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The status of the Indian endemic *Typhlops acutus* (DUMÉRIL & BIBRON) and the identity of *Typhlops psittacus* WERNER (Reptilia, Serpentes, Typhlopidae)

by V. WALLACH

Abstract

The morphology of *Typhlops acutus* (DUMÉRIL & BIBRON, 1844) and its distribution are reviewed, the internal anatomy is described, a neotype is designated, and the species is transferred from *Typhlops* to *Rhinotyphlops* and placed in the *Rhinotyphlops unitaeniatus* species group. *Typhlops boylei* FITZSIMONS (1932) and *Typhlops simoni* BOETTGER (1879) are referred to the genus *Rhinotyphlops*. The holotype of *Typhlops psittacus* WERNER (1903) is redescribed and compared with suggested affinities to *Rhinotyphlops ataeniatus* (BOULENGER, 1912), *R. caecus* (DUMÉRIL, 1856), and *R. unitaeniatus* (PETERS, 1878). It is concluded that it represents a specimen of *Rhinotyphlops acutus* from peninsular India, and is placed in the synonymy of *R. acutus* within the *R. unitaeniatus* group.
Key-words : *Typhlops acutus*, *Typhlops psittacus*, *Typhlops boylei*, *Rhinotyphlops*, *Rhinotyphlops caecus*, *Rhinotyphlops ataeniatus*, *Rhinotyphlops unitaeniatus*, India, distribution, visceral anatomy.

Résumé

La morphologie et la distribution de *Typhlops acutus* (DUMÉRIL & BIBRON, 1844) sont révisés, l'anatomie interne est décrite et un néotype est désigné. L'espèce est transférée du genre *Typhlops* au genre *Rhinotyphlops* et placé dans le groupe espèce *unitaeniatus*. *Typhlops boylei* FITZSIMONS (1932) et *Typhlops simoni* BOETTGER (1879) sont rattaché au genre *Rhinotyphlops*. L'holotype de *Typhlops psittacus* WERNER (1903) est redécrit et comparée, sur base d'affinitiés suggérées, avec *Rhinotyphlops ataeniatus* (BOULENGER, 1912), *R. caecus* (DUMÉRIL, 1856), et *R. unitaeniatus* (PETERS, 1878). En conclusion, l'holotype représente un spécimen de *Rhinotyphlops acutus* de la péninsule indienne et est mis en synonymie avec *R. acutus* au sein du groupe *unitaeniatus*.
Mot clés : *Typhlops acutus*, *Typhlops boylei*, *Typhlops psittacus*, *Rhinotyphlops*, *Rhinotyphlops caecus*, *Rhinotyphlops ataeniatus*, *Rhinotyphlops unitaeniatus*, India, distribution, viscères.

Introduction

Typhlops acutus, commonly known as the giant or beaked blind snake (GHARPUREY, 1962; WHITAKER, 1978; DANIEL, 1983), is a unique endemic member of the peninsular Indian ophiofauna. It is immediately recognizable from all other Indian scolecophidians, even by the novice, due to its large size, beaked lateral head profile, wide rostral, and high number of longitudinal scale rows (WALL, 1923b; SMITH, 1943; MURTHY, 1986). Very little is known about its biology and natural history as it is not a common snake, at least in museum collections, even though ANNANDALE (1905) reported it to be the most abundant species in Calcutta. My survey of *Typhlops acutus* holdings from all collections (excepting those in India) reveals that the three largest series consist of three (UF), six (CAS), and 13 (BMNH) specimens, with the majority of museums containing only a single individual. MURTHY (1990a) mentioned that the Zoological Survey of India collection contains only two specimens of *T. acutus*. It seems appropriate, therefore, as an introduction, to provide a synopsis of the literature, distribution records, and morphology on this rare and unusual blind snake.

Materials and Methods

All specimens were examined with the aid of a Wild binocular dissecting microscope. Measurements were made to the nearest 0.5 mm with two exceptions : cephalic measurements of the types of *Typhlops acutus* and *Typhlops psittacus* were made to the nearest 0.05 mm with an ocular micrometer and total lengths have been rounded to the nearest mm in the Tables. Scale rows were counted as follows : transverse scale rows (TSR) between the rostral shield and apical spine/scale along middorsal line; longitudinal scale rows (LSR) at three points, first at level of 20th midventral scale caudad of mental, second at midbody, and third at level of 10th scale craniad of anals; subcaudals (SC) between vent and terminal spine/scale midventrally; dorsocaudals (DC) between line drawn perpendicular to body axis at anterolateral edge of vent and apical spine/scale. Descriptive ratios include total length/midbody diameter (L/W), relative tail length or tail length/total length (TL/BL), and tail proportion or tail length/midtail diameter (TL/W).

Measurements of head dimensions, parallel or perpendicular to the body axes, are as follows : lateral head length (LHL) is tip of snout to posterior edge of fourth

supralabial, lateral rostral length (LRL) is tip of snout to posterior edge of rostral, eye-snout length (ESL) is tip of snout to posterior edge of eye, eye-nostril length (ENL) is anterior edge of nostril to posterior edge of eye, ventral rostral length (VRL) is rostral length along midline, dorsal head width (DHW) is head diameter at ocular level, dorsal rostral width (DRW) is maximum width of rostral, ventral head width (VHW) is width of head at level of nostrils, ventral rostral width (VRW) is maximum width of rostral ventrally, ventral nostril width (VNW) is maximum width of nostrils ventrally, interocular width (IOW) is distance between eyes, lateral head depth (LHD) is depth of head from rostral to lip border at ocular level, rostral-nostril depth (RND) is vertical distance between rostral and dorsal edge of nostril at level of eye, eye-nostril depth (END) is ventral edge of eye to dorsal edge of nostril. Supralabial imbrication patterns (SIP) follow WALLACH (1993a). In the description of the soft anatomy, all percentages refer to percent snout-vent length (% SVL), rounded off to the nearest 0.1 %, with MP representing the midpoint value of the organ as % SVL (see WALLACH, 1985, 1994, for definitions of visceral characters). Museum acronyms follow Leviton et al. (1985) with the addition of ASB (Asiatic Society of Bengal, Calcutta), ETRC (École Technique (Realschule) de Cologne), and IM (Indian Museum, Calcutta).

Taxonomic account

Typhlops acutus (DUMÉRIL & BIBRON, 1844)

Onychocephalus acutus DUMÉRIL & BIBRON, 1844 : 333. Type locality : "inconnue." Holotype : in the "collections zoologiques réunies au fort Pitt, à Chatham" *fide* DUMÉRIL & BIBRON, 1844 : 334, but now lost *fide* HAHN, 1980 : 49. DUMÉRIL & DUMÉRIL, 1851 : 204; JERDON, 1853 : 527 (Chyebasa; Carnatic at Nellore); PETERS, 1860 : 79; GÜNTHER, 1864 : 177, pl. 16, fig. A (Anamallay Mountains; the Deccan; Madras); GÜNTHER, 1869 : 501 (Belgaum; Bombay; Matheran); THEOBALD, 1868 : 42 (Chaibassa); NICHOLSON, 1870 : 56; NICHOLSON, 1874 : 48; THEOBALD, 1876 : 126 (Anamallay hills; the Dekkan); PHIPSON, 1888 : 49 (Alibag, Kolaba; Carwar; Neemuch).

Typhlops russellii GRAY, 1845 : 132 (preoccupied by *Typhlops russeli* SCHLEGEL, 1839 [= *Ramphotyphlops braminus fide* GÜNTHER, 1864 : 175]). Type locality : "India." Holotype : BMNH 1946.1.11.70. Synonymy *fide* PETERS, 1865 : 263. JERDON, 1853 : 527 (Chyebasa).

Onychocéphale museau pointu DUMÉRIL, 1853 : 422. (nonbinomial vernacular name).

Onychocephalus westermanni LÜTKEN, 1862 : 306, pl. 1–2, figs. 5a-c. Type locality : "India Orientali." Holotype : ZMUC R52183. Synonymy *fide* PETERS, 1865 : 263.

Onychodactylus westermanni, LÜTKEN, 1862 : pl. 1–2. (printer's error)

Typhlops excipiens JAN, 1864 : 30. Type locality : "Indes orientales." Holotype : École Technique (Realschule) de Cologne. Synonymy *fide* PETERS, 1865 : 263. JAN, 1865 *in* JAN & SORDELLI, 1860–1866 : livr. 9, pl. 1, fig. 5 (Indes orientales).

Onychocephalus malabaricus BEDDOME *in* GÜNTHER, 1875 : 224. (*nomen nudum*). Type locality : "Nellumbar, India." Syntypes : BMNH 1946.1.11.66 and CAS 17170.

Grypotyphlops acutus, PETERS, 1881 : 70; HOFFMANN, 1890 : 1622; WILLIAMS & WALLACH, 1989 : 66.

Typhlops (Onychocephalus) acutus, MÜLLER, 1885 : 674 (Malabar).

