



RECORDS OF THE INDIAN SAND SNAKE *PSAMMOPHIS CONDANARUS* (MERREM, 1820) (REPTILIA: LAMPROPHIIDAE) IN SOUTHERN INDIA

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Abstract: We present new records of the Indian Sand Snake *Psammophis condanarus* from southern India, where its existence has remained doubtful till date. Our records are based on both live and preserved voucher specimens that are illustrated and described here. We furnish distribution records of this species from two sites belonging to two different ecoregions in southern India—Tirupati in the Eastern Ghats and Hospete in the Deccan plateau. Our work highlights the obscurity of certain, large-growing, diurnal land snakes that have as yet managed to evade the attention of field biologists largely due to a lack of field surveys in certain ecoregions.

Keywords: Distribution, literature records, snake, southern India.

The Indian Sand Snake *Psammophis condanarus* (Merrem, 1820) is distributed in eastern, northern and central India including parts of the Himalayan foothills, Bengal, Indo-gangetic plains, northwestern arid desert zones including Pakistan and northern parts of the Deccan plateau (Stoliczka 1872; Murray 1886; Wall 1908; Minton 1966; Whitaker & Captain 2004; Chandra & Gajbe 2005), making it the most widespread species of the genus in the Indian subcontinent. In fact it is the only congener in most of the central and eastern

parts of peninsular India (Smith 1943; Whitaker & Captain 2004). Three more congeneric species namely *P. schokari* (Forskal, 1775), *P. longifrons* Boulenger, 1890, and *P. leithi* Günther, 1869 are confined mainly to northwestern and central India (Whitaker & Captain 2004; Vyas & Patel 2013). A closely related congener *Psammophis indochinensis* Smith, 1943 inhabits the Indo-Chinese region (Smith 1943).

Psammophis condanarus was originally described as *Coluber condanarus* based on the plate of Russell (1796) which was drawn on the basis of material originating from Ganjam in the Circar coastal plains of the Indian peninsula (Merrem 1820). That specimen, measuring 724mm that was described and illustrated in Russell (1796: 32–33, pl.27) under the title “Condanarouse” was designated as the lectotype of *Coluber condanarus* by Wallach et al. (2014). There are some subjective junior synonyms namely *Leptophis bellii* Jerdon, 1853 from Jalna (19.83 N & 75.88 E) in Deccan Plateau, *Psammophis taeniata* Günther, 1862 from “India”, *Psammophis indicus* Beddome, 1863 from Nallamala (15.40 N

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& 78.47 E) in the Eastern Ghats, *Phayrea isabellina* Theobald, 1868 from an unknown locality, *Psammophis sibilans quadrilineata* Jan in Jan & Sordelli, 1870 from an unknown locality and *Mike elegantissima* Werner, 1924 from an unknown locality (Wallach et al. 2014) for this species [in the combination *Taphrometopon condanarum* (see Wallach et al. 2014)]. A nomen nudum *Psammophis sibilans quadrilineata* Jan, 1863 also exists (Wallach et al. 2014).

The current day distribution of this species as such encompasses the type localities of these synonymised nomina in as far as they are known (Whitaker & Captain 2004). Ali (1943) reported this species from Bandipur (11.44 N & 76.50 E) near the Western Ghats, abutting the Mysore plateau, on the basis of a single specimen recovered from the stomach of a Short-toed Eagle *Circaetus gallicus*. Prasad (1992) highlighted the same and opined it to be a valid but overlooked record. He did not present any new material from southern India. We hereby confirm and elaborate on the distribution of this species in southern India.

MATERIAL AND METHODS

This study is based on the examination of both live and preserved specimens, one each from the Eastern Ghats and the Deccan plateau. Morphological examination terminology and protocols follow Whitaker & Captain (2004). Ventral scale counting follows Dowling (1951) and hemipenial description follows Dowling & Savage (1960). Body length was measured using a standard measuring tape (L.C 1mm) while other smaller measurements were taken using vernier callipers (L.C 0.1mm). Scale counts were done using a magnifying hand lens (5 X optical zoom). Scallation and distribution data were compared with literature. Photographs were taken using digital cameras.

