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TWO NEW SPECIES OF BLIND SNAKE, GENUS *TYPHLOPS* (REPTILIA: SQUAMATA: TYPHLOPIDAE), FROM THE PHILIPPINE ARCHIPELAGO

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Abstract.—Two new species of *Typhlops* from the Philippine Islands are described. *Typhlops castanotus* has a distinctly bicolored pattern without a head to vent reduction in the number of pigmented scale rows on the dorsum. *Typhlops collaris* has a collar of unpigmented scales behind the head and a high number (>400) of middorsal scale rows. Sexual dimorphism is indicated for the total number of middorsal scales in *T. castanotus,* and for tail length in both species. A preliminary key is provided to the Philippine typhlopids.

The blind snakes of the family Typhlopidae are among the least tractable snakes to study. Their small size, small samples from single localities, few readily accessible or reliable external and skeletal characters, skewed sex ratios that may result from facultative parthenogenesis, potential ease of transport (especially in inter-island trade of agricultural products), and poor descriptions with even less reliable illustrations of nominal species, all contribute to the veil of uncertainty that surrounds these animals.

Largely due to paucity of material, little work has been done on Philippine typhlopids. Until the mid-1950s fewer than 50 blind snakes had been collected throughout the whole of the Philippines. Most were obtained between 1915 and 1921 by Edward Harrison Taylor, who also described eight of the 18 nominal species attributed to those islands (Taylor 1917, 1918, 1919, 1922). Moreover, most specimens collected before Taylor were poorly documented as to provenance, although all seem legitimately attributable to the Philippines, except *Typhlops dichromatus* Jan (listed by Taylor [1922] in his synonymy of *T. ruficaudus*).

More recently, Savage (1950) described *Typhlops hypogius* and *Typhlops hedraeus,* each based on single specimens collected by A. W. Herre in 1940. Although McDowell (1974) dealt specifically with typhlopids from New Guinea and the Solomon Islands, he also commented on a number of closely related Philippine species. For instance, McDowell defined the "*ruficaudus*" group of *Typhlops* as those species without a rectal caecum (or, if present, a poorly defined rectal caecum), and having an anterior shift of the suture between the second and third upper labials, resulting in a fusion of the dorsal portion of the glandular line at the base of both of these scales.[a] He referred six species to this group (*Typhlops hypogius, T. jagorii, T. kraali, T. luzonensis, T. ruber,* and *T. ruficaudus*), but not a seventh, *Typhlops canlaonensis,* which is also clearly allied. Six

[a] McDowell (1974) states that the gland row lying under the posterior edge of the postnasal fuses with the gland row under the posterior edge of the preocular and second upper labial in all members of the *T. ruficaudus* group, even those in which the imbricate portion of the preocular and second upper labial narrowly contact. In contrast, we find that in *T. luzonensis* (a species with contact between the preocular and second upper labial) the glandular lines do not fuse. Rather, they are separated by a distance corresponding to the width of contact between the preocular and second upper labial, as expected if the glandular line forms the scale base and mirrors the shape of the imbricate portion of each scale. Nonetheless, the second upper labial is reduced in size, as in other members of the *T. ruficaudus* group.

of the seven species are endemic to the Philippines; the seventh, *T. kraalii,* is known only from the Kei Islands and Ceram (McDowell 1974).

During the past 50 years, Harry Hoogstral, Walter Brown, Angel Alcala, and Donald Hahn have each added large numbers of specimens so that now there are over 500 from throughout the Philippines in museum collections. During our examination of much of this material, it became clear that several series of specimens cannot be readily assigned to described taxa. Two of these are described here as new species. We also provide a preliminary key to those species we currently recognize.