Typhlops acutus, BOULENGER, 1890 : 242 (Southern India; Deccan); SCLATER, 1891a : 232 (Calcutta; Chybassa in Chota Nagpur; Krishnaghur; Malabar; Sipri in Gwalior [Bengal]); SCLATER, 1891b : 3 (Balasore dist.; Calcutta; Chybassa; Deccan; Krishnaghur; Sipri, Gwalior [Bengal and Madras Presidencies]); BOULENGER, 1893 : 56 (India; Aska, Ganjam; Anamallays; Belgaum; Madras Presidency; Malabar; Matheran; Nellumbar; Palghat Hills; Trichinopoly); BETHENCOURT-FERREIRA, 1897 : 221 (Junta de Saude [India port.]; Faría Leal [Gôa]; Mahé); CARDEW, 1897 : 596; Lampe, 1902 : 8 (Ost-Indien); ANNANDALE, 1904 : 208; ANNANDALE, 1905 : 209 (Calcutta); WALL, 1905 : 293 (Cannanore); ANNANDALE, 1907 : 398 (Gopkuda Island, Chilka Lake, Orissa); SARASIN, 1910 : 141; D'ABREU, 1916 : 5 (Nagpur, Central Provinces); WALL, 1918 : 377 (Peninsular India, South of the Ganges Basin); WERNER, 1921 : 331 (Vorderindien); WALL, 1923a : 351 (Peninsular India. South of the Ganges Basin, South of Rajputana); WALL, 1923b : 7, fig. 9 (Pen. India S. of Ganges basin); LINDBERG, 1932 : 694 (Kurduvadi, Bombay Deccan); LINDBERG, 1939 : 331 (Deccan [Inde]); SMITH, 1943 : 56, fig. 16 (India, south of the Ganges Basin and south of Rajputana, west to Baroda and east to Calcutta); ANGEL, 1947 : 57 (Kurduvadi [Bombay Presidency]); GUIBÉ, 1949 : 226; KASHYAP, 1950 : 43 (Dharwar); KASHYAP, 1960 : 253; SATYAMURTI, 1960 : 5 (Madras); PARKER, 1963 : 156, fig. 11, 186; DEORAS, 1965 : 81, fig. 40 (mislabelled as *Typhlops braminus*); BEHURA, 1966 : (unnumbered) (Orissa); SHARMA, 1971 : 87 (Baroda [Gujarat]; Calcutta [West Bengal]; Nagarjuna Hill, ca. 4 km NW Pullareddygudem, Guntur District, Andhra Pradesh; South Rajasthan); TIWARI & SHARMA, 1971 : 109 (Calcutta, Cossipur, Krishnanagar [West Bengal]; Chaibassa in Manbhum District [Bihar]; Balasore, Gophuda Island, Barkuda Island, Rambha Island in Chilka Lake [Orissa]; Nagarjuna Hill, Guntur District [Andhra Pradesh]; Madras; Calicut, Trichur [Kerala]; Baroda [Gujarat]; Gwalior [Madhya Pradesh]; Vetal Hill, Poona [Maharashtra]); LANZA, 1972 : 40 (Penisola Indiana); MCDOWELL, 1974 : 22; SHARMA, 1976 : 159 (Ponda [Goa]); HAHN, 1977 : 39; PARKER, 1977 : 156, fig. 11, 186; HAHN, 1980 : 49 (India, south of the Ganges Basin and south of Rajputana, west to Baroda and east to Calcutta); SHARMA, 1982 : 100 (Peninsular India; Bihar; Orissa; West Bengal; Baroda, Virandragarh ca. 14 km. from Dhrangadhra, Surendranagar Dist., Gujarat); MAHENDRA, 1984 : 34, fig. 7 (South of the Gangetic Plain and South of Rajputana, westward to Baroda and eastward to Calcutta); MURTHY, 1985 : 59 (Peninsular India); TIWARI, 1985 : 227; MURTHY, 1986 : 10, fig. 9 (Ganges Basin, South of Rajasthan, West to Baroda, Maharastra, and east to Calcutta; Bengal, Bihar, Rajasthan); MURTHY & PILLAI, 1986 : 225, fig. p. 226 (top) (Bengal, Central India, Gujarat); MURTHY, 1987 : 10 (Kalijugeswar Hill near Balugoan); GREENE, 1988 : 151; SOKOLOV, 1988 : 358; WELCH, 1988 : 7 (India south of the Ganges and

Rajputana, west to Baroda and east to Calcutta); MURTHY & RAO, 1989 : 101, fig. 1 (Baroda [Gujarat]; Bombay, Pune, Matheran [Maharashtra]; Chaibasa [Bihar]; Barkuda Is., Gopkuda Is., Rambha, Kalijugeswar Hill in the lake off Balugoan, Balasore Dist., Chilka Lake [Orissa]; Calcutta, Cossipore, Krsihnanagar [West Bengal]; Nagarjun Konda, Guntur Dist. [Andhra Pradesh]; Madras, Tiruchirapalli [Tamil Nadu]; Calicut, Trichur [Kerala]; Belgaum [Karnataka]; Anaimalais, Palghat Hills [Western Ghats]); DUTTA & ACHARJYO, 1990 : 40 (Orissa); MURTHY, 1990a : 6, fig. 4 (Calicut, Trichur [Kerala]; Pune [Maharastra]); MURTHY, 1990b: 15, fig. 16 (Gopakuda and Breakfast Is., Kalijugeswar Hill of the Chilka lagoon [Orissa]).

Gryptotyphlops acutus, BOULENGER, 1893 : 56. (unjustified emendation or *lapsus calami*)

Typhlops acuta, CONSTABLE, 1949 : 113 (incorrect subsequent spelling) (near Madras, Taliparamba).

Typhlina acutus, WHITAKER, 1978 : 108 (Central India); DANIEL, 1983 : 65, pl. opp. p. 59, fig. 1 (mislabelled as fig. 3) (Peninsular India, south of the Gangetic Plain).

Typhlops acuts, MURTHY, 1983 : 77 (typographical error) (Vetal Hill, Pune).

Typhlops actus, RAJENDRAN, 1986 : 12, fig. 11. (typographical error).

DISTRIBUTION

Typhlops acutus is endemic to peninsular India (Fig. 1), being recorded from the following states and territories : Rajasthan, Gujarat, Madhya Pradesh, Bihar, West Bengal, Orissa, Maharashtra, Goa, Karnataka, Andhra Pradesh, Kerala, Pondicherry, and Tamil Nadu. It inhabits the plains and low hills from sea level to 760 m. It should be noted that the remark by MURTHY & RAO (1989) that ANNANDALE (1907) failed to report *Typhlops acutus* in the Chilka Lake region (even though specimens of his were deposited in the ZSI) is incorrect because he did report *T. acutus* from Gopkuda Island in the Chilka Lake, Orissa (ANNANDALE, 1907). Thus, the report of MURTHY & RAO (1989) was not the first record of *T. acutus* from Orissa, being preceded by SCLATER (1891b), BOULENGER (1893), ANNANDALE (1907), BEHURA (1966), TIWARI & SHARMA (1971), and SHARMA (1982).

Fig. 1. – *Distribution of* Typhlops acutus *in India. Open circles = specimens examined, solid circles = literature records, arrow points to type locality.*

DIAGNOSIS

Snout pointed dorsally and hooked laterally with corneous horizontal transverse keel. Head not distinct from neck, body nearly uniform diameter throughout. Eye variable, usually a small dark spot lacking a pupil, a small eye with pupil present, or absent; in both lateral and dorsal view visible under all or most of postnasal. Total length 115–630 mm, total length/midbody diameter ratio 30-66. Tail about as broad as long, relative tail length 0.75–1.3 % (1.9 % reported in the literature but questionable), with a ventral concave curvature. Sexual dimorphism in caudal characters absent. Apical spine minute or absent, a small terminal knob-like scale usually present. There are 28–36 anterior longitudinal scale rows, 24–34 midbody scale rows, 23–30 posterior scale rows, 448–526 transverse scale rows, 7–13 subcaudals, and 10–14 dorsocaudals. Large rostral covers 4/5 head dorsum. Nasal divided or semidivided, inferior nasal suture contacting second supralabial. Nostrils located inferiorly, in close proximity to rostral border. Laterally, one ocular, preocular, and subocular, all subequal in size. Four (rarely three or five) postoculars. Four supralabials, increasing in size posteriorly, SIP type T-0, represented thusly : N1/SL1, PreOc/SL2, SubOc/SL3, PtOc/SL4. The following dorsal head shields narrow but transversely elongated : a single frontal, interparietal and interoccipital, and paired supraoculars and parietals. Remaining head scales the size of costals. Three infralabials. Lateral papillae present on tongue. Coloration of the dorsum brown or golden-brown with yellowish venter, dorsal scales often with a transverse yellow streak or yellow center that produces a lineate effect. Diet includes eggs, pupae, larvae and adults of ants, termites and other insects, plus earthworms (ANNANDALE, 1905).

ILLUSTRATIONS

Typhlops acutus has been illustrated by LÜTKEN (1862 : pl. 1-2, figs. 5a-c), GÜNTHER (1864 : pl. 16, fig. A), JAN & SORDELLI (1860-1866 : livr. 9, pl. 1, fig. 5), WALL (1918 : pl. 24, figs. 1-2; 1923b, fig. 9), SMITH (1943, fig.

16), PARKER (1963, fig. 11; 1977, fig. 11), DEORAS (1965 : fig. 40), DANIEL (1983 : pl. opp. p. 59, fig. 1), MAHENDRA (1984 : fig. 7), MURTHY (1986 : fig. 9; 1990, fig. 4), RAJENDRAN (1986 : fig. 11), and MURTHY & PILLAI (1986 : fig. p. 226 [top]).

VARIATION

LÜTKEN (1862) and WALL (1918, 1923b) listed *Typhlops acutus* as having three postoculars, while SMITH's (1943) fig. 16 shows four postoculars. BOULENGER (1893) and SMITH (1943) reported 28–34 scale rows (presumed midbody), while WALL (1918) recorded 28 rows anteriorly and 24–26 rows at midbody. I have examined one specimen (CAS 17170) of *T. acutus* with 24 midbody scale rows (formula of 28-24-23). WALL (1923a) reported a L/W ratio of 30–60. A small to minute terminal spine has been reported (GÜNTHER, 1864; WALL, 1918; SMITH, 1943) but ANNANDALE (1905 : 209) stated that the terminal spine was absent in *T. acutus*, whose actions indicated the hook on the snout functionally replaced the tail spine. Thus *Typhlops acutus* may or may not possess a small terminal spine.

Table 1 presents comparative data on specimens examined during this study. Although the sample is small, there is apparent clinal variation in the number of midbody scale rows with an increase from 26 rows in the north to 32 rows in the south. Likewise, a weak cline in transverse scale rows exists with an increase in number from east to west. Ontogenetic variation appears to be present for several features, but again the sample upon which the data are based is small. Apical spines are most common in smaller individuals while larger specimens usually possess a knob-like terminal scale. A granular rostral shield is present, the tubercles more obvious in juveniles than in adults.

Juvenile specimens generally possess a visible pupil in the eye while all specimens > 275 mm total length possess only a dark eyespot. In a series of five specimens collected at Bisrampur by A. W. Herre on 13 December 1940, only the juvenile (CAS-SU 12516) possesses a pupil while the four adults (CAS-SU 12514-15, 12517, 13666) exhibit a dark eyespot. While the eye in *Typhlops acutus* is variable, it is usually reduced and represented by only a small dark eyespot lacking a visible pupil (64% of specimens examined), as illustrated

Table 1.
Typhlops acutus (including *Typhlops psittacus*) material examined

Mus. no.	Locality	LSR	TSR	SC	BL	L/W	TL/BL	TL/W	PO	E	AS
ZMUC R52183	Bengal	30-26-24	451	8	262	43.7	1.15	0.8	4/3	2	0
USNM 122276	Asansol	30-26-24	448	9	135	38.4	1.86	1.0	4/4	1	0
USNM 122278	Asansol	30-26-24	475	10	152	43.2	1.65	1.0	4/4	1	0
MCZ 3849	Madras	34-30-28	496	10	168	42.0	1.49	1.0	4/4	2	0
CAS-SU 12516	Bisrampur	29-26-26	511	9	180	51.4	1.11	1.3	3/4	1	+
MCZ 18033	Taliparamba	32-32-30	499	13	193	38.8	1.55	0.8	4/3	3	0
UF 19900	Borivli	28-26-24	526	11	272	54.3	1.66	1.3	5/4	1	+
FMNH 8651	Allapalli Forest	30-26-24	466	9	289	52.5	1.04	?	4/4	2	?
CAS-SU 12515	Bisrampur	29-26-25	504	7	324	64.8	0.93	0.9	4/4	2	0
CAS-SU 12517	Bisrampur	29-26-24	486	9	335	51.5	0.90	0.9	4/4	2	0
CAS-SU 12514	Bisrampur	30-26-26	523	8	365	52.1	0.82	0.8	4/4	2	0
UF 19902 [1]	Kanheri Caves	32-26-25	518	8	381	58.6	1.05	0.9	4/4	2	+
CAS-SU 13666	Bisrampur	31-26-25	507	10	405	57.9	0.99	0.9	3/3	2	0
CAS 17170	Nilambur	28-24-23	485	12	413	47.4	1.45	1.2	4/3	2	0
UF 19901	Bombay	30-27-26	517	?	469	58.6	1.28	1.1	4/4	2	+
IRSNB 2017 [2]	India	28-24-24	460	11	354	78.6	0.99	1.0	3/3	2	0

LSR = longitudinal scale rows; TSR = transverse scale rows; SC = subcaudals; BL = total length; L/W = total length/midbody diameter; TL/BL = tail length/total length; TL/W = tail length/midtail diameter; PO = postoculars (left/right); E = eye (1 = pupil present, 2 = eyespot, 3 = absent); AS = apical spine (+ = present, 0 = absent).