TAXONOMY

***Psammophis condanarus* (Merrem, 1820)**

***Coluber condanarus* Merrem, 1820**

***Leptophis bellii* Jerdon, 1854**

***Psammophis taeniata* Günther, 1862**

***Psammophis indicus* Beddome, 1863**

***Phayrea isabellina* Theobald, 1868 (inc. sed. fide Wall 1921)**

***Psammophis sibilans quadrilineata* Jan, 1870 in Jan & Sordelli, 1866–1870**

***Mike elegantissima* Werner, 1924**

***Psammophis condanarus condanarus* - Smith 1943**

***Taphrometopon condanarum* - Wallach et al. 2014**

Specimens studied: BLT77 (Biolab Tirupati), an adult male preserved specimen (Image 1) with everted hemipenis, 21.xii.2013, Kapilatheertham (13.65 N & 79.42 E; 180m; Image 1), Tirupati, Chittoor District, Andhra Pradesh, central Eastern Ghats, coll. Bubesh Gupta.

A live adult (Image 2) from Hospet (15.27 N & 76.39 E; 480m; Image 2), in Bellary District, Karnataka, part of Deccan plateau, captured by Aslam Sayed on 12.11.2016.

Description (also see Table 1): A thick-set, smooth and glossy-bodied snake with fairly large head, sharply protruding snout, concave loreal, distinct neck, robust body and tapering tail. Measurements of preserved specimen (in mm): head length: 23.50, head width: 11.50, head depth: 7.50, midbody width: 12.00, eye diameter: 3.30, eye-lip distance: 5.50, inter-narial distance: 3.50, frontal scale length: 6.00, frontal-rostral distance: 4.00, frontal width at midline: 2.20, frontal width at anterior end: 3.00. Measurements of live specimen (in mm): head length: 18.5; head width: 7.5; head depth: 7.0; body width: 10.5; eye diameter: 2.5. Scallation: Rostral visible from above, protruding, with a distinct cleft underneath; nasal scale only partially divided, sutured below the nostril, reaching between 1st and 2nd supralabials, loreal oval, posterior genials slightly longer than anterior pair, dorsal scales imbricate, smooth but with distinct and deep apical pits, outermost coastal scale rows slightly larger than the rest, vertebral scale rows not larger than the rest, scales on dorsal tail larger, ventral scales very wide, extending on to ventrolateral parts, not angulate laterally. Colour in preservation of voucher specimen (formalin-darkened): slaty dark grey above with white and black spots on labia, chin and outermost scalerows; dorsum with three dark greyish-brown stripes - one vertebral stripe that is five scalerows wide (at midbody) narrowing posteriorly to three scalerows wide; this one flanked by two lateral stripes on either side that are one scale row wide; each ventral scale dotted with black on either extremities forming a ventro-lateral line. Colouration in life (based on both specimens): dorsum light rosy grey, with a broad, five scales-wide dark coffee brown, black and white edged vertebral stripe; laterally flanked by two thinner stripes three scales-wide, partly of fully black-bordered similar dark brown bilateral stripes on each side. Top of head dark brown being the origin of the dark broad vertebral stripe; sides of head covered by similar dark brown stripe across eye, separated above a thin lighter supraocular stripe; rest of the head (including labia), chin and underside of head pale white with brownish spots; a brown-bordered white ventrolateral stripe covering the confluence of