Materials and methods.—All measurements and observations are based on specimens stored in 70% ethanol or 42% isopropyl alcohol. If hemipenes were not everted, sex was determined by examination of gonads or associated structures. Total length was measured to the nearest 1 mm, and tail length and body diameter were measured to the nearest 0.5 mm. Relative eye size was determined with an optical micrometer. The number of middorsal transverse scale rows was determined by counting all middorsal scales posterior to the rostral, including the terminal spine on the tail. All midventral scales between the mental scale and anterior lip of the vent were counted for the number of midventral transverse scale rows, and all midventral scales posterior to the vent, including the terminal spine, were counted for the number of mid-subcaudals. The number of middorsocaudal scales was determined by counting the middorsal scales posterior to the level of the preanal scales. This method was preferred over counting mid-subcaudals because of the numerous irregularities in the subcaudals from loss of longitudinal scale rows on the underside of the tail, and the difficulty in determining the first subcaudal at the posterior edge of the vent. Intercalary scales on the dorsal midline were not counted except when occurring in pairs. Terminology for head and rostral shape follows Thomas (1976). In discussions of the number of pigmented scale rows in the dorsal stripe, the middorsal and pigmented longitudinal rows to both sides are included. If a particular longitudinal scale row is noted, it is counted from the middorsal. All body length measurements are from the anterior tip of the head. Hemipenal orientation and morphology follow Dowling & Savage (1960), except that medial refers to orientation toward the midline, and lateral away from the midline, with the everted hemipene oriented perpendicular to the body. Museum acronyms follow Leviton et al. (1985).

Typhlops castanotus, new species
Figs. 1, 2

Holotype.—CAS-SU 27940, an adult male from 8 km west of Pulupandan, Inampulugan Island, Negros Occidental Province, Philippines, collected by Angel Alcala and party, 23 May 1967.

Paratypes (12).—CAS-SU 27934–39, 27941–45, 28446, same data as holotype, except as follows: CAS-SU 27934–36, 27942 collected 24 May 1967; CAS-SU 27937 collected 26 May 1967; CAS-SU 27943–44 collected 25 May 1967; and CAS-SU 28446, collector and collecting date unknown.

Additional material examined (2).—CAS 127973, from Balabag Barrio, Borocay Island, Aklan Province, Philippines, collected by L. Alcala, 16 May 1970; CAS 139171, from Makato, Castillo Barrio, Aklan Province, Panay Island, Philippines, collected by L. Alcala and party, 3 May 1973.

Diagnosis.—A moderate-sized member of the *Typhlops ruficaudus* group (McDowell 1974) with 28 scale rows around the anterior body; dark dorsal stripe, nine or 11 scale rows wide, the lateral-most scale row continuously pigmented for the entire body length, sharply set off from the cream-colored lateral and ventral scale rows; tail uniformly dark dorsally and laterally.

Description of holotype.—Total length (TL), 224 mm; tail length, 7 mm; midbody diameter (MBD), 7 mm; body diameter at vent, 6 mm; TL/MBD, 32; 318 middorsal scale rows; 307 midventral scale rows; 13 mid-subcaudal scales; 13 mid-dorsocaudal scales; 28 scale rows around body anteriorly reducing to 24 rows posteriorly; head (viewed from above) tapered; in profile, snout rounded, projecting anteriorly above mouth, without transverse rostral keel; nostrils lateral, near tip of snout; eyes dorsolateral, visible beneath ocular shield immediately behind posterior edge of preocular, diameter of eye 16% of distance from anterior edge to tip of snout on right, 17% on left; rostral oval, extends from upper lip ventrally to a level just anterior to eyes on dorsum, about ½ width of head, widest just posterior to level of nostrils, bordered laterally by the nasals and by the prefrontal posteriorly; nasals incompletely divided into pre- and postnasals, suture dividing each nasal originating ventrally at second upper labial, then extending dorsally and anteriorly to nostril, beyond nostril ending in a minute dimple-like depression near edge of rostral; prenasal overlaps first upper labial and anterior edge of second upper labial; postnasals separated from contact behind rostral by prefrontal, posterior edge overlaps supraocular, in broad contact with preocular, ventral edge overlaps second upper labial and anterior edge of third upper labial; preocular inserts dorsally between postnasal and supraocular, borders ocular posteriorly, inserts between postnasal and third upper labial ventrally (excluded from contact with the second upper labial by postnasal); ocular slightly larger than preocular, inserts dorsally between supraocular and parietal, posteriorly contacts two postoculars, inserts ventrally between third and fourth upper labials, the ventroanterior edge overlapped by third upper labial, the ventral edge overlapping fourth upper labial; four upper labials, first and second smallest (second slightly larger than the first), third and fourth approximately equal in size and more than twice as large as second; four middorsal scales posterior to rostral (including prefrontal, frontal, and interparietal) slightly larger than the succeeding body scales; one supraocular, one parietal, and two postoculars on each side, each 1.5 to 2 times the width of a body scale.