[1] neotype of *Onychocephalus acutus*.

[2] holotype of *Typhlops psittacus;*

by LÜTKEN (1862), GÜNTHER (1864), JAN & SORDELLI (1860-1866), and DEORAS (1965). Illustrations in WALL (1923b), SMITH (1943), PARKER (1963), MAHENDRA (1984), and MURTHY (1986, 1990) show an apparently large eye with a small dark pupil and 29 % of the specimens examined (MCZ 3849, UF 19900, USNM 122276, 122278) possess a small eye with discernible pupil. One individual (MCZ 18033) is totally blind. A. H. WYNN (pers. comm.) suggested the possibility that blind snakes may have pupils that expand and contract, an hypothesis that merits investigation and is supported by two nearly identical specimens from Asansol, India : a large pupil is present in USNM 122278 but in USNM 122276 only a minute pupil is visible as if the iris has constricted.

VISCERAL ANATOMY

Data on the internal anatomy are based upon and presented in the following order : adult male (UF 19900), adult female (CAS-SU 12515), and immature male (FMNH 8651). The sternohyoideus muscle is short, its posterior tip at 8.4 % and 9.0 %. The heart is long (3.0 %, 4.0 %, 5.2 %, MP = 29.8 %, 31.6 %, 32.0 %) but very narrow, its length/width ratio being 3.5-5.3. The ventricle is 1.5-2 times the length of the right atrium and 2-3 times the length of the left atrium. The junctions of the right (3.0 %, 3.7 %) and left (2.8 %, 4.7 %) systemic arches, craniad of the apex of the ventricle, are very near to one another in the adult. In the juvenile the left systemic arch is located 4.4 % craniad of the heart tip, the right junction unknown. The liver is moderate in length (27.9 %, 29.0 %, 29.0 %, MP = 46.0 %, 49.1 %, 49.5 %) and multisegmented with approximately 23-24 segments on the right and 16-19 on the left. The cranial 0.35 and caudal 0.15 of the liver are straight but the middle half is convoluted and looped over itself. The anterior tip of the liver nearly contacts the ventricle as the heart-liver gap is short (0.7 %, 0.9 %, 0.3 %). The left liver segment is 0.88, 1.03, 0.84 the length of the right, with a short anterior extension on the left of 4.0 %, 8.1 %, 7.2 % and a long posterior tail on the right of 16.1 %, 5.4 %, 21.7 %. The spleen (1.1 %, 1.3 %, 1.7 %) is closely applied to the anterior end of the pancreas (1.1 %, 1.7 %, 1.4 %), which is divided into three segments, and both organs are in contact with the gall bladder (1.3 %, 2.0 %, 1.0 %, MP = 62.1 %, 71.7 %, 67.7 %). The liver-gall bladder gap is short in males (1.3 %, 3.1 %) but longer in the female (7.2 %) and the liver-gall bladder interval is moderate (30.7 %, 38.2 %, 33.2 %). The testes of the adult are slightly shorter and half the diameter of the kidneys, the right testis (4.3 %, MP = 76.7 %) and left testis (3.4 %, MP = 81.8 %) being markedly asymmetrical. In the juvenile they are undeveloped and symmetrical, with the MP of both organs at 85.3 %. In the female the ovaries are short, the right (3.9 %, MP = 81.1 %) containing 16 follicles and the left (3.6 %, MP = 84.0 %) containing 18 follicles. A vestigial left oviduct is present in the femlae in addition to the well-developed right oviduct. This represents the first report of paired oviducts within the Typhlopidae and is similar to the condition in *Anomalepis* and *Helminthophis* of the Anomalepididae (Robb & SMITH, 1966). Both ovaries and the right oviduct lie along the left side of the body with the left oviduct on the right side. From the distended condition of the right oviduct and lack of enlarged follicles or developing ova, it appears that the female had recently laid some eggs prior to its capture on 13 December 1940. The right adrenal (0.9 %, 0.6 %, 0.7 %, MP = 83.6 %, 88.8 %, 88.1 %) and left adrenal (0.9 %, 0.6 %, 0.7 %, MP = 86.4 %, 90.3 %, 89.2 %) are slightly asymmetrical. The right kidney (5.4 %, 3.6 %, 4.2 %, MP = 93.0 %, 93.7 %, 95.4 %) and left kidney (3.9 %, 3.1 %, 3.8 %, MP = 95.2 %, 95.3 %, 97.4 %) are short and asymmetrical, each possessing a single renal artery. Far back in the abdominal cavity, the kidney-vent interval (anterior tip of right kidney-vent) is 9.7 %, 8.0 %, 6.6 % and the kidney-vent gap (posterior tip of left kidney-vent) 2.8 %, 3.1 %, 0.7 %. The rectal caecum is large (2.6 %, 2.5 %, 2.8 %), 2/3 of the body diameter and 2-4 times the diameter of the adjacent small intestine.

There is no left lung complex and the tracheal entry into the right lung is terminal. The trachea (30.3 %, 32.7 %, 33.9 %, MP = 16.1 %, 17.3 %, 17.7 %) contains approximately 450, 368, 453 rings (or 133.5, 112.4, 133.5 per 10 % SVL), each of which possesses a short free tip. The tracheal membrane is narrow, being 0.25-0.5 the width of the tracheal rings. A multicameral tracheal lung exhibits 15, 16, 25 type C foramina cranially and 23, 17, 7 type A foramina caudally. The cardiac lung (3.0 %, 4.0 %, 5.2 %) is multicameral with 5, 4, 7 foramina. The right lung of the adult male (12.9 %, MP =37.7 %) is short and narrow while that of the juvenile (17.8 %, MP = 43.5 %) is moderate in length but expanded, while in the female it is long (23.4 %, MP = 45.3 %) and expanded. The right lung contains a single layer of large faveoli that extends to the posterior lung tip (44.2 %, 57.0 %, 52.4 %) as a weak network of small blood vessels. Total lung foramina number 48, 45, 42. The intrapulmonary bronchus is short (4.5 %, 6.9 %, 4.5 %) and represents 0.35, 0.29, 0.25 of the length of the right lung.

Neotype designation

The holotype of *Onychocephalus acutus* DUMÉRIL & BIBRON is now lost *fide* HAHN (1980), not having been mentioned since the original description in 1844 and never having been entered into the MNHN collection *fide* DUMÉRIL & DUMÉRIL (1851), who listed it as "Manque" in reference to the Paris collections, and I. INEICH (*in litt.*, 9 Dec. 1993). It was described as having 29 scale rows, 466 middorsals, 12 subcaudals, a total

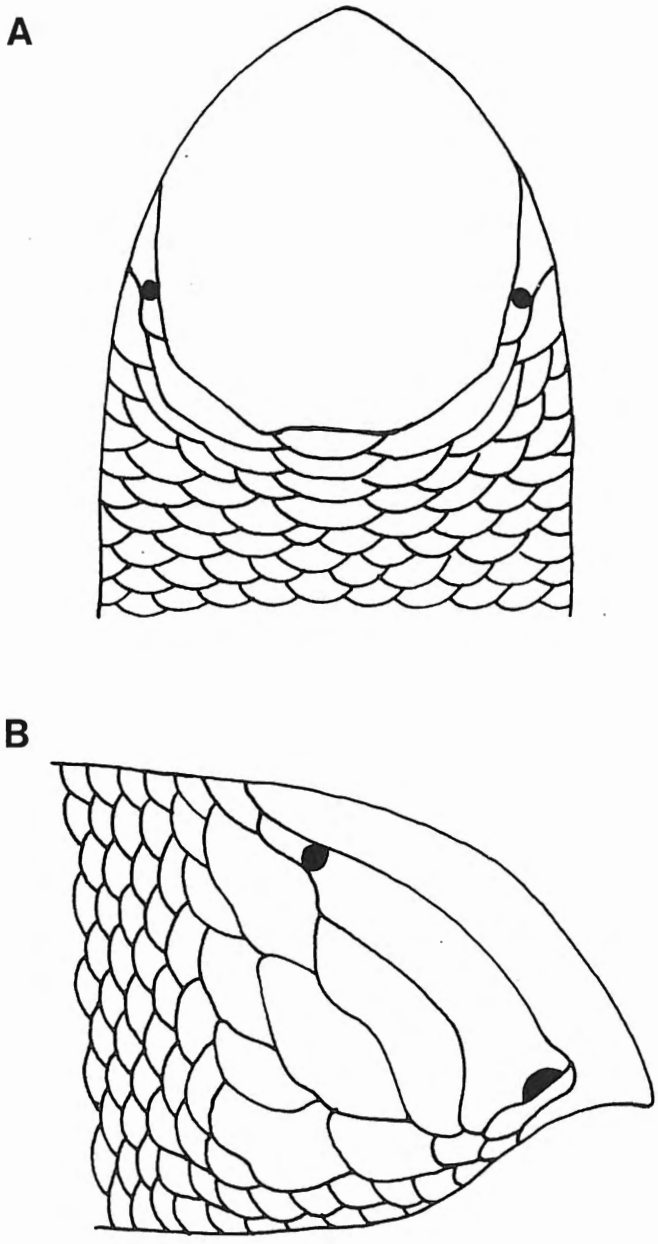

Fig. 2. – Head of neotype of Onychocephalus acutus *(UF 19902). A = dorsal view, B = lateral view*

length of 400 mm, and a relative tail length of 1.25. Since the correct allocation of Werner's *Typhlops psittacus* bears directly upon the taxon currently known as *Typhlops acutus*, as discussed below, I hereby designate UF 19902 as the neotype of *Onychocephalus acutus* (Fig. 2). Collected by Walter AUFFENBERG on the afternoon of 23 June 1964, it was found crawling on the floor of one of the Kanheri Caves at the base of the Kanheri Hills, Kanheri National Park, 5 mi. E Borivli and ca. 20 mi. NNE Bombay, north-central Salsette Island, western Maharashtra State, west-central India, elevation ca. 180 m, 19°14'N, 72°51'E. The type locality is an igneous man-made rock cave approximately 1000 years old that is used as a monk's shelter for solitude, meditation and prayer (W. AUFFENBERG *fide* D. L. AUTH, *in litt.*, 14 Dec. 1993).

