

On the distribution of Cantor's Kukri snake *Oligodon cyclurus* (Cantor, 1839) (Squamata: Colubridae) from Nepal

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Abstract

The distribution of Cantor's Kukri Snake *Oligodon cyclurus* has been poorly documented in its geographic range from Bangladesh, Cambodia, China, India, Laos, Myanmar, Nepal, Thailand and Vietnam. We provide confirmed locality records with notes on some aspects of natural history information for *O. cyclurus*. Although the species is designated as Least Concern according to IUCN Red list of Threatened Species, the species is facing multiple threats like roadkills and vindictive killing. We suggest a more detailed inventory to better understand its biology, distribution patterns, population status and molecular identity to aid in a more comprehensive global conservation action.

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Introduction

Globally, the genus *Oligodon* Fitzinger, 1826 is comprised of 79 currently known species (Uetz et al., 2019; Nguyen et al., 2020). These snakes are primarily distributed in South and South-east Asia (Nguyen et al., 2020) and commonly known as Kukri snakes; having enlarged posterior maxillary teeth that resemble an indigenous Nepalese Khukuri knife. Nepal is known to have five species of the Kukri snakes belonging to the genus *Oligodon*. The currently known species of *Oligodon* in Nepal are *O. albocinctus* (Cantor, 1839), *O. arnensis* (Shaw, 1802), *O. cyclurus* (Cantor, 1839), *O. erythrogaster* Boulenger, 1907, and *O. kheriensis* Acharji

and Ray, 1936 (Schleich and Kästle, 2002; Shah and Tiwari, 2004; Pandey, 2012; Bhattarai et al., 2017a; Bhattarai et al., 2018; Gautam et al., 2020; Rawat et al., 2020).

The earlier records of the Cantor's Kukri snake, *O. cyclurus* from Nepal were either doubtful (see Kästle et al.; 2013) or mentioned its occurrence in Nepal without locality records (see Shrestha, 2001). Later, Pandey (2015) reported *O. cyclurus* in Nepal based on a photo voucher from South-eastern Nepal (Bhattarai et al., 2017b).

Here-in, we provide confirmed locality records and natural history observations of *O. cyclurus* from Nepal.

Material and Methods

We recorded two individuals of *O. cyclurus* from altered habitats: the first individual was recorded on 25 April 2019 as a road killed specimen during biodiversity assessment in the Pathari-Shanischare forest patch (26°39'39.17"N, 87°32'57.47"E) in Morang district (Fig. 1). The total length of the badly crushed individual was 690 mm, and we could not count the scales of the road killed individual but could observe the color and some patterns on the body. Later, on 9 December 2019, we recorded another specimen of *O. cyclurus* from an agricultural field in Ranjani village (26°29'15.62"N, 87°27'57.50"E), Morang, Nepal (Fig. 1) when a woman was bitten by the same specimen while collecting grasses from the field. Upon notice, the first author approached the victim and collected the snake which was already killed by the victim believing it to be a venomous snake.

We preserved the dead specimens in 70% ethanol. The body measurements (in mm)

were measured with thread and later scaled to a measuring tape; and scale counts were taken following Nguyen et al. (2020). The characters measured are: snout to vent length (SVL)- measured from the tip of the snout to the vent; tail length (TaL)- measured from the vent to the tip of the tail; eye diameter (EyeL)- maximum horizontal length of the eye; interorbital distance (IOD)- the shortest distance between the eyes; internarial distance (IND)- distance between the two nostrils; supralabials (SL)- number of scales on upper lip; ventral scales (VS)- number of scales from the second ventral scale posterior to gulars to the vent excluding cloacal plate; subcaudal scales (SC)- number of paired subcaudal scales excluding the terminal scute; midbody scale rows (MSR)- number of scale rows at midbody; number of preocular scales (PrO); number of postocular scales (PtO).

A Nikon- P900 digital camera with 83X optical zoom was used for the photographic record, description of colors, and patterns.

