

Distribution of Cantor's Kukri snake *Oligodon cyclurus* (Cantor, 1839) (Squamata: colubridae) in Bhutan

Tashi Phuntsho and Jigme Tshelthrim Wangyal

Abstract

This paper provides the distribution and morphometric measurements, along with locality information, of *Oligodon cyclurus* in Bhutan through the study of five specimen n=5 collected from 2016 to 2021. As a Least Concern (LC) species that is little known in the locality, the species faces threats from the community. The study suggests that awareness campaigns for local people, especially the younger generation, on the role of *Oligodon cyclurus* in the ecosystem must be conducted in order to protect the species. Further studies about its distribution pattern, population status, and molecular identity are direly needed.

Introduction

The genus *Oligodon* Fitzinger, 1826, is known by 79 extant species primarily distributed in South and South-east Asia (Utez et al., 2019; Nguyen et al, 2020). It is commonly known as Kukri snakes due to its enlarged posterior maxillary teeth that resemble an indigenous Nepalese Khukuri knife (Sah et al.,2020). Bhutan has records of eight species of Kukri snakes belonging to the genus *Oligodon*. The species include *O. albocintus* (Cantor, 1839), *O. cinereus* (Gunther), *O. dorsalis* (Gray and Hardwicke), *O. juglandifer* (wall), *O. taeniolatus* (Jerdon), *O. cyclurus* (Cantor, 1839), *O. chinensis* and *O. venustus* (Jerdon, 1853) (Wangyal and Gurung, 2020; Wangyal et al., 2020).

Much of the earlier records of Cantor's Kukri snake, *O. cyclurus*, from Bhutan do not have locality data or morphological descriptions. This study provides confirmed locality data and natural history observations from 2016 to 2021. The species was observed multiple times in the study area and was often mistaken for *Oligodon nikhili* (Whitaker and Dattatri 1982) due to their similar morphological patterns.

Materials and Methods

Ten species of *O. cyclurus* from different habitats (Figure 1) were recorded. The first record was obtained from Singye Gewog, Sarpang Dzongkhag, in 2016 which was followed by several other observations. Two road kills were recorded in Balatung. The snakes were killed because the local people believed them to be venomous. The morphological dimensions of the road kill species could not be obtained since it was significantly crushed by vehicle and damaged beyond the possibility of collecting data. Five individuals (n=5) from the dead specimens stored in 70% ethanol in Phibsoo Wildlife Sanctuary headquarters were examined. Species information including the locality are provided in Table 1. The body measurements were carried out using threads before measuring by metric system marked scale in millimeters (mm). Scale counts were carried out using method adopted by Whitaker and Dattatri 1982. Characters assessed were:

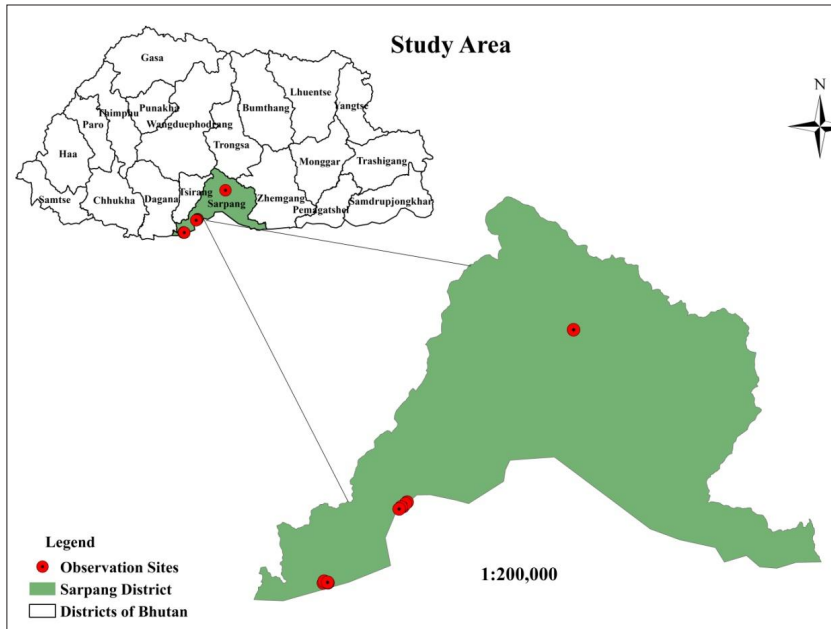


Figure 1: Study Area.