The neotype has the following measurements : total length 381 mm, tail length 4 mm, relative tail length 1.05, nuchal diameter 5.5 mm, midbody diameter 6.5 mm, precloacal body diameter 6 mm, total length/midbody diameter ratio 58.6, midtail diameter 4.5 mm, and tail length/width ratio 0.89. There are 518 transverse scale rows, 8 subcaudals, 15 dorsocaudals, and a longitudinal scale row formula of 32-26-25. The head is acutely pointed in dorsal aspect. The rostral is pointed in dorsal and lateral aspect, 3/4 width of the head, and extends far beyond the level of the eyes. Bordering the rostral posteriorly along the midline are four transversely enlarged scales, prefrontal, frontal, interparietal and interoccipital. Bordering the rostral between the prefrontal and postnasal are supraoculars that are enlarged three times the width of the frontal. All of the remaining scales on the dorsum of the head are equal in size to the costals. Most of the head shields are granular with small convex tubercles present on the rostral, prenasal, postnasal, preocular, ocular, subocular, all supralabials, and inferior postocular. The tubercles are most prominent on the ventral rostral and first two supralabials.

In lateral aspect the snout is pointed with a slightly hooked rostral and a horizontal corneal edge. The completely divided nasal is the largest lateral head shield. The nostril is half-moon shaped, angled 45° to the vertical and located inferiorly with its opening directed posterolaterally. It is situated so near to the rostral that the anterodorsal edge almost contacts the rostral border, the superior nasal suture being so short that it is barely discernible. The inferior nasal suture contacts the second supralabial. Caudally bordering the postnasal are two shields : a small superior ocular and a large inferior preocular. The ventral apex of the ocular is wedged between the elongate preocular and the subocular that borders the preocular, each of which is 1.5 times as high as the ocular. The postnasal, preocular, ocular, and subocular are all oriented with their long axes at an angle of approximately 45°. The majority of the small eyespot is located under the postnasal shield at the postnasal-ocular junction in both dorsal and lateral views. Dorsally, the left eyespot lies totally under the narrow dorsal extension of the postnasal but 3/4 of the right eyespot is covered by the postnasal and 1/4 by the rostral. In lateral view 3/4 of the right eyespot lies under the postnasal and 1/4 under the ocular. The SIP is T-0 or N1/SL1, PreOc/SL2, SubOc/SL3, PtOc/SL4. The fourth supralabial is subequal in size to the third and has a small posterior notch. The third supralabial is twice the size of the second, and the second is 1.5 times the size of the first. Four enlarged postoculars are present between the fourth supralabial and the supraocular. A small terminal spine is directed ventrally. Comparison of data for the neotype and the lost holotype (parenthetically) is as follows : midbody scale rows, 26 (29),

Table 2.
Comparison of *Typhlops acutus* with southern Asian typhlopids

Species	ML	LSR	TSR	SIP	PSP	SO	Eye
T. acutus	630	24-36	448-526	T-0	+	1	4
T. andamanensis	160	18	?	?	O	2	2
T. beddomii	140	18	190-222	T-II	O	O	2
T. bothriorhynchus	245	22-24	283-330	T-V	O	O	1
Ram. braminus	181	20	290-364	T-III	O	O	1-2
T. ceylonicus	140	18	329-330	T-II	O	1	3
T. exiguus	196	18	348	T-V	O	O	2
T. jerdoni	280	22	260-313	T-III	O	O	2
T. lankaensis	130	20	229-261	T-III	O	O	2
T. leucomelas	130	22	234-235	T-III	O	O	1
T. loveridgei	208	18	430	T-III	O	O	3
T. malcolmi	107	20	273-282	T-III	O	O	2
T. mirus	140	18	298-360	T-II	O	1	3
T. oatesii	200	24	?	T-V	O	O	1
T. oligolepis	145	16	?	T-II	O	O	1
T. pammeces	195	20	328-400	T-III	O	O	1
T. porrectus	285	17-18	388-465	T-III	O	O	2
T. tenebrarum	112	20	312-339	T-III	O	O	2
T. tenuicollis	365	22	480-520	T-III	O	O	3
T. thurstoni	317	20	552-600	T-II	O	O	3
T. tindalli	175	18	300	?	O	O	3
T. veddae	91	20	259-309	T-III	O	O	2
T. violaceus [1]	135	20	245-308	T-III	O	O	2

ML = maximum total length (mm); LSR = longitudinal scale rows at midbody; TSR = transverse scale rows middorsally; SIP = supralabial imbrication pattern; PSP = pointed lateral snout profile; SO = number of suboculars; Eye = 1 : pupil present, 2 : eyespot, 3 : absent, 4 : variable.
[1] conspecific with *T. lankaensis fide* A. H. WYNN, pers. comm.

total middorsals, 518 (466), subcaudals, 8 (12), total length, 381 mm (400 mm), and relative tail length, 0.89 (1.25).

Typhlops acutus has long been recognized as a unique blind snake in the Asian region, as reflected by its common names, the giant blind snake and the beaked blind snake. In order to compare *Typhlops acutus* with possible relatives from the geographic vicinity of India, selective data is presented for it and all known species from India, Sri Lanka and adjacent countries (Table 2), Southeast Asia and West Malaysia (Table 3), Indonesia, East Malaysia and the Philippines (Table 4), and New Guinea and islands of the southwestern Pacific (Table 5). *Typhlops acutus* differs from all species listed by at least two characters. Table 6 presents data comparing *Typhlops acutus* with other typhlopid genera, illustrating that it shares more characters with *Rhinotyphlops* than with *Typhlops*. *Typhlops acutus* is by far the largest typhlopid in Asia with a maximum length of 630 mm (MURTHY & PILLAI, 1986). The Asian species nearest in size to *Typhlops acutus* are *Ramphotyphlops lineatus* of Indonesia at 480 mm, *Typhlops diardii* of Southeast Asia at 430 mm, and *Typhlops muelleri* of Indonesia at 400 mm. In fact, *T. acutus* is the seventh longest species of typhlopid known, four species in Africa and two in Australia having longer total lengths, thusly : *Rhinotyphlops schlegelii* - 950 mm, *Typhlops punctatus* - 795 mm, *Ramphotyphlops proximus* - 750 mm, *Typhlops angolensis* - 703 mm, *Ramphotyphlops unguirostris* - 700 mm, and *Typhlops lineolatus* - 640 mm.

Table 3.
Comparison of *Typhlops acutus* with Southeast Asian typhlopids

Species	ML	LSR	TSR	SIP	PSP	SO	Eye
T. acutus	630	24-36	448-526	T-0	+	1	4
Ram. albiceps	209	20	376-424	T-III	O	O	2
T. diardii	430	24-28	260-341	T-V	O	O	1
T. floweri	230	18	478-520	T-V	O	1	2
T. giadinhensis	237	22	319	?	O	O	1
T. khoratensis	141	20	315-328	T-III	O	O	2
T. klemmeri	151	24	292	T-V	O	O	1
T. siamensis	305	20-22	306-368	T-V	O	O	1
T. trangensis	155	24	370	T-V	O	O	3

[1] see Table 1 for key.

Table 4.
Comparison of *Typhlops acutus* with Indonesian and Philippine typhlopids

Species	ML	LSR	TSR	SIP	PSP	SO	Eye
T. acutus	630	24-36	448-526	T-0	+	1	4
Ram. acuticaudus	256	22-24	337-412	T-III	O	O	1
T. ater	140	18	263-310	T-II	O	1	2
T. bisubocularis	131	18	308	T-II	O	2	3
T. castanotus	253	26-28	299-338	T-III	O	O	1
T. collaris	255	26-28	411-460	T-III	O	O	1
T. conradi	175	20	398	T-III	O	O	2
Ram. cumingii	400	24-28	466-497	T-III	+	O	1
Ram. flaviventer	319	22	324-390	T-III	O	O	1
T. hedraeus	130	18	332-398	T-II	O	O	2
T. hypsobothrius	285	20	?	?	O	O	1
T. koekkoeki	336	26	280	T-III	O	O	2
Ram. lineatus	480	22-24	315-430	T-III	O	O	3
T. marxi	180	30	525	T-0	+	O	1
T. muelleri	400	24-30	326-402	T-V	O	O	1
Ram. olivaceus	430	20-22	441-544	T-III	+	O	1
Ram. polygrammicus	450	22	346-479	T-III	O	O	2
T. ruficaudus	367	26-30	335-417	T-III	O	O	1
T. ruber	260	26	338-378	T-III	O	O	2
T. schmutzi	140	20	403-413	T-V	O	O	2

[1] see Table 1 for key.

Table 5.
Comparison of *Typhlops acutus* with New Guinea and SW Pacific typhlopids

Species	ML	LSR	TSR	SIP	PSP	SO	Eye
T. acutus	630	24-36	448-526	T-0	+	1	4
Ram. angusticeps	350	20	593-631	T-III	+	O	1
T. depressiceps	321	20-24	628-653	T-V	+	O	1
Ram. depressus	240	22	316-393	T-III	O	O	1
Ram. erycinus	297	20	315-335	T-III	O	O	2
Ram. infralabialis	360	26-28	418-526	T-III	+	3	1
T. inornatus	227	20-22	295-434	T-V	O	1	1
Ram. multilineatus	427	20	491-518	T-III	+	O	1
Ram. solomonis	450	30-34	334-424	T-III	O	2-5	1
Ram. subocularis	397	32-36	363-485	T-0	O	4-7	1
Ram. willeyi	170	20-22	206-358	T-III	O	O	2

[1] see Table 1 for key.