All head scales except rostral have basal glands forming a glandular line which is overlapped by the posteriorly projecting free edge of the preceding scale; glands lying along internasal suture between nostril and second upper labial expand into a striated organ; glands lying beneath posterior edge of postnasal and preocular fuse at base of third upper labial (under imbricate posterior edge of postnasal); basal glands of scales on body occupy anterior ¼ to ⅕ of the scale (excluding posterior free edge of scale).

The number of scale rows around the body decreases in two pairs of reductions from 28 rows anteriorly to 24 rows posteriorly. Immediately following the fourth enlarged middorsal head scale there are 28 scale rows around the body (at 6 mm body length, however, the midventral row splits producing 29 scales before fusing again four rows posteriorly), reducing to 26 rows by fusion of first and second para-midventral scale rows on left at 109 mm body length and on right at 119 mm body length, followed by the second pair of reductions to 24 scale rows at 207 mm body length.

Dorsal scales dark brown, densely covered with chromatophores except for unpigmented glandular area. All dorsal and dorsolateral scales of head, extending posteriorly to the postoculars, darkly pigmented except as follows: rostral adjacent to mouth under snout; on right, prenasal, first, second, and third upper labials, and ventral and posterior three-fourths of fourth upper labial; on left, area of prenasal anterior to nostril and ventral portion bordering first upper labial, all of first and second upper labials, ventral three-fourths of third and fourth upper labials. Behind the head shields,

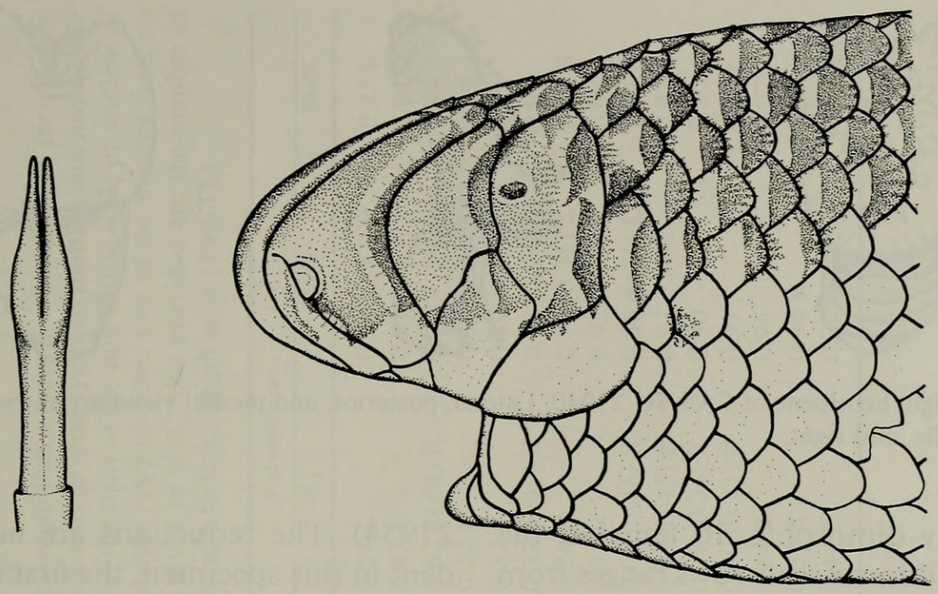

Fig. 1. Holotype (CAS-SU 27940) of *Typhlops castanotus*: left lateral view of head and ventral view of tongue. The bar represents 5 mm.