Table 1: Specimen Information

Sl. No	Species	Accession Number	Locality	Collector and year of collection
1	<i>O.cyclurus</i>	01	Road side of Singye Gewog	PWS, 2016
2	<i>O.cyclurus</i>	02	Inhabited area of Phibsoo	PWS,2017
3	<i>O.cyclurus</i>	03	Inhabited area of Phibsoo	PWS 2017
4	<i>O.cyclurus</i>	04	Inhabited area of Phibsoo	Tashi Phuntsho, 2018
5	<i>O.cyclurus</i>	05	Road side of Balatung	Kado Rinchen, 2021

Table 2: Morphometric Measurement of Specimen

Accession Number	SVL (mm)	TaL (mm)	HL (mm)	HD (mm)	EyeL (mm)	SL (no.)	L (no.)	VS (no.)	SC (no.)	DSR (no.)	PrO (no.)	PtO (no.)
01	410	56	12	9	4	8	1	166	37	17-19-14	3	2
02	310	41	12	10	3	8	1	156	39	15-18-15	3	2
03	450	64	16	12.5	3	7	1	167	38	19-17-15	3	2
04	440	60	13	9.3	3	7	1	167	38	17-17-15	3	2
05	480	54	14	11.8	3	8	1	173	32	19-19-14	3	2

snout to vent length (SVL); tail length (TaL); head length (HL); head diameter (HDeye); eye diameter (EyeL); supralabials (SL); loreal (L); ventral scales (VS); subcaudal scales (SC); midbody scale rows (MSR); number of preocular scales (PrO); number of postocular scales (PtO); posterior temporal (PT), and anterior temporal (AT) scales.

Result and Discussion

A total of five individuals (n=5) preserved in 70% ethanol were assessed and provided with taxonomic descriptions. All five individuals revealed the same phenotypic characters with smooth body scales, short head almost similar to neck width, round pupils; presence of black dots on ventral, absence of black markings in subcaudal, and black streak from

eye touching supralabials. Morphometric measurements of the species were compared. Loreal, Postocular, and Peocular are common scalation of the specimen assessed (**Table 2**). The first specimen of *O. cyclurus*, accession number 01, was collected from Singye Gewog (26°51'1.32"N, 90°13'1.80"E) in 2016, at an elevation of 291masl at 1300hours (Figure 2). It was observed on the roadside in the subtropical forest type of Bhutan.

Diagnosis: Medium size specimen on the basis of morphological attributes: 17-19-14 dorsal scale rows; SVL 410mm; TaL 56mm; HL 12mm; HD 9mm; EyeL 4mm; SL 8 with 4th&5th touching eyes; presence of loreal; VS 166; SC 37 paired without black dots; anal plate entire PrO 3; PtO; 2; PT 2+3; AT 1+2.



Figure 2: Dorsal (A), Ventral (B), Head (C) and Tail (D) of *O. cyclurus* observed in Singye.

The second specimen of *O. cyclurus*, accession number 02, was collected in Phibsoo Gewog from a Sal forest (26°45'8.15"N, 90°6'13.80"E) at an elevation of 245masl at 1100hours.

Diagnosis: Medium size specimen: SVL 310mm; TaL 41mm; HL 12mm; HD 10mm; EyeL 3mm; SL 8 with 4th & 5th touching eyes; L 1; VS 156; SC 39 paired; anal plate entire; DSR 15-18-15; PrO 3; PtO; 2; PT 1+2; AT 2+3.



Figure 3: Dorsal (A), Ventral (B), Head (C) and Tail (D) of *O. cyclurus* observed in Phibsoo Sal Forest.

The third specimen of *O. cyclurus*, accession number 03, was also collected in Phibsoo Gewog (26°45'9.17"N, 90°6'36.31"E) at an elevation of 197masl at 1400hours (Figure 4). It was observed at the same place as the field rangers' outpost.