Revalidation of *Rhinotyphlops*

ROUX-ESTÈVE (1974) revived *Rhinotyphlops* for those species in Africa that possessed a rostral that was broad in ventral view (greater than 1/2 the width of snout at level of nostrils), consisting of an angular, keratinized horizontal edge. Most, but not all, of the species transferred from *Typhlops* to *Rhinotyphlops* were blind or had reduced eyes and possessed pointed snouts or beaked rostrums in lateral view. In contrast, all African *Typhlops* exhibit rounded or obtusely blunted snouts in dorsal and lateral view and a narrow rostral in ventral aspect. BROADLEY (*in* HAHN, 1977) and BROADLEY (1983, 1990) criticized the recognition of *Rhinotyphlops* solely on the basis of a single character (relative ventral rostral width), citing the close relationship of *Rhinotyphlops lalandei* and *Typhlops boylei*, which were separated generically by ROUX-ESTÈVE (1974). The genus has not been considered valid by many other workers since then (BRUTON & HAACKE, 1975; DOWLING & DUELLMAN, 1978; GIARDIN, 1978; JACOBSEN, 1978; MCLACHLAN, 1978; PIENAAR, 1978; POYNTON & BROADLEY, 1978; BROADLEY & BLAKE, 1979; STUCKI-STIRN, 1979; BUYS & BUYS, 1981; ELTER, 1981; MCCOY & CENSKY, 1982; ERASMUS & BRANCH, 1983; HEDGES, 1983; HAACKE, 1984; TONGE & MORGAN, 1984; AUERBACH, 1985, 1987; SHINE, 1985; HALLIDAY & ADLER, 1986a-b; MATTISON, 1986; PATTERSON, 1986, 1987; BRANCH & BRAACK, 1987, 1989; BERGER-DELL'MOUR, 1987; MCDOWELL, 1987; MEHRTENS, 1987; BRANCH, 1988, 1990, 1993; BRANCH *et al.*, 1988; BROADLEY, 1988, 1990; GREENE, 1988; MCLACHLAN, 1988; SOKOLOV, 1988; BOURQUIN, 1989; GRIFFIN *et al.*, 1989; ROYLE, 1989; SPAWLS & GRAFF, 1989; MARAIS & IRISH, 1990; STANISZEWSKI, 1990; BROADLEY & HOWELL, 1991; HAAGNER, 1991; YEADON, 1991; BOYCOTT & CULVERWELL, 1992; MARAIS, 1992; SHINE, 1992; BATES & DOUGLAS, 1993; BAUER *et al.*, 1993; LAMBIRIS, 1993; COBORN, 1994).

HAHN (1977), in arguing against the validity of *Rhinotyphlops* as an African genus, listed seven extralimital species (*Typhlops acutus, T. arenarius, T. hypogius, T. inornatus, T. lehneri, T. mirus, T. trinitatus*) that supposedly possessed a wide rostral ventrally (VHW/VNW < 2.0), in addition to noting that most species of *Typhlina* (= *Ramphotyphlops*) would also qualify for inclusion in *Rhinotyphlops* based on that character. However, all of the above except *T. acutus* (VHW/VNW = 1.3) and *T. mirus* (VHW/VNW = 1.7-2.2) are excluded from *Rhinotyphlops* as now defined because they possess either a ventral rostral, a T-III or T-V SIP, or both. *Typhlops mirus* agrees with *Rhinotyphlops* in its T-II SIP, wide rostral, and lack of eyes; however, the snout is rounded in dorsal and ventral aspects and lacks a horizontal corneal edge. One species from Madagascar that HAHN (1977) overlooked, *Typhlops grandidieri*, also possesses a wide ventral rostral (1.7-1.8), T-0 SIP, blind aspect, pointed dorsal and lateral snout profiles, lack of scale row reduction, and unpigmented coloration. It appears to be closely related to *Rhinotyphlops* and is the subject of another paper (WALLACH & INEICH, submitted).

Other authors have continued to follow ROUX-ESTÈVE (1974) in recognizing *Rhinotyphlops* (ROUX-ESTÈVE, 1975a-b; VESEY-FITZGERALD, 1975; VILLIERS, 1975; GOIN *et al.*, 1978; LARGEN, 1978; SPAWLS, 1978, 1993; WAAL, 1978; DIXON & HENDRICKS, 1979; LIEB *et al.*,

1979; BRUTON & HAACKE, 1980; JACOBSEN & HAACKE, 1980; HAHN, 1980; VAN DEN ELZEN, 1980; TRAPE, 1981, 1985; HOEVERS & JOHNSON, 1982; WELCH, 1982; HUGHES, 1983; LANZA, 1983; PAKENHAM, 1983; BUTLER & REID, 1986; DOWLING, 1986, 1988; GREENE, 1988; OBST, 1988; SHINE, 1988; WILLIAMS & WALLACH, 1989; JOGER, 1990; LANZA, 1990; TRAPE & ROUX-ESTÈVE, 1990; COBORN, 1991; RASMUSSEN, 1991; MEIRTE, 1992; GRILLITSCH & GRILLITSCH, 1993; LARGEN & RASMUSSEN, 1993; WALLACH, 1993a-c; ZUG, 1993).

Rhinotyphlops is here considered a valid genus for the reasons discussed below. The key characters separating *Rhinotyphlops* from *Typhlops* and *Ramphotyphlops* are the wide ventral rostral (ROUX-ESTÈVE, 1974) and supralabial imbrication pattern (WALLACH, 1993a). *Rhinotyphlops* is distinguished from *Typhlops* by a VHW/VNW ratio of less than 2.0 (vs. > 2.0) and is easily separable from Ramphotyphlops by a T-0 or T-II SIP (vs. T-III). A T-0 SIP is rare among Asian typhlopids. Within Asia only *Typhlops marxi* of the Philippines and *Ramphotyphlops subocularis* (*sensu stricto fide* WALLACH, in press) of Papua New Guinea possess a T-0 pattern. However, a T-0 SIP is characteristic of most *Rhinotyphlops* (a T-II pattern occurring in *Rhinotyphlops praeocularis, R. rufescens, R. schinzi, R. stejnegeri* and *R. wittei*). It should be pointed out that ROUX-ESTÈVE (1974) retained the species *boylei* in *Typhlops* and figured the SIP as T-III (fig. 13) while her figures of the head of *T. boylei* show a T-0 SIP (fig. 104), as do those of FITZSIMONS (1962 : fig. 7) and BROADLEY (1983 : fig. 7). Examination of a *Typhlops boylei* (NMZB 15184) confirms a T-0 labial pattern diagnostic of *Rhinotyphlops*, in addition to a multicameral cardiac lung (five foramina) and right lung (six foramina) and a nearly straight, unsegmented liver. Based on these data, *T. boylei* FITZSIMONS (1932) is transferred to *Rhinotyphlops* and placed in the *R. schlegelii* species group, thus eliminating the objections of HAHN (1977) and BROADLEY (1983, 1990) to recognition of the genus.

Other characters of *Rhinotyphlops* as now recognized and found in most, but not all, species include : snout pointed in dorsal and lateral view, with at least a horizontal corneal ventral rostrum, wide rostral in dorsal view covering most of snout, pale unpigmented body (usually pink or beige), high number of total middorsals (400-700), lack of longitudinal scale row reduction, eye usually absent but sometimes present as a pigmented spot, lateral head shields oriented obliquely, nostrils inferior and located adjacent to rostral border, prenasal very small in comparison with postnasal, a multicameral tracheal lung, cardiac lung and right lung, and a straight unsegmented liver (Table 6).

Laterally pointed snouts are present among most *Rhinotyphlops* of Africa and some *Ramphotyphlops* of Australia. Besides *Typhlops acutus*, there is no other typhlopid with a pointed or beaked snout in continental Asia. Outside of Africa and Australia, the only typhlopids exhibiting a pointed lateral profile are *Ramphotyphlops*

Table 6.
Comparison of *Typhlops acutus* with typhlopid genera and *T. grandidieri* [1]

Character	*T. acutus*	*Rhinotyphlops*	*T. grandidieri*	*Typhlops*	*Ramphotyphlops*
SIP	T-0	T-0/T-II	T-0	T-0, II, III, V	T-III
Lat. pointed snout	+	+ (O)	+	O (+)	O/+
Dor. pointed snout	+	O/+	+	O	O/+
Reduced eye/blind	+	+	+	O (+)	O/+
Broad dor. rostral	+	+	+	O	+/O
Broad ven. rostral	+	+	+	O	O (+)
Oblique lat. shields	+	+	O	O	+/O
Nostril adj. rostral	+	+	+	O	+/O
Tracheal lung	M	M (U)	M	U/P/M	U/P/M
Cardiac lung	M	M	M	U/M	U/P/M
Right lung	M	U/P/M	M	U/M	U/P/M
Liver	C	S	S	C (S)	C
Liver segments	M	U	U	M	M

[1] polymorphic conditions separated by slash; rare conditions in parentheses.
Lungs : U = unicameral, P = paucicameral, M = multicameral; Liver : C = convoluted, S = straight, M = multisegmented, U = unsegmented.

cumingii, *Ramphotyphlops olivaceus* and *Typhlops marxi* of the Philippines, *Ramphotyphlops infralabialis*, *Ramphotyphlops multilineatus* and *Typhlops depressiceps* of the Solomons and New Guinea, and *Typhlops ocularis* and *Typhlops grandidieri* of Madagascar (a new genus is being proposed for the latter species, WALLACH & INEICH, submitted). Among those, *T. marxi* appears closest to *T. acutus* but differs in the presence of a large ocular and preocular, lack of a subocular, large eye with pupil, shorter and narrower rostral, prefrontal, frontal and supraoculars not transversely enlarged, obliquely oriented parietals, large V-shaped interparietal, and head slightly distinct from neck (WALLACH, 1993c).

Based upon a VHW/VNW ratio of 1.30, a T-0 SIP, large body size, pointed snout with inferior nostrils adjacent to rostral, large dorsal and ventral rostral with inferior horizontal corneal cutting edge, reduced eye located under postnasal, obliquely oriented lateral head shields with subocular larger than ocular, and short tail, *Typhlops acutus* is transferred to the genus *Rhinotyphlops*. *Rhinotyphlops acutus* (DUMÉRIL & BIBRON) is most similar in appearance to *Rhinotyphlops ataeniatus* (BOULENGER) in disposition of head shields and scutellation so it is placed in the *Rhinotyphlops unitaeniatus* species group, to which it is probably related.

The restriction of *Typhlops acutus* to peninsular India and its apparent relationship to the African *Rhinotyphlops* fits well with an hypothesis of a Gondwana origin of *T. acutus*. The peninsular-autochthonous endemics form the oldest component of the Indian fauna, and have their closest relatives in Madagascar or Africa (JAYARAM, 1974). Scolecophidians are one of the most ancient snake groups, along with the anilioids and booids. An unpublished record of an anomalepidid from the Cretaceous-Tertiary boundary in Big Bend Texas (STANDHARDT, 1986) extends the known geological age for the group back to the early Paleocene and confirms the scolecophidians as one of the most ancient snake groups (RAGE, 1987). India separated from Africa during the Cretaceous, about 100 million years ago, probably with the ancestors of *T. acutus* present. JAYARAM (1974) did not list *Typhlops acutus* as one of the principal endemics because he dealt at the generic level and the majority of *Typhlops* in India have affinities to the Indo-Chinese and Malayan faunas whose Indian elements entered through the Assam Gateway in the northeast. Since India's collision with Asia, *T. acutus* apparently has not expanded its range due to physical barriers. MANI (1974) listed four natural barriers to faunal movements in India : 1) the Himalayas, 2) the Indo-Gangetic plain separating the Assam-Myanmar hills from the northeast corner of the peninsula (Garo-Rajmahal Gap), 3) the desert of the Rajasthan-Sind region (Great Indian Desert), and 4) the Deccan Lava area. Although *Typhlops acutus* inhabits the Deccan, it appears limited by the other three barriers. Its restriction to lowlands and non-arid and non-marshy habitats explains its present peninsular distribution, its northward expansion being curtailed by the cooler temperatures and highland elevations of the Himalayas, its westward expansion by the arid regions of the Great Indian Desert of western Gujarat and Rajasthan, and its eastward expansion by the Garo-Rajmahal Gap.

