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Short Communication

On the distribution, taxonomy, and natural history of the Indian Smooth Snake, *Coronella brachyura* (Günther, 1866)

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***Abstract.*—The Indian Smooth Snake *Coronella brachyura* is one of the least studied endemic species of snake from India with regard to distribution, taxonomy, and natural history. In the present study, we verified literature, museum specimens and distributional records which enabled us to correct erroneous reports and map the distribution of this species. Additionally, we provide information on taxonomy, morphology, microhabitat, and behavior of the species based on three live specimens and voucher specimens in the collection of the Bombay Natural History Society, Mumbai.**

Key words. Colubridae, endemic, India, rare, morphology, scalation

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Members of colubrid snake genus *Coronella* Laurenti, 1768 are among the least studied snakes across the world. The genus is represented by three species namely *C. austriaca* Laurenti, 1768, *C. girondica* (Daudin, 1803), and *C. brachyura* (Günther, 1866) (Wallach et al. 2014; Uetz and Hošek 2015). The former two species are distributed in western Palaearctic (from southern Norway in the north to northern Algeria in the south; Portugal in the west to northern Iran in the east) and the latter, endemic to India (Wallach et al. 2014; Uetz and Hošek 2015). Günther (1866) described this species from Poona (Pune) in the Indian state of Maharashtra. Subsequently, the species was reported from several localities based on which the distribution range of the species was considered to be restricted to three states in the western part of India namely; Maharashtra, Gujarat, and Madhya Pradesh. Reported localities from Maharashtra state are: "Wun, S. E. Berar" (now Wani, Yavatmal district) referred by Blanford (1870), Anderson (1871), Theobald (1876), Boulenger (1890), Sclater (1891), and Wall (1923); Chink Hill and Kurduwadi in Solapur district (Lindberg 1932); Visapur, Ahmednagar district (Gharpurey 1935); Marole (Andheri)—Salsette Islands, Mumbai (Abdulali 1935); Nashik (Mistry 2005); Melghat, Amravati district (Nande and Deshmukh 2007); Latur, Latur district (Kamble 2010); Khed, Pune district (Ghadage et al. 2013), and Jalna (Z. Mirza, pers. comm.). Furthermore, the species was reported from Gujarat state (Vyas and Patel 2007) and Ujjain, Madhya Pradesh state (Ingle and Sarsavan 2011). Sarasin (1910) referred to this species but did not provide any specific localities. Whitaker and Captain (2004) gave the range of this species as "few localities in Maharashtra." According to Smith (1943) the range of this species is "Northern India. Poona district and Visapur, near Bombay; S. E. Berar," however, it is unclear why he included "Northern India" in its range. In the recent past, we came across three live individuals of *C. brachyura* from Surat, Gujarat. Based on museum specimens, published literature, and additional data from live individuals we provide additional morphological and distributional data, as well as natural history observations for this poorly known species.

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Material and Methods

Three live specimens (two females and one male: field number assigned as: NCS 01-03) rescued by snake rescuers and brought to us (they were photographed, examined, and released at the same locality within a few days), and seven specimens catalogued in the museum of Bombay Natural History Society (BNHS), Mumbai as *Coronella brachyura* from six localities were also examined. The pholidosis and morphometric data of museum specimens and live specimens are given in Table 1.

Ventral scales were counted following the method proposed by Dowling (1951). Head measurements of voucher specimens were measured with a digital calliper to the nearest 0.01 mm and other body measurements were recorded with string and a ruler to the nearest mm. Descriptions and mensural characters were compared with available literature (Smith 1942; Mistry 2005; Vyas and Patel 2007). The number of dorsal scale rows were counted at approximately one head length behind the head, midbody, and one head length before the vent, respectively. Subcaudal counts reported here do not include the terminal scute. The supralabials touching the eye are given in brackets after the number of supralabials. Values for symmetric head characters are given in right/left order. Abbreviations used to describe scalation and other comparable characters are: V, ventrals; SC, subcaudals; D, dorsal rows; SL, supralabials; L, loreal; PrO, preocular; PO, postocular; T, temporal; IL, infralabial; SVL, snout-ventral length; TaL, tail length; TL, total length; HL, head length; and HW, head width.

Results

Morphology and coloration: Head short, comprising 2.3% of total length; longer than wide (HL/HW ratio: 1.55); slightly distinct from neck; eyes circular with round pupil; nostrils large; body circular. Dorsal color of live individuals was olive brown, with indistinct light variegation on head and forebody (Fig. 1); labials pale olive; lateral scale rows dark brown, forming indistinct lateral stripe on each side from nostril to tail, which is prominent between nostril to eye; underside cream white.