Diagnosis: Measurement details includes SVL 450mm; TaL 64mm pointed tip; HL 16mm; HD 12.5mm; EyeL 3mm; SL 7 with 3rd and 4th touching eyes; L 1; VS 167; SC 38 paired without black dots; anal plate entire DSR 19-17-15; PrO 3; PtO; 2; PT 2+3; AT 1+2.



Figure 4: Dorsal (A), Ventral (B), Head (C) and Tail (D) of *O.cyclurus* observed in Phibsoo Outpost.

The fourth specimen of *O. cyclurus*, accession number 04, was collected from a grassland in Phibsoo Gewog (26°45'16.35"N, 90°6'17.35"E) at an elevation of 200masl at 1300hours (Figure 5).

Diagnosis: Medium size specimen: SVL 440 mm; TaL 60 mm pointed tip; HL 13mm; HD 9.3 mm; EyeL 3 mm; SL 7 with 3rd and 4th touching eyes; L 1; VS 167; SC 38 paired without black dots; DSR 17-17-15; PrO 3; PtO; 2; PT 1+3; AT 2+3. The species also had dorsal streak from head to tail with smooth body, round pupils, and pointed tail.



Figure 5: Dorsal (A), Ventral (B), Head (C), and Tail (D) of *O. cyclurus* observed in Phibsoo.

The fifth specimen of *O. cyclurus*, accession number 05, was collected as a road kill in Balatung (26°50'41.83, 90°12'42.11) (Figure 6). The specimen was deposited to PWS library by Mr. Kado Rinchen during his Covid-19 border duty. It was observed at an elevation of 340masl at 1700hours.

Diagnosis: Medium size specimen: SVL 480 mm; TaL 54mm pointed tip; HL 14mm; HD 11.8mm; EyeL 3mm; SL 8 with 4th and 5th touching eyes; L1; VS 173; SC 32 and paired; anal plate entire; DSR 19-19-14; PrO 3; PtO; 1; PT 2+3; AT 1+2;

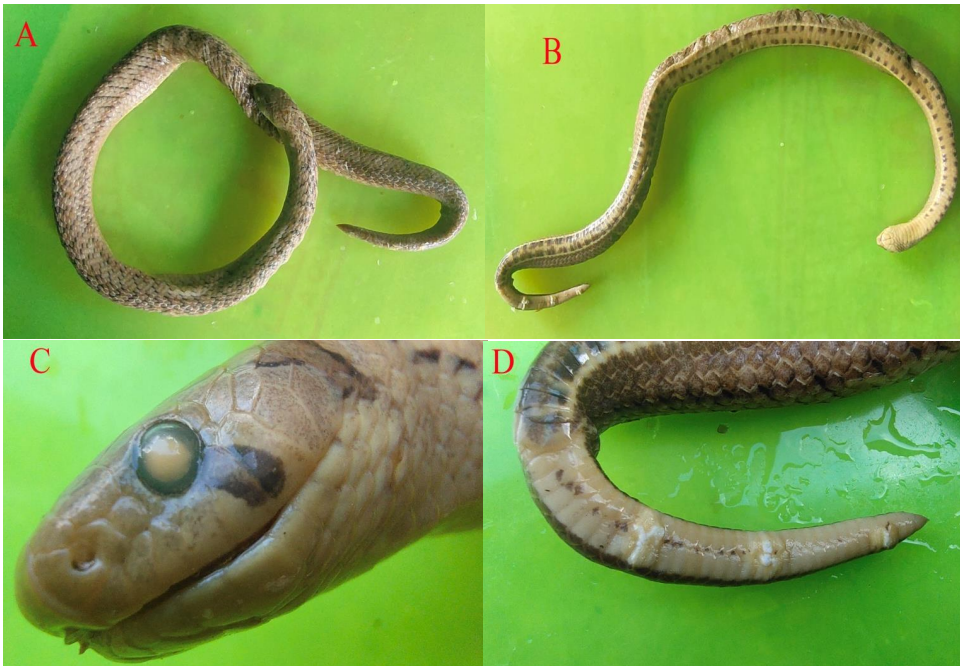


Figure 6: Dorsal (A), Ventral (B), Head (C), and Tail (D) of *O.cyclurus* observed in Balatung.

