very small); 1+2 temporals, and nuchal gland present. The ventral count is 149 and the subcaudal count is 49, though there is slight uncertainty on the ventral count due to damage to the scales. This damage also precluded an exact scale row count on most of the body. Nonetheless, at approximately the 70th ventral, a complete count could be made of 16 scales in five consecutive rows (Fig. 1D), in line with the reduction from 17 to 15 that occurs in *R. leonardi* near midbody.

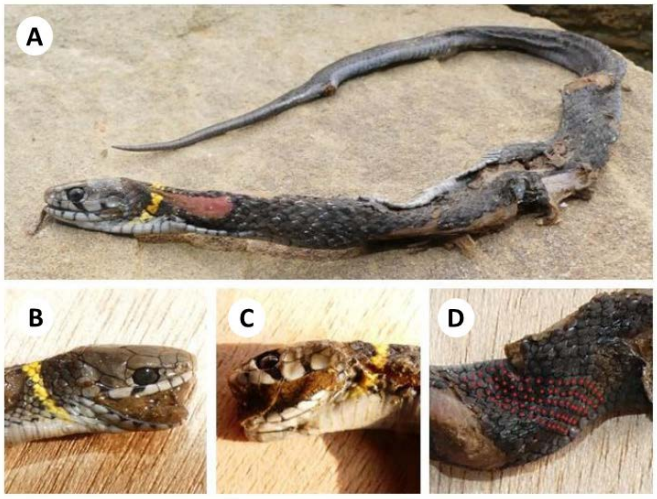

Figure 1. Juvenile *Rhabdophis leonardi* [ZRC(IMG) 2.674a-h] found in Phuba Thapham, Manipur, India - **A.** Full body view, **B.** Right dorsolateral view of head, **C.** Left lateral view of head, **D.** Scale count just short of midbody showing 16 rows

These attributes key the snake out to *R. leonardi* according to the chart of *Rhabophis* keelbacks found in Yang et al. (2023). The presence of 16 scales near the midbody rules out its closest relative, *R. nuchalis*, which consistently displays 15 scale rows throughout its length. Furthermore, *R. nuchalis* can be ruled out by the range established in Zhu et al. (2022), which restricts *R. nuchalis* senso stricto to no closer than Tangjiahe, Sichuan, China, 1,140 km north-east of our locality (Nguyen & David, 2023). The only other species listed in the Yang et al. (2023) key that may display 16 scale rows at or before midbody is *Rhabdophis angeli*, which occasionally starts with 16 scale rows before reducing to 15, but this species has a much lower ventral count (117–126)

and subcaudal count (39–46), furthermore it is restricted to a small range in Vietnam, 1,236 km south-east of our specimen's locality. A recently described species not present in the Yang et al. (2023) key, *Rhabdophis kaiyuanensis*, also sometimes reduces through 16 scale rows near the midbody (Liu et al., 2023), but the diagnostic of *R. kaiyuanensis* differs from our specimen in lacking a bright collar on the neck, lacking dark bands on the supralabials, and having a range currently restricted to Kaiyuan, Yunnan Province, China, which is 943 km east of our specimen location.

The identification of our specimen as *R. leonardi* was confirmed by Patrick David and by Guang-Xiang Zhu after an examination of pattern and scalation. This represents the first record of *R. leonardi* in Manipur, 35 km south-east of the nearest previous records in Khonoma, Nagaland (Ahmed & Das, 2006; Nguyen & David, 2023). Photographs of the specimen were deposited as photo vouchers in the Lee Kong Chian Natural History Museum in Singapore [ZRC(IMG) 2.674a-h].

Patrick David noted that our specimen differs from most recorded *R. leonardi* in having a thin yellow collar, rather than the published diagnostic of a thin orange collar in females. However, the juvenile snake from Ahmed & Das (2006) that was identified as *R. leonardi* by Nguyen & David (2023) also shows a yellow collar similar in tone to our specimen [see the photo in Uetz et al. (2024b)], as does the genetically confirmed hatchling *R. leonardi* from Xiaoshanbao Village in South Sichuan Province, China, which is photographed on page 11 of Yang et al. (2022).

With the confirmation of *R. leonardi* in Nagaland and Manipur, the species is likely present elsewhere in north-east India. A road-damaged snake in Arunachal Pradesh posted by Ronith Urs on iNaturalist on 3 July 2023 (https://www.inaturalist.org/observations/170850200) appears to be morphologically similar to *R. leonardi*, though the degree of damage to the specimen precludes identification via scale counts. Attention should be given to future *Rhabdophis* specimens in other north-east Indian states as well as Myanmar, Bhutan, Nepal and Tibet to ensure that *R. leonardi* finds are not accidentally misidentified as *R. himalayanus* or *R. nuchalis*.

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