A similar disjunct distribution scenario is seen in the case of *Rhinotyphlops simoni* (BOETTGER, 1879) of Israel, Jordan, and Syria. Although HAHN (1980) listed the species as a *Typhlops*, it is clearly a derived form of *Rhinotyphlops*, possessing all the internal and external characters of the more derived members of the genus, including a VHW/VNW ratio of 1.05-1.08. Since its distribution is extralimital to Africa, it was not dealt with by ROUX-ESTÈVE (1974) and thus was never properly allocated. Its ancestral origin is without doubt Africa and it has been isolated from its nearest relatives by the arid country of Egypt and the Sinai, thus forming a relict population in extreme southwestern Asia. Other snakes possessing similar disjunct distribution patterns and probable histories include *Micrelaps muelleri* BOETTGER (1880) and *Atractaspis microlepidota engaddensis* HAAS (1950).

Redescription of *Typhlops psittacus*

Typhlops psittacus WERNER, 1903
Fig. 3

Typhlops psittacus WERNER, 1903 : 248 ("Mexico"); WERNER, 1921 : 331 ("Mexiko"); TAYLOR, 1940 : 443 (? "Mexico," probably Old World); DIXON & HENDRICKS, 1979 : 8 (? "Africa"); HAHN, 1980 : 77, *Incertae Sedis* ("probably not Mexico"); LANG, 1990 : 21, *Incertae sedis* ("probably not Mexican").

WERNER (1903) described a supposedly new species of blind snake whose type locality was listed solely as Mexico, the collector and date of collection being unknown. In the first paragraph of his description, WERNER stated that the type was similar to *Typhlops* (= *Rhinotyphlops*) *unitaeniatus* PETERS, 1878, and had 24 scale rows but in the identification key to American *Typhlops* that followed, he listed *T. psittacus* as having 20 scale rows and compared it in section III with *Typhlops microstomus* COPE, 1866, having 18 rows. Section I of the key, containing *Typhlops unilineatus* DUMÉRIL & BIBRON, 1844, with 26–28 scale rows, was presented without an opposing species. Since the type of *T. psittacus* does indeed have 24 midbody scale rows, it appears WERNER mistakenly placed *T. psittacus* in the wrong section as it should have been compared with *T. unilineatus* in section I.

Later, in his catalogue of the Typhlopidae, WERNER (1921) listed *Typhlops psittacus* as being close to *Typhlops unitaeniatus*. In the last couplet (# 16) of his

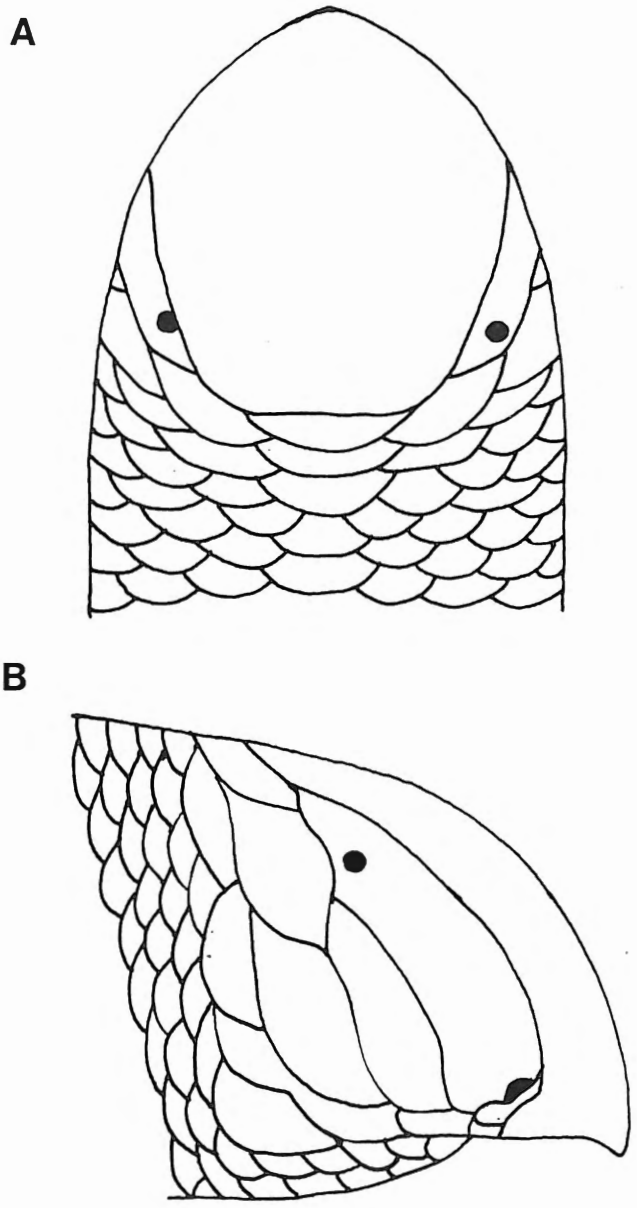

Fig. 3. – Head of holotype of Typhlops psittacus *(IRSNB 2017). A = dorsal view, B = lateral view*

identification key he ended in a trichotomy with *T. unitaeniatus* (25 scale rows, L/W ratio of 62-63, dorsum and venter black with yellow vertebral stripe), *T. psittacus* (24 scale rows, L/W ratio of 76, brown dorsum with yellowish venter), and *T. acutus* (28-34 scale rows, L/W ratio of 40-60, light brown dorsum with yellowish venter). WERNER probably never considered *T. acutus* a possible relative based on the geographical separation of Mexico and India. The purported differences between *T. psittacus* and *T. acutus* were small : 24 vs. ≥ 28 scale rows, L/W ratio of 76 vs. ≤ 60, and dorsum brown vs. light brown, respectively.

In his review of Mexican *Typhlops*, TAYLOR (1940) remarked that *Typhlops psittacus* differed from all other western hemisphere typhlopid species in possessing a hooked snout with a sharp transverse keel and inferior nostrils. He suggested that the type locality might be in error since no collector or specific locality was provided in the original description. DIXON & HENDRICKS (1979) examined the type of *Typhlops psittacus* and agreed with TAYLOR about the apparently incorrect type locality of Mexico. They satisfactorily demonstrated how WERNER confused the type of *T. psittacus* with another supposedly Mexican specimen on hand at the time of writing that had 20 scale rows. This caused WERNER to enter *T. psittacus* into section III of the key with 20 rows opposite *T. microstomus* rather than in section I where it belonged with its actual 24 rows opposite *T. unilineatus*. The specimen from "Mexico" was actually a *Typhlops brongersmianus* VANZOLINI (1976) from an untagged series in the IRSNB, collected in Surinam in 1879 (DIXON & HENDRICKS, 1979). DIXON & HENDRICKS concluded that the type of *Typhlops psittacus* belonged to either *Rhinotyphlops* or *Ramphotyphlops*, and suggested a possible relationship with *Rhinotyphlops caecus* (DUMÉRIL, 1856) of Africa due to its external squamation. HAHN (1980) listed *Typhlops psittacus* as *incertae sedis,* stating that the range was unknown and "probably not Mexican in origin." LANG (1990), following HAHN (1980), listed *Typhlops psittacus* as *incertae sedis* within the Typhlopidae. The taxon has never been illustrated or redescribed.

REDESCRIPTION

The holotype of *Typhlops psittacus* (IRSNB 2017) is an adult of unknown sex with a present snout-vent length of 351.5 mm, a midbody diameter of 4.5 mm, a tail length of 3.5 mm, and a midtail diameter of 3.5 mm. By comparing the original total length of 378 mm with the present length of 354, a typical shrinkage due to preservation of 6.3 % is found. The tail represents 0.01 of the total length, and it is as broad as long with a length/width ratio of 1.0. It curves ventrally in lateral view and although a apical spine is lacking, it possesses a small knob-like scale on its terminus. The body's diameter is presently contained in the total length approximately 79 times (WERNER reported a L/W ratio of 76). The longitudinal scale rows number 28–24–24. There are approximately 460 transverse scale rows, 11 subcaudals, and 13 dorsocaudals.

The head (Fig. 3) is not distinct from the body, snout pointed in dorsal profile, strongly projecting and slightly hooked in lateral profile with a sharp inferior horizontal edge. The large rostral shield is 4/5 the diameter of the head and extends beyond the level of the eyes. In lateral view the rostral is as wide as the ocular, preocular, and subocular and nearly as wide as the postnasal. Prominent head glands are visible only under the rostral shield around its periphery. Minute convex tubercles are present on the following head shields : rostral, prenasal, postnasal, preocular, ocular, subocular, all supralabials, and inferior postocular. They are most prominent and

more numerous on the inferior rostral and the supralabials while on the dorsum of the rostral they appear abraded and are only faintly visible.

The nostrils are located inferiorly, adjacent to the rostral, twice the diameter of the eyes, and in lateral view oriented at a 45° angle to the vertical plane. In ventral view their medial edges are located close to the rostral, which is wide with VHW/VNW = 1.30, while their lateral edges are near the sides of the snout. The nasal is divided into a small inferior prenasal, overlapping the first supralabial and anterior edge of the second supralabial, and a large lateral postnasal that extends nearly to the posterior edge of the rostral. The inferior nasal suture contacts the second supralabial while the superior nasal suture extends dorsally for a distance equal to 1/7 of the nostril's length to contact the rostral. The postnasal, with an angle of 45° to the horizontal, is the second largest head shield and presents two concavities along its posterior edge where it borders the ocular and preocular. It overlaps the anterior part of the second supralabial and is bordered dorsally by the supraocular and caudally the ocular and preocular. The eye is a small dark spot, 0.3 mm in diameter and lacking a visible pupil, located beneath the postnasal in both dorsal and lateral views. In dorsal aspect it is adjacent to or contacting the rostral; in lateral view it is close to the ocular border at approximately the midocular level.