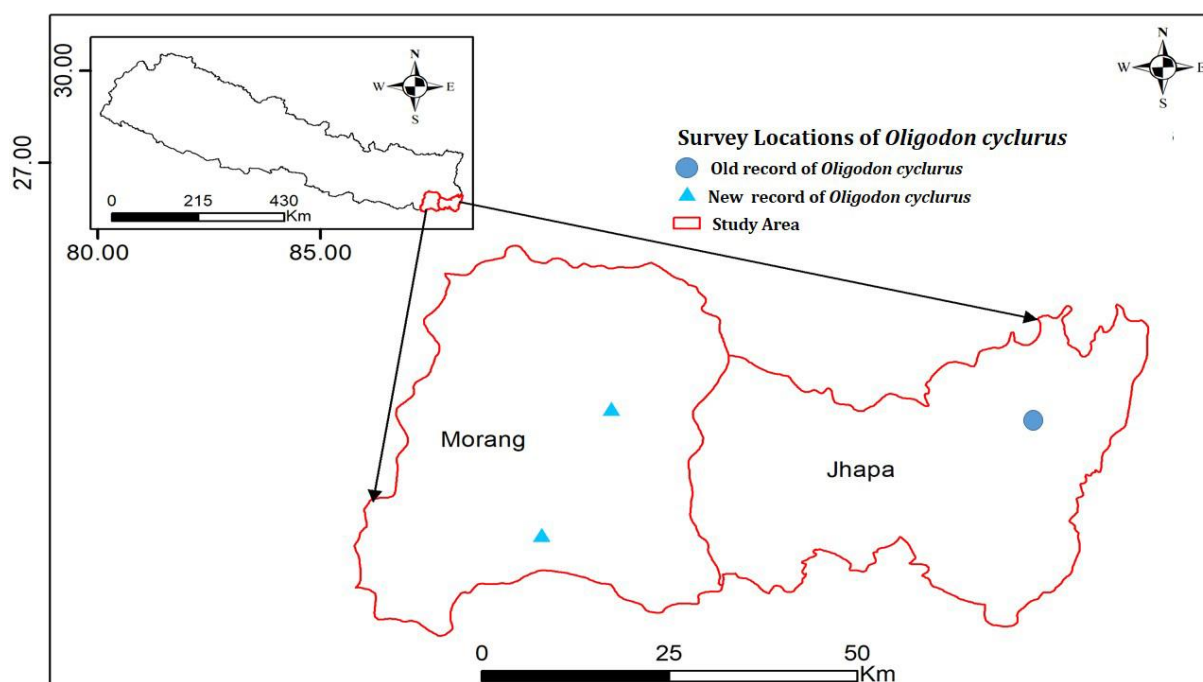


Figure 1: Map shows the previous and new records of *Oligodon cyclurus* from Nepal.

Results and Discussion

For the first (road-killed) specimen, from Pathari-Kanepokhari road segment of east-west national highway, we could measure the total length as 690 mm. We observed the dorsal streak from the head to the tail tip. The morphological characters for the second female specimen were: smooth scales; head short and not distinct from neck; round pupils; SVL 580 mm; TaL 80

mm; MSR 19; VS 168; SC 36 (divided); SL 8 (4th and 5th in contact with the eye); EyeL 3 mm; IOD 7 mm; IND 6 mm; PrO 2; and PtO 2. The cream-colored vertebral streak ran from the base of the head to the tail tip. The ventral scales exhibited black dots which were more prominent towards the posterior end. However, such dots were absent in the subcaudal scales (Figs. 2 and 3).



Figure 2: Road-killed specimen of *Oligodon cyclurus* recorded from Pathari-Kanepokhari road segment, Morang, Nepal. Photo by Bivek Gautam.