Smith (1943) provided description on morphological variation of 33 species including *Oligodon cyclurus*. Three specimens correspond to the presence of 8 normal supralabials with 4th and 5th touching eyes. Two of the specimens have 7 supralabials with 3rd and 4th touching eyes. All specimen n=5 correspond to form I (Smith 1943) with presence of dark squares spots at the outer margins of the ventral, brown above, dark brown reticulations confined to the edges of scales and being uniform whitish below. The specimens also correspond to form III with the presence of dark brown edge spots and less distinct cross-bars.

According to Smith (1943), *O. cyclurus* is fairly common in many parts of southern Indo-China, inhabiting the plains, and hills at low altitudes. Form I is also well distributed from Myanmar to Assam, India, inhabiting the

plains and lower hills (Smith, 1943). Sah et al., 2020 reported from Morang Nepal, which is part of the Eastern Himalaya. The locality of the specimens recorded in this study share a border with Assam, corresponding to the description of Smith, 1943.

Habitat and Threats

The five specimens recorded in the study were from different altered habitats. The first and fifth specimens were from road-sides with associated tree species of *Shorea robusta*, *Schima wallachia*, and mixed subtropical broadleaved forest with underground species of *Chromolaena odorata*. The second, third, and fourth species were from inhabited areas dominated by *Shorearobusta*, *Tectona grandis* with undergrowth of *Chromolaena odorata*, *Psilathus bengalensis* and palatable grasses. The non-assessed individuals observed were also from similar altered habitats,

corresponding to Staurt (2010). Since they were observed multiple times in disturbed habitat, the species is considered to be under direct threat from human population. Awareness on snakes and their importance to ecology are lacking among the local people as well as the general population of Bhutan. Four species were observed dead between 2016 and 2021, either on road or killed by local residents believing them to be venomous.

Conclusions

Oligodon cyclurus has been listed as a Least Concern (LC) species in the IUCN red list category. Even though conservation awareness in Bhutan outside the protected areas is increasing, especially with more research on wildlife in recent years, focus on herpetofauna remains a challenge. Snakes, whether venomous or non-venomous, are being killed. Therefore, conservation awareness on snakes and their role within the eco-system, are necessary, specially among students and local leaders and residents. Beside that, morphological studies on snakes are also imperative to understand the behavior of snakes in Bhutan.

Acknowledgement

We would like to thank the Phibsoo Wildlife Sanctuary for assisting in data collection and storing the specimens. We would also like to thank the Department of Forest and Park Services for giving conservation utmost importance. We thank Kado Rinchen, Forest Ranger of Trongsa, for depositing dead specimens to PWS, Namgyel Dorji and the foresters of PWS for providing pictures and locality data of species. We thank all staff of PWS for their assistance in the collection of specimen.

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Forester, his love for amphibians and reptiles kept him busy beyond his normal call of duty, that included tasks as simple as tree marking for extraction and disposal, to writing biodiversity reports. Jigme is also a member of Desuung, the Guardian of Peace, a project of His Majesty the King of Bhutan.

About the author:



Tashi Phuntsho has a Diploma in Forestry from College of Natural Resources, Lobesa. He currently works with Phibsoo Wildlife Sanctuary and is very much interested

in all kinds of subjects in the wild.



Jigme Tshelthrim Wangyal (born Bhutan: 1975) is a doctoral student at the School of Environment and Rural Science, University of New England, Armidale, NSW,

Australia. A pioneer in Bhutanese herpetology, he has been associated with study of reptiles and amphibians of Bhutan since 2008. He has an M.Sc. in Biodiversity, Wildlife and Ecosystem Health from University of Edinburgh, Scotland and advocates use of citizen science to understand the mostly unexplored herpetofauna of the Kingdom of Bhutan. After serving the Department of Forest and Park Services for two and half decades, he recently joined Bhutan Ecological Society as a Research Fellow, Biodiversity and Climate. As an employee of the Royal Government of Bhutan, he served the remotest of the places in Bhutan and gained enormous field experience in conservation of biodiversity and social welfare. Primarily a