Lepidosis: Dorsal scale rows (DSR) smooth, in most specimens 23:23:19 (23:23:21 in BNHS 3407; 23:23:17 in NCS 2); with single apical pit on the posterior margin. Ventrals 209–237 (maximum 224 *fide*. Smith 1943); anal undivided; subcaudals 43–54 (46–53 *fide*. Smith 1943); rostral wider than high, scarcely visible from above; 2 internasals, wider than long; 2 prefrontals, as long as wide, longer than the internasals; frontal bell shaped, slightly longer than wide; parietals longer than wide, slightly longer than frontal; 1 loreal, as long as high, rarely longer than high; 1 preocular reaching top of head; 2 postoculars; 2 anterior temporal scales; 2, rarely 1 posterior temporal scale(s); 8, sometimes 9 (8 *fide*. Smith 1943) supra-

Fig. 1. Dorsal aspect of *Coronella brachyura* in life, from Surat, Gujarat, India.

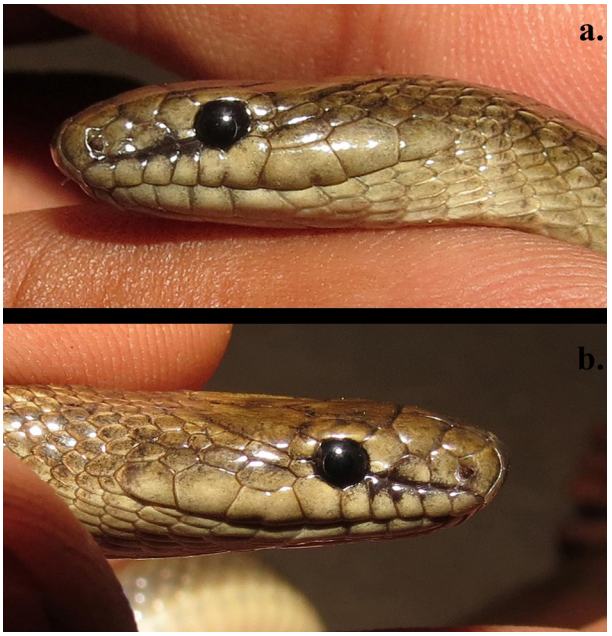

Fig. 2. Lateral aspect of *Coronella brachyura* (NCS 2); a, left side showing 8 supralabials and 5th supralabial partly divided; b, right side showing 9 supralabials, 4–6th touching eye.

labials, the 4th and 5th, sometimes 5th and 6th and rarely 4th to 6th (4th and 5th *fide*. Smith 1943) touch the eye (Fig. 2); 9–11 infralabials.

Distribution: The present study and published records (Günther 1866; Blanford 1870; Anderson 1871; Theobald 1876; Boulenger 1890; Scarlet 1891; Wall 1923; Lindberg 1932; Gharpurey 1935; Smith 1943; Whitaker and Captain 2004; Mistry 2005; Vyas and Patel 2007; Nande and Deshmukh 2007; Ingle and Sarsavan 2011; Ghadage et al. 2013) shows that the species is narrowly distributed in western India (Table 2).

Fig. 3. BNHS 794, collected by Abdulali (1935) from Mumbai, India.

Four museum specimens BNHS 793, 796, 798, and 3407 were examined. Two specimens BNHS 795 and 797 were damaged; therefore unable to examine for pholidosis and morphometric data. The specimen BNHS 794 (Fig. 3) from Marol, Mumbai collected and reported as *C. brachyura* by Abdulali (1935); was re-examined by the senior author. It had 23 scale rows at mid body; 217 ventrals; anal scale damaged; 96+ subcaudals, divided; 8 supralabials; 1 presubocular; 2+3 temporals; and measured 285 mm total length. All these characters clearly matched with *Argyrogena fasciolata* (Shaw, 1802). The coloration of this specimen has faded likely due to long

Table 1. Scale counts, measurements (mm), and collection details for specimens of *Coronella brachyura*.