13 dorsal scale rows are darkly pigmented (on the seventh row from the middorsal, the second scale behind the fourth upper labial also has a slight amount of pigment), reducing to nine pigmented longitudinal scale rows at 8 mm body length; these nine dorsal rows pigmented for remainder of body length; at level of vent, the fifth row from the middorsal has a slight amount of pigmentation, nine pigmented rows then continuing onto tail; at about half the tail length the number of pigmented rows reduces to seven; posterior to this, dorsal scale reductions reduce the number of pigmented rows, but the lateral-most pigmented row on each side is continuous to the spine; spine pigmented except for the extreme tip. Dorsal stripe uniformly dark, without a lateral decrease in chromatophore intensity. The unpigmented ventral and ventrolateral scales of the head, body, and tail are cream in color and lack chromatophores.

Tongue length, 3.5 mm, forked about 1.5 mm from tip, without lateral papillae (Fig. 1). The hemipenes are everted on both sides. The right hemipene subtends four scales and is 3 mm in length. It is a single, soft organ. The medial base is essentially smooth and expands into a pair of smooth sacs, the largest on the anterior side, a smaller sac on the posterior side. At about half the length of the hemipene, the lateral side expands into a flat papillose disk covering the apicolateral surface. The distal tip of the disk is enfolded to produce a deep groove that extends onto the medial shaft. The sulcus spermaticus is a deep groove with smooth lips arising on the posterior base and extending along the posterior surface to the proximal lip of the disk, where it ends in an area contiguous with a series of grooves on the surface of the disk. The remainder of the hemipene is flounced with smooth parallel ridges (Fig. 2). The left hemipene is similar, but the apicolateral disk appears to be flaccid.

Variation.—The sex ratio in our sample is seven males, six females. Two juveniles could not be sexed. Total length ranges from 109–253 mm, with no apparent difference between the sexes (Table 1). In contrast, although our samples are small, both middorsal scale number and tail length appear

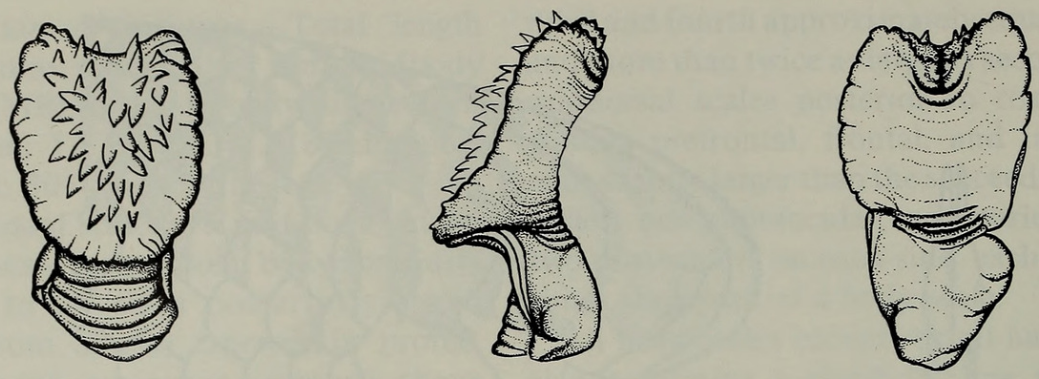

Fig. 2. The right hemipene of CAS-SU 27940. Lateral, posterior, and medial views are shown, respectively, on the left, middle, and right.