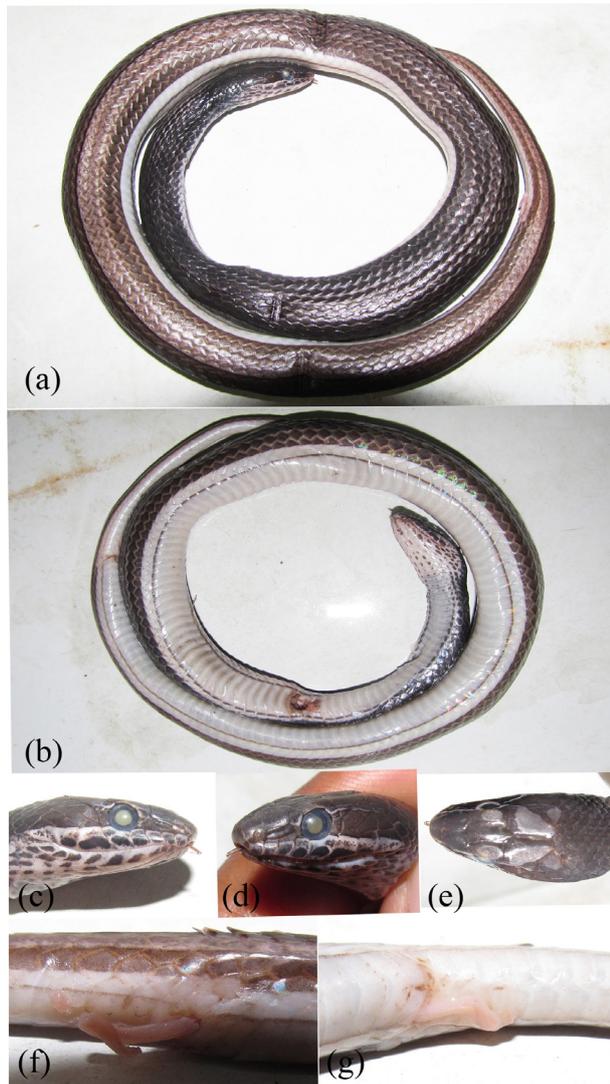


Image 1. *Psammophis condanarus* voucher specimen BLT77 showing (a) entire dorsal, (b) ventral, (c) head right side, (d) head left side, (e) head top view, (f) hemipenis asulcate view, (g) hemipenis sulcate view. © S.R. Ganesh

ventral and outermost coastal scalerows; ventral and subcaudal scales pale yellow. Hemipenis (n=1, of the preserved specimen): organ everted, with a single side exposed out; organ smooth, slender and without a broad lobe-head, not quite forked at tip; pedicel narrower, at the level of tubular part; pedicel head lacking spiny projections or other distinct architecture; sulcal lips not prominent, smooth; organ 18mm long and 4mm wide, extending upto 5th subcaudal scale.

Field observations: The snake from Tirupati was observed actively moving about in a grassy patch during early morning hours in Kapilatheertham, at the foot of the Tirumala Hills. The one from Hospet was captured from suburban outskirts of the city during daytime

Table 1. Morphological data of new southern Indian specimens of *Psammophis condanarus*, compared with the literature (Smith 1943; Whitaker & Captain 2004)

Character	Tirupati, Andhra Pradesh (BLT77)	Hospet, Karnataka	Smith 1943; Whitaker & Captain 2004
S	Male	Female	-
SVL	450mm	375mm	-
TL	80 + ? mm (tail cut)	72.5 mm	-
ToL	530 + ? mm	447.5mm	1,075mm (max.)
PV	3	2	-
V	154	156	165-179
SC	53 + ? (tail incomplete)	70	85-93 (M), 75-85 (F)
A	2	2	2
D	17:17:13	17: 17: 13	17: 17: 15/13
N	United above	United above	United above
SL	8	8	8
SLE	4-5	4-5	4-5
L	1	1	1
Pre-O	1	1	1
PF	0	0	0
PO	2	2	2
T	1+2	1+3	1+2
IL	10	10	-
ILG	5	5	-
ST	5	5	5 ¹
TS	3	3	5/3 ²

Abbreviations used are: S - Sex, SVL - Snout-ventral length, TL - Tail length, ToL - Total length, PV - Preventral, V - Ventral, SC - Subcaudal, A - Anal, D, Dorsal, N - Nature of suture of nasal, SL - Supralabial, SLE - Supralabial in contact with eyes, L - Loreal, PF - Preocular-Frontal contact, Pre-O - Preocular, PO - Postocular, T - Temporal, IL - Infralabial, ILG - Infralabial in contact with anterior genials, ST - Number of dorsal scales covered by vertebral stripe, TS - Total number of dark stripes.

1 - From Deccan (Vidarbha in Eastern Maharashtra); 2 - Deccan (Eastern Maharashtra) population bears three dark stripes.

when it was taking shelter along the boundary wall of a building. The area was vegetated with thorny bushes and human settlements.

DISCUSSION

We attribute the Eastern Ghats and Deccan populations to *P. condanarus* based on the following combination of characters which are compared with all Indian congeners: anal scale divided (vs. single in *P. leithi*), preocular not touching frontal (vs. touching in *P. leithi* and *P. schokari*), frontal anteriorly not twice as wide as at midline (vs. anteriorly twice as wide as at midline in *P. leithi* and *P. schokari*), nasal only partially divided (vs. completely divided in *P. leithi* and *P.*