Specimen No	BNHS 793	BNHS 796	BNHS 798	BNHS 3407	NCS 1	NCS 2	NCS 3
Locality	Visapur, Ahmednagar, Maharashtra	Talegaon, Pune, Maharashtra	Bhopal, Madhya Pradesh	Piplod, Surat, Gujarat	Surat, Gujarat	Piplod, Surat, Gujarat	Piplod, Surat, Gujarat
Date	—	October 27, 1956	July 1945	March 2006	December 5, 2012	February 12, 2014	Feburary 17, 2014
TL	375	523	507	495	410	620	560
SVL	322	447	443	445	360	552	480
TaL	53	66	64	50	50	68	80
D	23:23:19	23:23:19	23:23:19	23:23:21	23:23:19	23:23:17	23:23:19
V	221	216	209	237	223	223	220
A	Undivided	Undivided	Undivided	Undivided	Undivided	Undivided	Undivided
SC	45	49	47	45	47	43	54
SL	9(5,6)/8(4,5)	8(4,5)/8(4,5)	8(4,5)/8(4,5)	8(4,5)/8(4,5)	9(5,6)/8(4,5)	9(4 to 6)/8(4,5)	8(4,5)/8(4,5)
L	1/1	1/1	1/1	1/1	1/1	1/1	1/1
IL	10/10	9/10	10/10	9/9	10/10	11/11	9/9
PreO	1/1	1/1	1/1	1/1	1/1	1/1	1/1
PO	2/2	2/2	2/2	2/2	2/2	2/2	2/2
T	2+2/2+2	2+2/2+2	2+2/2+2	2+1/2+1	2+2/2+2	2+2/2+2	2+2/2+2
Sex	ND=Not Determined	ND	ND	ND	Female	Female	Male

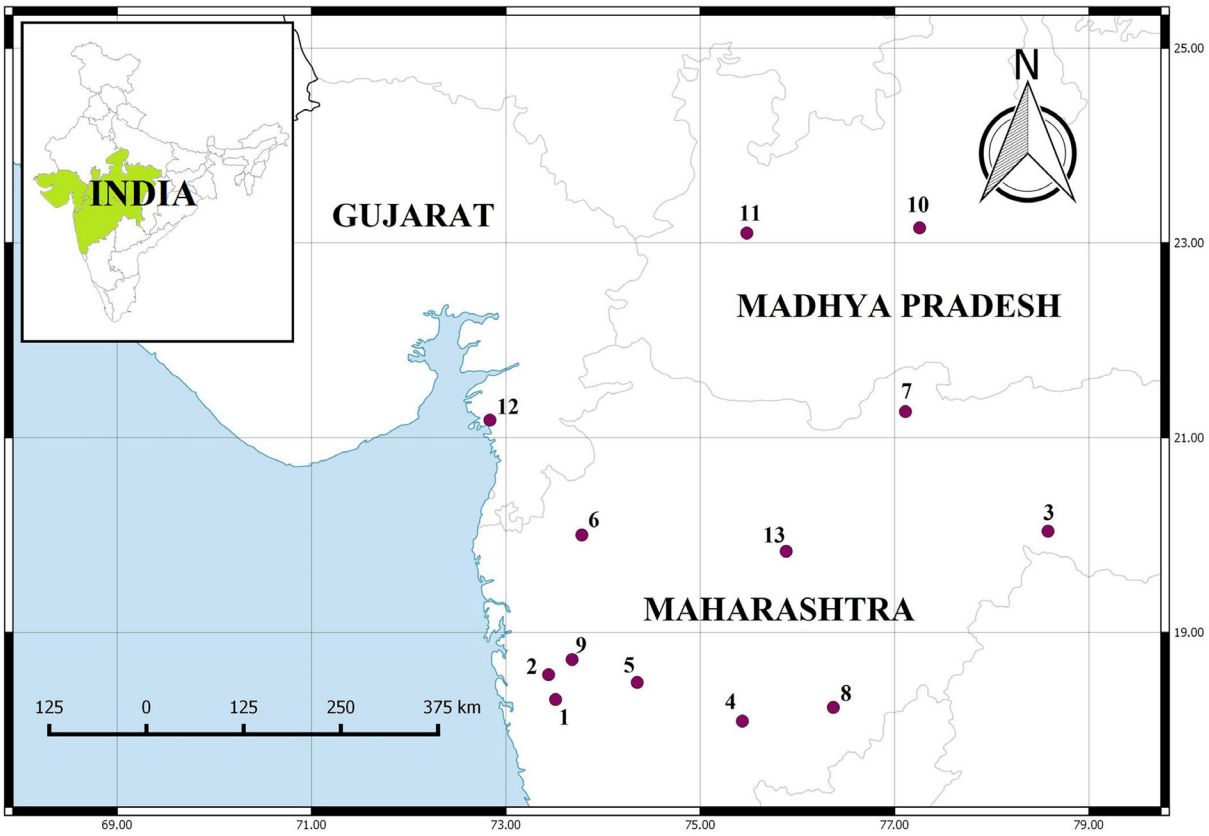

Fig. 4. Map showing distribution range of *Coronella brachyura* (For all the localities: 1–13, reference Table 2).

term preservation. However, it shows remains of 27+ vestigial whitish bands in the forebody which became paler in posterior half and became indistinguishable—which is found in juveniles of *A. fasciolata*. Based on our observations we here conclude that the specimen cited by Abdulali (1935) is conspecific with *A. fasciolata* and is an erroneous report from Mumbai, and should be removed from the known distribution range of *C. brachyura*.