The remaining lateral head shields all subtend an angle of approximately 30° to the vertical. The preocular is 2/3 the height of the postnasal, equal in height but slightly narrower than the subocular, and fits into the lower concavity of the postnasal, overlapping the posterior edge of the second supralabial. The ocular, wider than either the preocular or the subocular but only 2/3 their height, fits into the upper concavity of the postnasal and is located in a linear series of scales including the supraocular above and the subocular and third supralabial below. The subocular equals the preocular in height but is slightly wider, is 1.5 times the height of the ocular, and overlaps the third supralabial (on the left side of the head only). An aberrant condition exists on the right side of the head where the subocular does not extend far enough to overlap the posterior edge of the third supralabial, and the third supralabial is fused to the inferior postocular (Fig. 3b). There are three postocular shields on each side between the supraocular and the fourth supralabial; the fourth supralabial is overlapped by the lowermost postocular. Four supralabials are present, each increasing in size from anterior to posterior; the first being half the size of the second, the second 2/3 the size of the third, and the third 3/4 the size of the fourth. The SIP is type T-0 as all four supralabials are overlapped by the shields above them. Three infralabials are separated along the midline by a mental.

Based upon the position of the other shields, a prefrontal is absent, probably fused to the enlarged rostral. The first three middorsal scales posterior to the rostral (frontal, interparietal, and interoccipital, respectively) are transversely enlarged, about equal in size, slightly smaller than the supraoculars, and about 1/4 the diameter of the head. Bordering the caudal curvature of the rostral between the frontal and the postnasals are the supraoculars, slightly larger than the three middorsal shields but smaller than the oculars. Between the interparietal and the upper postoculars, caudal to the supraoculars, are the parietals, which are slightly larger than the frontal and interparietal but smaller than the supraoculars. The occipitals, behind the parietals and bordering the interoccipital, are not enlarged but equal in size to the body scales.

The coloration of the body, although somewhat faded, consists of a brown dorsum (including 9 middorsal rows anteriorly and at midbody and 11 rows posteriorly) and an unpigmented venter (including 9 midventral rows at midbody and 7 rows posteriorly) separated by a lateral light brown transition of 3 scale rows on each side. The pigmented scales have brown anterior and posterior edges with a light yellow central region. The pattern on the head is faintly visible. A light yellow ring surrounds the periphery of the rostral with two yellow bars, each about 1/3 of the rostral length, extending cranially from the caudal portion. The largest lateral head shields (postnasal, preocular, ocular, and subocular) exhibit yellow coloration along their anterior margins, encompassing about half the shields. The venter appears pale yellowish-white. The terminal 4-5 scale rows encircling the tail tip also lack pigmentation and are pale yellow while the terminal scale is brown.

Discussion

In order to facilitate the discussion of the identity of *Typhlops psittacus*, comparisons will be made only with those species already suggested in the literature as being possible relatives, specifically *Rhinotyphlops caecus* (Duméril, 1856), *Rhinotyphlops ataeniatus* (Boulenger, 1912), and *Rhinotyphlops unitaeniatus* (Peters, 1878). *Rhinotyphlops caecus* currently includes *Typhlops acutirostratus* Andersson (1916), *T. avakubae* Schmidt (1923), and *T. caecus pitmani* Witte (1961), all of which were considered synonyms by Roux-Estève (1974). *Rhinotyphlops ataeniatus* was considered a synonym of *R. unitaeniatus* by Roux-Estève (1974), a subspecies of *R. unitaeniatus* by Largen (1978) and Largen & Rasmussen (1993), and a distinct species separate from *R. unitaeniatus* by Gans & Laurent (1965). I follow Gans & Laurent (1965) in recognizing the above two taxa as distinct species. Whatever their relationship, they are both clearly different from the type of *Typhlops psittacus* (Table 7).

While the transverse and longitudinal scale counts of the above taxa agree with those of *Typhlops psittacus* (Table 7), the similarity ends there. The type of *Typhlops psit-*

Table 7.
Comparison of *Typhlops psittacus* and possible related forms

Species	ASR	MSR	PSR	TSR	INS	SO	PO	TL	L/W	Eye	Pat	Col
T. *psittacus* (type)	28	24	24	460	SL2	1	3	354	76	4	2/3	2+3
R. *acutus*	28-36	26-34	24-30	448-526	SL2	1	3-4	115-630	39-60	2	2	2+3
R. *ataeniatus*	25-28	24-26	22-24	449-476	SL2	1	4-5	300-385	46-60	1	1	1
R. *unitaeniatus*	25-28	24-26	22-24	496-593	SL2	2	5-6	375-470	43-88	1	3	1+3
R. *caecus*	24-26	22-26	22	417-561	R	0	4	120-425	42-66	3	1	2
T. c. pitmani (types)	?	24	?	466-522	R	0	3	325-400	64-80	3	1	4
T. acutirostratus (type)	?	24	?	?	SL1/2	0	3	360	80	3	1	4
T. avakubae (types)	24	24	24-26	485	SL1	0	3	370	53-74	3	1	4
T. marxi (type)	28	30	26	525	SL2	0	3	180	45	1	2	2+3

ASR = anterior longitudinal scale rows; MSR = midbody longitudinal scale rows; PSR = posterior longitudinal scale rows; TSR = transverse scale rows (total middorsals); INS = contact of inferior nasal suture; SO = suboculars; PO = postoculars; TL = total length; L/W = total length divided by midbody diameter; Eye = 1 : eye with pupil, 2 : eyespot, 3 : blind; 4 : all of the above; Pat = color pattern, 1 : uniform, 2 : bicolored, 3 : striped; Col = color, 1 : black, 2 : brown, 3 : yellow, 4 : pink.

tacus differs from *Rhinotyphlops caecus* in numerous other particulars (cf. ANDERSSON, 1916 : fig. 3; SCHMIDT, 1923 : fig. 1; WITTE, 1966 : figs. 3, 7; ROUX-ESTÈVE, 1974 : fig. 145). The rostral, prefrontal, frontal, supraoculars, nasals, preocular, ocular, suboculars, and postoculars of *R. ceacus* are different from those of *T. psittacus*. The lateral head shields of *Typhlops psittacus* (and *Rhinotyphlops acutus*) more closely resemble the arrangement of a typical fragmented *Typhlops*. A large subocular has split off from the ocular and the preocular has reduced in size such that the ocular contacts the postnasal dorsally. In contrast, the lateral shield arrangement of derived *Rhinotyphlops* consists of reduced preoculars and oculars that lie in an anterodorsal-posteroventral line such that the small ocular is dorsal to the fourth supralabial. In *T. psittacus* the rostral is more pointed anteriorly than in *R. caecus* and lacks the parallel sides as found in the latter and a visible eye is present in *T. psittacus* but *R. caecus* is generally blind (although FMNH 212324 has a black eyespot on the left side of the head). *Typhlops psittacus* has a brown dorsum and a light venter in contrast to *R. caecus* which is unicolored pale tan or pink. Therefore, the size, disposition, number of head shields and coloration of *Typhlops psittacus* are distinctly different from those of *Rhinotyphlops caecus* and its synonyms, implying no close relationship.

Both *Rhinotyphlops ataeniatus* (LARGEN, 1978 : fig. 8) and *R. unitaeniatus* (ROUX-ESTÈVE, 1974 : fig. 180) more closely resemble *Typhlops psittacus* than does *R. caecus* but *T. psittacus* is distinct from both. In scale counts, size, the presence of a large subocular, nearly equal in size to the dorsal ocular and anterior preocular, and presence of an eye under the postnasal shield *R. ataeniatus* and *R. unitaeniatus* resemble *T. psittacus*. The ocular of *Rhinotyphlops ataeniatus* is wedged between the upper ends of the preocular and subocular as in *T. psittacus*, whereas in *R. unitaeniatus* the ocular is divided into two with the upper one wedged between the postnasal and preocular. However, both species differ from *Rhinotyphlops acutus* in maximum size, lack of a pointed rostral in dorsal view and recurved beak in lateral view, four to six postoculars, frontal separated from the supraoculars by a pair of scales, and dark brown to black coloration, *R. unitaeniatus* with a yellow vertebral stripe and *R. ataeniatus* with the yellow stripe confined to the rostral.

Thus, while there are certain similarities between *Typhlops psittacus* and *Rhinotyphlops ataeniatus*, and to a lesser degree *R. unitaeniatus*, it is not conspecific with either one. The type of *Typhlops psittacus* agrees in nearly every respect with that of *Rhinotyphlops acutus* (DUMÉRIL & BIBRON, 1844). Examination of comparative material, illustrations, and descriptions confirm the identity of *Typhlops psittacus* as *Rhinotyphlops acutus* (Figs. 2-3, Tables 1 & 7). In comparison with the neotype of *Rhinotyphlops acutus*, *Typhlops psittacus* differs only in the following minor features : the frontal is twice as wide and subequal to the supraoculars in width (vs. less than half the width of supraoculars), fewer transverse scale rows (460 vs. 518), fewer longitudinal scale rows (28–24–24 vs. 32–26–25), fewer postoculars (three vs. four), greater number of subcaudals (11 vs. 8), tail apex with knob-like terminal scale (vs. small spine), and more attenuate body (L/W > 75 vs. < 55). All of the above characters are within the range of variation of other specimens referred to *R. acutus* except the more gracile L/W ratio of 76. A comparison of five length,

five width and three depth measurements of the types of *Typhlops psittacus* and *Rhinotyphlops acutus* reveals the nearly identical cephalic proportions of the two specimens, alleviating the need to produce ratios for comparison (values presented in mm for *psittacus, acutus*) : lateral head length (3.70, 3.50), lateral rostral length (4.00, 4.00), eye-snout length (3.00, 3.10), eye-nostril length (2.00, 2.00), ventral rostral length (1.75, 1.50), dorsal head width (4.35, 4.25), dorsal rostral width (3.50, 3.50), ventral rostral width (3.25, 3.40), ventral nostril width (2.50, 2.50), interocular width (3.45, 3.50), lateral head depth (3.00, 2.75), rostral-nostril depth (2.00, 2.00), and eye-nostril depth (1.10, 1.10). Other measurements include the costal scale width (midbody middorsal) (1.25, 1.30), costal length (1.00, 0.75), supraocular length (1.70, 1.75), eye diameter (0.3, 0.3), nostril length (0.6, 0.5), and nostril inclination (45°, 45°).

I have no hesitation in identifying the type of *Typhlops psittacus* as a specimen of the giant Indian beaked blind snake *Rhinotyphlops acutus*. Therefore, *Typhlops psittacus* is placed in the synonymy of the *Rhinotyphlops acutus* of the *R. unitaeniatus* species group, with a restricted type locality of India. Including *Typhlops psittacus* in the synonymy of *Rhinotyphlops acutus* extends the latter's range of variation for the L/W ratio by increasing its maximum from 66 to 76.