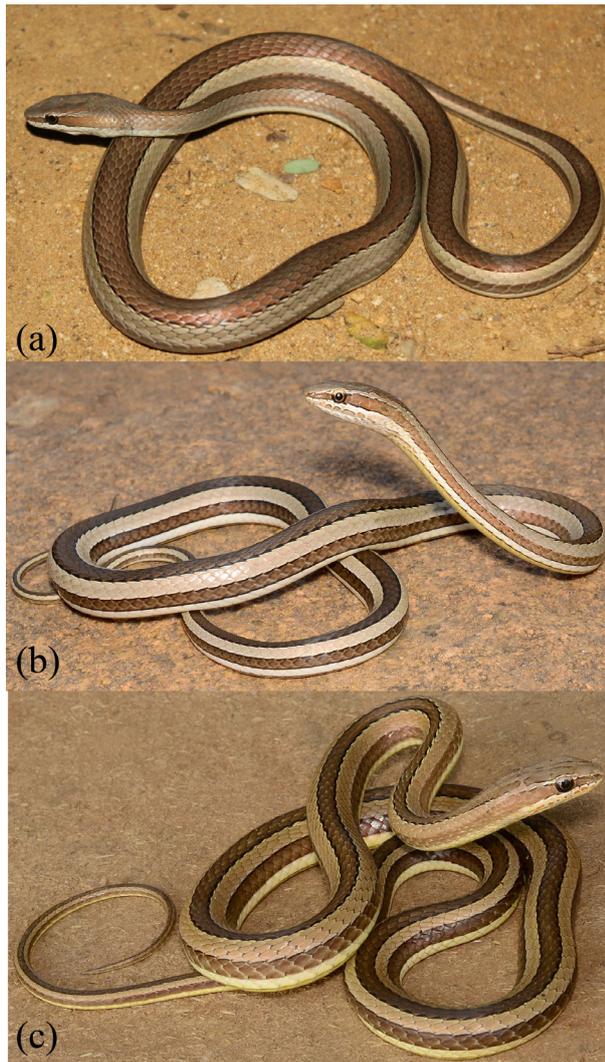


Image 2. *Psammophis condanarus* illustrated in life colouration: (a) from Tirupathi, Chittoor District, Andhra Pradesh, Eastern Ghats © Bubesh Guptha, (b) from Hospete, Bellary District, Karnataka, Deccan plateau © Vivek Sharma, (c) from Nasik, Maharashtra © Vivek Sharma

schokari), frontal distinctly longer than its distance from snout-tip (vs. not longer than its distance from snout-tip in *P. longifrons*), body with 3 or 5 longitudinal stripes with vertebral stripe darker (vs. 4 with vertebral stripe light in *P. leithi*, 4 or uniformly dark with vertebral stripe light in *P. schokari*, with brownish body and scales edged with black in *P. longifrons*) (see Smith 1943; Whitaker & Captain 2004).

Smith (1943) described the Indo-Chinese population of *P. condanarus* as subspecies *P. condanarus indochinensis* based on the differences in ventral, subcaudal counts and dorsal stripe patterns. Later it was given full species status by Hughes (1999) in his review on primarily African species. *Psammophis*

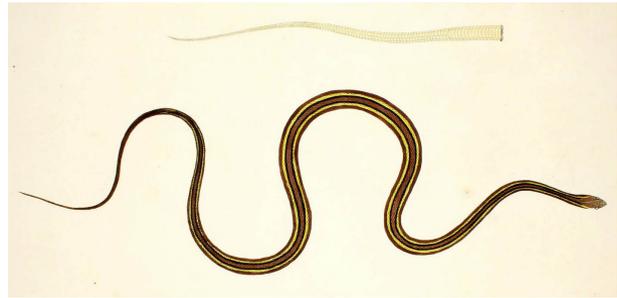


Image 3. *Coluber condanarus*. Reproduction of the lectotype's drawing in plate 27 of Russell (1796)

condanarus is distinct from *P. indochinensis* by having higher ventrals (165-179 vs. 156-173 in *P. indochinensis*), higher subcaudals (75-93 vs. 66-85 in *P. indochinensis*), dorsal pattern (vertebral stripes darker vs. vertebral stripe lighter/absent or variable), number of dark dorsal stripes (3 or 5 vs. 4 in *P. indochinensis*) and their different geographical distributions. It is noteworthy here that the ventral counts of the new material resemble *P. indochinensis* much more than *P. condanarus*. We provisionally consider them to represent *P. condanarus*, based on congruence of other morphological characters and distribution.