Vyas and Patel (2007) collected *C. brachyura* from Surat, Gujarat and in the same publication they also presented two more localities (Ahmedabad and Bhavnagar) from Gujarat based on photographs of a striped snake which they attributed to *C. brachyura*. However, specimens were not available to the authors and hence the exact identity of specimens from these two localities remains in question. Fresh specimens are needed to confirm the presence of *C. brachyura* from these localities.

Habit, habitat, and natural history: *Coronella brachyura* are found in plains and hillocks; majority of known localities are situated around 500 m a.s.l. The species appears to occur in a wide range of habitats from arid scrub lands to dry deciduous forests; they are also found in human habitations. Two live individuals (NCS 02 and 03) were found in a water body near a newly developing urban area; NCS 01 was found near a water body. The specimens were active during day time and did not show any aggression when handled. Live individuals were kept for a few days; juveniles of *Hemidactylus* sp. were offered food but none accepted. However, some authors reported that the species feeds on juvenile geckos in captivity (Whitaker and Captain 2004; Ingle and Sarsavan 2011).

Discussion

Distribution: Our observations coupled with published information of the species shows this endemic species is widely distributed encompassing a geographical area of 2,80,000 sq. km across three Indian states, namely Maharashtra, Madhya Pradesh (west), and Gujarat (south), only (Fig. 4). This has a very similar distribution range recorded in another endemic colubrid snake, *Psammophis longifrons* (Vyas and Patel 2013).

Conservation status: *Coronella brachyura* is legally protected as a Schedule IV species under the Indian Wildlife Protection Act of 1972 and categorized as Least Concern by the IUCN Red List of Threatened Species (Srinivasulu et al. 2013). During the study no specific threats to the species were observed, except the general threats to the reptilian fauna as reported by Vyas (2007), including expansion of urbanization, agricultural lands, habitat loss, and habitat alteration, and large numbers of snakes killed by laymen due to fear.

Taxonomy: The genus *Coronella* has shown to be paraphyletic based on molecular data from western Palaeart-

Table 2. List of localities for *Coronella brachyura* based on new collections or observations[1], examined specimens[2], literature or database records,[3] and photographic records.[4]

No	Locality	Coordinates	Elevation, m a.s.l.	District	State
1	Pune[2,3]	18.31°N 73.51°E	561	Pune	Maharashtra
2	Talegaon[2,3]	18.72°N 73.68°E	670	Pune	Maharashtra
3	Wani[3]	20.03°N 78.57°E	228	Yavatmal	Maharashtra
4	Kurduwadi[2,3]	18.08°N 75.43°E	502	Solapur	Maharashtra
5	Visapur[2,3]	18.48°N 74.35°E	620	Ahmednagar	Maharashtra
6	Nashik[3]	20.00°N 73.78°E	600	Nashik	Maharashtra
7	Melghat[3]	21.26°N 77.11°E	575	Amravati	Maharashtra
8	Latur[3]	18.23°N 76.36°E	620	Latur	Maharashtra
9	Khed[3]	18.56°N 73.43°E	715	Pune	Maharashtra
10	Bhopal[2]	23.15°N 77.25°E	527	Bhopal	Madhya Pradesh
11	Ujjain[3]	23.10°N 75.47°E	511	Ujjain	Madhya Pradesh
12	Surat[1,2,3]	21.18°N 72.83°E	13	Surat	Gujarat
13	Jalna[4]	19.83°N 75.88°E	489	Jalna	Maharashtra

ic species by recent workers (Pyron et al. 2010, 2013; Utiger et al. 2002). Recently, Hoser (2012) removed *C. brachyura* from the genus *Coronella* and allocated it to the genus *Wallophis*; it was earlier suggested by Werner (1929). In doing so, Hoser (2012) did not provide any valid taxonomic characters to support partitioning the genus *Coronella*. *Coronella brachyura* differs from its congeners by the higher number of scale rows at mid body (23 vs. 21 in *C. girondica* and 19 in *C. austriaca*); by the higher number of supralabials (8–9 vs. 7 in *C. austriaca* and 8 in *C. girondica*). However, the status of Indian taxa remains unresolved as there is no comparative study on the morphology or molecular data of *Coronella* with other colubrid genera. We believe for now, the Indian species should be considered as a member of the genus *Coronella*. Future studies involving detailed comparison of the genus *Coronella*, with the aid of molecular techniques, will be essential for the correct allocation of Indian species.

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