Material examined

Rhinotyphlops acutus (CAS 12514-17, 13666, 17170; FMNH 8651; IRSNB 2017 [holotype of *Typhlops psittacus*]; MCZ 3849, 18033; UF 19900-01, 19902 [neotype of *Onychocephalus acutus*]; USNM 122276, 122278); ZMUC R52183 [holotype of *Onychocephalus westermanni*], *Rhinotyphlops ataeniatus* (CAS 147972, 151200), *Rhinotyphlops boylei* (NMZB 15184), *Rhinotyphlops caecus* (BMNH; FMNH 212324; MCZ 13600 [paratype of *Typhlops avakubae*]; SDSU uncat.), *Rhinotyphlops unitaeniatus* (CAS 147972, 151200; MCZ 18175, 40079-81, 48058).

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V. WALLACH,
Center for Vertebrate Studies,
Department of Biology,
Northeastern University,
Boston, Massachusetts 02115,
USA

Appendix

Listed below are all records of *Rhinotyphlops acutus* that I was able to trace from museums (with catalogue number when known, otherwise listed by acronym only) and the literature (with author reporting it). An author following a museum number indicates report of that specimen in the publication. Geographical coordinates, taken from gazeteers, and elevations, estimated from maps (NSL = near sea level), are provided for all possible localities. Current spellings of localities are given parenthetically.

India (no specific locality). BMNH 1946.1.11.70 (holotype of *Typhlops russellii*) GRAY, 1845; BMNH 52.9.13.267; CM 90744; ZMUC R52183 (holotype of *Onychocephalus westermanni*) LÜTKEN, 1862; ETRC (holoype of *Typhlops excipiens*) JAN, 1864, 1865; MB BETHENCOURT-FERREIRA, 1897; UMMZ 65631 (ex MCZ 4115). *Indian regions (no specific locality).* Bengal Presidency : SCLATER, 1891a; Central India : WHITAKER, 1978, MURTHY & PILLAI, 1986; Deccan : (ca. 14°N, 77°E) GÜNTHER, 1864, THEOBALD, 1876, BOULENGER, 1890, IM 6940 SCLATER, 1891b; Madras Presidency : BMNH BOULENGER, 1893; Southern or peninsular India : NICHOLSON, 1870, 1874, BOULENGER, 1890, SARASIN, 1910, WALL, 1918, 1923a-b, SMITH, 1943, GHARPUREY, 1962, DEORAS, 1965, LANZA, 1972, HAHN, 1980, SHARMA, 1982, DANIEL, 1983, MAHENDRA, 1984, MURTHY, 1985, 1990, TIWARI, 1985, WELCH, 1988. *Andhra Pradesh.* MURTHY & RAO, 1989; Nagarjuna Hill, 107 m, ca. 4 km NW Pullareddygudem, Guntur Dist. (16°31 'N, 79°14'E), ZSI SHARMA, 1971, TIWARI & SHARMA, 1971; Nagarjun Konda, Guntur Dist., MURTHY & RAO, 1989; Nellore, ca. 15 m (14°26'N, 79°58'E), JERDON, 1853. *Bihar.* SHARMA, 1982, MURTHY, 1986, MURTHY & RAO, 1989; Chaibasa, ca. 250 m, Manbhum Dist. (22°34'N, 85°49'E), JERDON, 1853, THEOBALD, 1868, IM 6939 SCLATER, 1891a-b, TIWARI & SHARMA, 1971, MURTHY & RAO, 1989; "Chota Nagpur" (ca. 22°N, 86°E); Dhalbhum (ca. 22°30'N, 86°30'E), BMNH 1927.8.9.3. *Goa.* Faría Leal MBL BETHENCOURT-FERREIRA, 1897; Junta de Saude, MBL BETHENCOURT-FERREIRA, 1897 [= Dammu, Diu, or Goa]; Ponda, NSL (15°N, 74°E), ZSI SHARMA, 1976. *Gujarat.* MURTHY & PILLAI, 1986, MURTHY & RAO, 1989; Baroda, ca. 30 m (22°18'N, 73°12'E), SHARMA, 1971, 1982, TIWARI & SHARMA, 1971, MURTHY & RAO, 1989, BMNH 1923.10.13.18; Virandragarh, ca. 30 m, ca. 14 km from Dhrangadhra (22°59'N, 71°28'E), Surendranagar Dist. ZSI SHARMA, 1982. *Karnataka.* MURTHY & RAO,1989; Belgaum, ca. 760 m (15°52'N, 74°30'E), GÜNTHER, 1869, BMNH 1869.8.28.72 BOULENGER, 1893; Dharwad, ca. 700 m (15°43'N, 75°01'E); Dharwar (= Dharwad) KASHYAP, 1950; Karwar, NSL (14°48'N, 74°08'E), BNHM PHIPSON, 1888. *Kerala.* MURTHY & RAO, 1989; Calicut, NSL (11°15'N, 75°46'E) TIWARI & SHARMA, 1971, MURTHY & RAO, 1989, MURTHY, 1990a; Kananur (= Cannanore), NSL (11°51'N, 75°22'E), WALL, 1905; Nellumbar (= Nilambur) (11°17'N, 76°14'E), BMNH 1946.1.11.66 (syntype of *Onychocephalus malabaricus*) GÜNTHER, 1875, BOULENGER, 1893, CAS 17170 (syntype of *Onychocephalus malabaricus*); "Malabar" MÜLLER, 1885, IM 12422 SCLATER, 1891b, BMNH 1865.5.4.169, 1874.4.29.1028, 1886.4.21.7 BOULENGER, 1893, WALL, 1918, NMBA 317; Palghat Hills, Western Ghats (ca. 10°47'N, 76°39'E), BMNH 1874.4.29.130 BOULENGER, 1893, MURTHY & RAO, 1989; Trichur, ca. 30 m (10°31'N, 76°31'E), TIWARI & SHARMA, 1971, MURTHY & RAO, 1989, MURTHY, 1990a. *Madhya Pradesh.* Allapalli forest, Chanda Dist. (SE Madhya Pradesh or E Maharashtra), FMNH 8651; Bisrampur, 260 m (21°45'N, 81°47'E) CAS-SU 12514-17, 13666; Gwalior, ca. 180 m (26°13'N, 78°10'E), TIWARI & SHARMA, 1971, MURTHY & RAO, 1989; Sipri in Gwalior, IM 13235 SCLATER, 1891a-b; Neemuch (= Nimach), 500 m (24°27'N, 74°56'E), BNHM PHIPSON, 1888. *Maharashtra.* MURTHY, 1986, MURTHY & RAO, 1989; Alibag, NSL (18°39'N, 72°54'E); Alibag, Kolaba, BNHM PHIPSON, 1888; Bombay, NSL (18°58'N, 72°50'E), BMNH 1869.8.28.55-57 GÜNTHER, 1869, MURTHY & RAO, 1989, CM 67531, UF 19901; Borivli, ca. 30 m (19°14'N, 72°51'E), UF 19900; Nagpur, ca. 300 m (21°07'N, 79°05'E), d'Abreu, 1916; Kanheri caves, Kanheri Hills, 5 mi. E Borivli, ca. 180 m (18°30'N, 75°43'E), UF 19902 (neotype of *Onychocephalus acutus*); Kurduwadi (= Kurduwadi), Bombay Presidency, 488-670 m (18°05'N, 75°26'E), MNHN 1946.40 LINDBERG, 1932, 1939, ANGEL, 1947; Matheran, ca. 500 m (18°59'N, 73°16'E), BMNH 1869.8.28.73 GÜNTHER, 1869, MURTHY & RAO, 1989; June (= Pune), MURTHY & RAO, 1989, Pune, ca. 550 m, MURTHY, 1990; Vetal Hill, Pune (18°32'N, 73°52'E), TIWARI & SHARMA, 1971, MURTHY, 1983. *Orissa.* BEHURA, 1966, SHARMA, 1982, MURTHY & RAO, 1989, DUTTA & ACHARJYO, 1990; Aska, Ganjam Dist. (19°36'N, 84°39'E), BMNH 1886.9.22.6 BOULENGER, 1893; Balasore, 15 m (21°30'N, 86°56'E), TIWARI & SHARMA, 1971; Balasore Dist., IM 13399 SCLATER, 1891b, MURTHY & RAO, 1989; Barkuda (= Breakfast) Island, NSL, Chilka Lake (19°33'N, 85°10'E), TIWARI & SHARMA, 1971, MURTHY & RAO, 1989, MURTHY, 1990b; Gopkuda (= Gopakuda) Island, NSL, Chilka Lake (19°35'N, 85°10'E), ANNANDALE, 1907, TIWARI & SHARMA, 1971, MURTHY & RAO, 1989, MURTHY, 1190b; Rambha Island, NSL, Chilka Lake (19°30'N, 85°06'E), TIWARI & SHARMA, 1971, MURTHY & RAO, 1989; Kalijugeswar Hill near Balugoan, MURTHY, 1987; Kalijugeswar Hill in the lake off Balugoan, NSL, Chilka Lake (19°44'N, 85°13'E), MURTHY & RAO, 1989, MURTHY, 1990b. *Pondicherry.* Mahé, NSL (11°41'N, 75°31'E), MB BETHENCOURT-FERREIRA, 1897. *Rajasthan.* MAHENDRA, 1984, MURTHY, 1986; Rajputana (= Rajasthan); South Rajasthan SHARMA, 1971. *Tamil Nadu.* MURTHY & RAO, 1989; Anaimalai Hills, Western Ghats (10°18'N, 77°00'E), BMNH 1861.12.30.67 GÜNTHER, 1864, ASB THEOBALD, 1876, BOULENGER, 1893, MURTHY & RAO, 1989; Madras, NSL (13°05'N, 80°17'E), GÜNTHER, 1864, SATYAMURTI, 1960, TIWARI & SHARMA, 1971, MURTHY & RAO, 1989; near Madras, MCZ 3849 CONSTABLE, 1949; Taliparamba, Madras, MCZ 18033 CONSTABLE, 1949; Tiruchirappalli, ca. 75 m (10°49'N, 78°41'E), MURTHY & RAO, 1989; Trichinopoly (= Tiruchirappalli), BMNH 1883.1.12.65 BOULENGER, 1893. *West Bengal.* SHARMA, 1982, MURTHY, 1986, MURTHY & PILLAI, 1986, MURTHY & RAO, 1989; Asansol, 120 m, 30 mi. E Panagarh (23°41'N, 86°59'E), USNM 122276, 122278; Calcutta, NSL (22°32'N, 88°22'E), IM 6937-38 SCLATER, 1891a-b, ANNANDALE, 1905, SHARMA, 1971, TIWARI & SHARMA, 1971, MURTHY & RAO, 1989; Cossipore, NSL (22°38'N, 88°22'E), TIWARI & SHARMA, 1971, MURTHY & RAO, 1989; Krishnanagar, NSL (23°24'N, 88°30'E), IM 6935-36 SCLATER, 1891a-b, MURTHY & RAO, 1989.