Due to this morphological incongruence, it is essential here to deal with the synonyms of *P. condanarus* (Günther 1864; also see Uetz & Hosek 2017). Jerdon (1854) described *Leptophis bellii* from Jalna. Günther (1864) remarks that he was able to categorically identify Jerdon's Snake based on Walter Elliot's drawing named *Leptophis bellii* that depicted a snake identical to *P. condanarus*. Günther (1864) also associated another nomen *Psammophis taeniata* Günther, 1862 from Forts Pitt's museum specimens from India as a synonym of *P. condanarus*. Though *P. taeniata* was later not recognised as a synonym (Smith 1943) it was then again listed so (Wallach et al. 2014). It is noteworthy here that *Psammophis taeniata* mentions four dark dorsal stripes (Günther 1862). The next synonym *Psammophis indicus* Beddome, 1863 was erected on the basis of a holotype from the Eastern Ghats (Nallamalais, as Nullay Mullay hills of Kurnool district; Beddome 1863). It also specifies three dark stripes, although, Beddome (1863) did not mention any ventral count value, precluding us to associate or recognise our geographically discrete morphological variation.

Another synonym *Phayrea isabellina* Theobald, 1868 has had a rather unsettled past. In its original description, Theobald (1868) provided a very brief account and later authors often just repeated the same information. This short-lived nomen remained valid for just two years and

was synonymised under *P. condanarus* as early as in 1870 by multiple authors. Günther (1870) stated that *P. condanarus* had been described as *Phayrea isabellina*. Stoliczka (1870) associated both these nomina as synonyms whilst mentioning about a specimen from Shimla. Scalter (1891) mentioned that the type is in the Zoological Survey of India, Kolkata's Museum catalogue stating that "no locality" and "no [collector] history" is associated with the specimen. Later, Wall (1921) redescribed the type and opined it to be more related to an *Amphiesma* pointing out discrepancies in dorsal scale row counts and the consequent taxonomic interpretations that entail. Das et al. (1998) mention this nomen as a synonym of an unrelated Neotropical snake *Liophis lineatus* (Linnaeus, 1758). Without discussion, Wallach et al. (2014) again list *Phayrea isabellina* in the synonymy of *P. condanarus*. In essence, due to the complicated taxonomy of *P. condanarus*, a population systematics study is needed to resolve the problems.

Our individuals are similar to those from Maharashtra plateau in having only three dark dorsal stripes where vertebral stripe covers 3 or 5 vertebral scale rows. In the past records it is also mentioned that Eastern Maharashtra's population bears only three dark stripes (Whitaker & Captain 2004). Smith (1943) mentions a juvenile from the same area having a vertebral stripe that occupies five scale rows. No other data or discussion is available except these small variations, perhaps indicative of the very few specimens examined from these parts. To get further support, one of us (VS) examined and confirmed the above mentioned characters in the population of Nashik of western Maharashtra where one specimen had a vertebral stripe covering five dorsal scales with 172 ventrals and 73 subcaudals while another one had the same covering three dorsal rows with 173 ventrals and 73 subcaudals (Image 2). To know the pattern in the nominotypical population, we examined the plate of Russell (1796) and found that the drawn specimen had only three stripes.

In southern India, this species was doubtfully known from Bandipur of Mysore plateau (Ali 1943) so far. This work confirms and extends the distribution of *P. condanarus* in southern India where it is likely to be the only representative congener in most of its range unlike other parts further north. It may be noted that recent surveys also revealed the presence of at least one other congener, the stout Sand Snake *Psammophis longifrons* Boulenger, 1890 in southern India (Shikaripur, Shimoga of Karnataka by Premkumar & Sharma 2017), where its existence had been doubted previously (Boulenger 1890; Smith 1943; Whitaker & Captain 2004). Large

variation in ventral and subcaudal scale counts warrants taxonomic studies on this population. It is hoped that our current findings will instigate and encourage further work on the population systematics of *Psammophis condanarus*.

In peninsular India, studies on snakes had mainly targeted the evergreen forest-clad Western Ghats biodiversity hotspot in the past (e.g., Hutton & David 2009; Ganesh et al. 2014), while other ecoregions (such as the Eastern Ghats, Deccan plateau, etc.) that are much drier, have been rather neglected. But recent works in these under-studied regions (e.g., Rao et al. 2005; Srinivasulu & Das 2008; Ganesh & Arumugam 2016; Pompayya & Aslam 2016) reveal higher herpetological diversity than earlier presumed. Both the historical reports of *P. condanarus* from Nallamala (Beddome 1863) and *P. longifrons* from Cudappah (Boulenger 1890) were not mentioned in the recent works on the Nallamala herpetofauna (Rao et al. 2005; Srinivasulu & Das 2008). The recent findings show that the biodiversity, especially of the herpetofauna, of the dry forests in several ecoregions of southern India, was grossly underestimated.

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