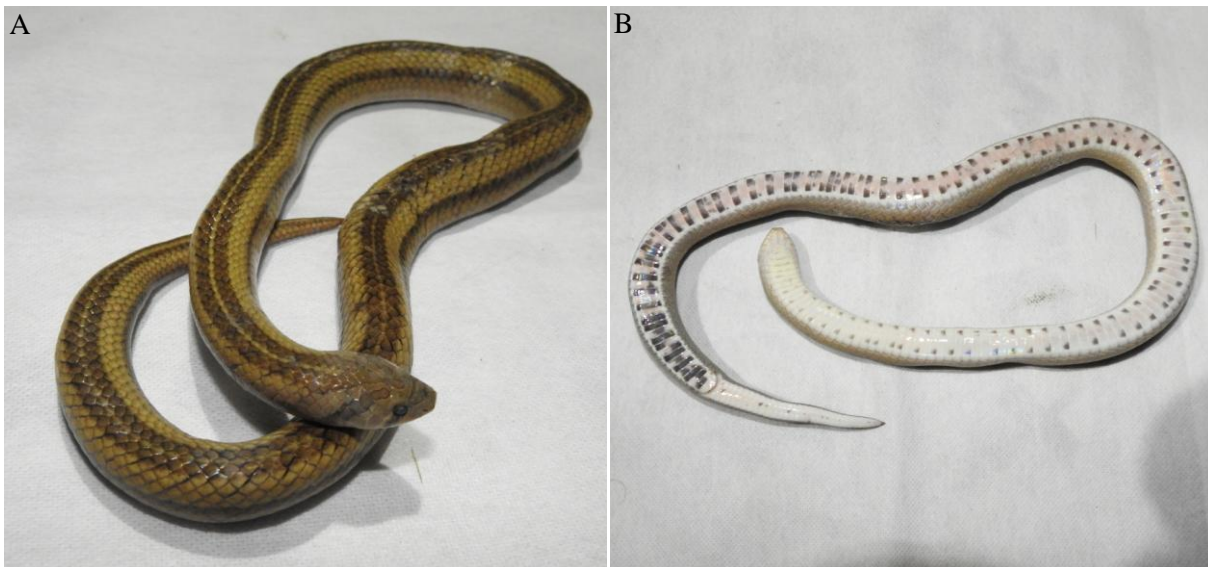


Figure 3: Dorsal (A) and ventral view (B) of *Oligodon cyclurus* recorded from Ranjani village, Morang, Nepal. Photo by Bivek Gautam.

As Nepal is home to five species of *Oligodon*, *O. cyclurus* differs from *O. albocinctus* and *O. arnensis* in not having cross bands. *O. kheriensis* is a uniform red colored snake while *O. cyclurus* has variable color patterns. *O. cyclurus* has a larger body size than *O. erythrogaster* with a white dorsal streak while *O. erythrogaster* has a brown vertebral stripe. The earlier records of *O. erythrogaster* are from hills with an elevational range from 1500–2000 m (Schleich and Kästle, 2002) while *O. cyclurus* is restricted to lower elevations.

Smith (1943) mentions the occurrence of five forms of *O. cyclurus* in its distribution range with morphological variations and four forms are intergraded into each other. Our specimens with dark squarish spots on the outer margins of the ventrals correspond to form I (Smith, 1943) and only differ from it by having a mid-dorsal whitish streak from base of the head to tail tip. Our specimens also differ from the form III by not having dark cross-bars on the body. Our specimens also differ from *O. taeniolatus* in having a larger body size and a mid-dorsal scale count of 19 compared to *O. taeniatus* with 15. According to Smith (1943) form I is well distributed from the whole of Myanmar to Assam, India with fairly common distribution inhabiting plains and lower hills. Our records from Morang, Nepal are in part of the plains of Eastern Himalaya.

Habitat, natural history and threats

The genus *Oligodon* is a highly secretive and nocturnal snake (Tillack and Günther, 2009) and *O. cyclurus* is likely to have a wide distribution and tolerance of modified habitats and agricultural fields (Stuart, 2010; Das and Das, 2017). Both of our observations are from altered habitats, also corresponding to Stuart (2010). The associated habitat of the first specimen was road-side Sal (*Shorea robusta*) mixed forest where ground cover was mainly dominated by an invasive weed *Ageratum* sp. (Fig. 4A). Similarly, the second

specimen was found from an agricultural habitat mosaic where wheat cropping was practiced (Fig. 4B).

Our records, both dead specimens of *O. cyclurus* show that the species has direct threats on its populations. Pandey (2015) mentioned the record of *O. cyclurus* from a snake bite treatment center by a snakebite victim and it is likely that people in the area are frequently bitten and kill the species whenever they encounter it believing it to be venomous; despite the fact that only 17 species of snakes in Nepal are venomous (Sharma et al., 2013).

Conclusion

The conservation activities of any wildlife species in Nepal are mainly targeted in Protected Areas only. Our records of *O. cyclurus* is ca. 50 km east of the nearest Protected Area (Koshi Tappu Wildlife Reserve) suggest that the citizen science conservation initiative (eg. distribution of photographic guides, posters or booklets of local snake fauna) provided to the farmers, school and college students with basic identification tools and ecosystem functions of snakes would be instrumental for the conservation of snakes.

O. cyclurus has been enlisted as of Least Concern (LC) in the IUCN Red list category with population trends being unknown and it is treated as a species group (David et al., 2012). Therefore, we suggest a collection-based detailed inventory of this secretive snake in Nepal to ascertain its identity based on molecular evidence.

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Figure 4: Habitats of two recorded specimens of *Oligodon cyclurus* in Morang, Nepal (A and B). Photo by Bivek Gautam.

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