to be sexually dimorphic. In females, the number of middorsal scale rows ranges from 324–339 ($\bar{X}$ = 331), in males 300–327 ($\bar{X}$ = 314), with only one male (CAS-SU 27942) in the range of females. Although the total number of middorsal scale rows is less in most males, males have more mid-dorsocaudal scales (12–14 [$\bar{X}$ = 13] vs. 11–12 [$\bar{X}$ = 11.5] for females) and a tail that is proportionately longer (as percent total length: 0.026–0.036 [$\bar{X}$ = 0.031] in males, 0.020–0.027 [$\bar{X}$ = 0.025] in females).

In all specimens the number of scale rows around the body reduces in two pairs of reductions from 28 rows posterior to the head to 24 rows anterior to the vent, although reduction patterns vary (Table 1). When reducing from an even to odd number of scale rows, reductions involve the two para-midventral scale rows, or the midventral and one of the adjacent rows to either side; reductions from an odd to even number occur by fusion of the first and second rows to either the right or left of the midline, or fusion of the first scale row to the right with the first row to the left of the midline. Only one specimen (CAS 127973) has a reduction (from 25 to 24 scale rows) that involves other scale rows, rows seven and eight to the right of the middorsal. The first pair of reductions is offset in 14 of 15 specimens (CAS-SU 27939 being the one exception). The first reduction occurs on the left side of the body in 13 of these specimens and on the right side in one specimen (CAS-SU 27934). The reductions are nearly coincident in this specimen, the first occurring on the right slightly before the second on the left. Displacement of the first pair of reductions can occur by as much as 31% TL. Moreover, each reduction can be followed for a considerable length (up to 32% TL) by subsequent splitting and refusing of the scale rows. Consequently, at midbody (50% TL ± 10%) five specimens have 26 scale rows, and ten have 28–26 scale rows, depending on exactly where the count is made.

The second pair of reductions, from 26 to 24, occurs together (or nearly so) at 89–97% TL in 12 specimens. In three specimens the second pair of reductions is offset: the reduction from 26 to 25 occurs at 66% or 70% TL (followed by a region of splitting and refusing up to 16% TL), and the reduction to 24 at 84% or 89% TL.

All specimens from Inampulugan Island have nine pigmented dorsal scale rows with no dorsal to ventral reduction in chromatophore intensity. Specimens from Panay (CAS 139171) and Borocay Island (CAS 127973) have 11 dorsal pigmented scale rows, also with no dorsoventral reduction in chromatophore intensity in the four scale rows to either side of the middorsal, but with a slight reduction in intensity in the lateral-most row (row 5) on each side.

The prefrontal separates the postnasals in all but one specimen (CAS-SU 27936), in which the postnasals touch behind the rostral and overlap (right nasal over left) under

Table 1.—Scale row reduction patterns in *Typhlops castanotus*. Each reduction is presented as the percent total length that a reduction occurs from the anterior tip of the head. When the single scale resulting from a fusion subsequently splits again, before refusing (sometimes after several cycles of splitting and fusing), the percent body length at which the final fusion takes place is given in parentheses. R refers to a fusion occurring to the right of the midventral scale or midline of the body. L refers to the reduction occurring on the left. When a pair of reductions occurs together, or the two scale rows to either side of the midline fuse, no letter is given (however, rounding may produce offset reductions with the same percent). Total length (TL) is given in mm. Also provided are the number of middorsal scale rows (MD), mid-dorsocaudals (MDC), midventrals (MV), mid-subcaudals (MSC), and the tail length to total length ratio (Tail/TL).

								# of scale rows			
Museum #	Sex	TL	MD	MDC	MV	MSC	Tail/TL	28–27	27–26	26–25	25–24
CAS-SU 27934	F	152	337	12	326	12	0.026	0.51 (0.55) R	0.51 L	0.91 (0.92) R	0.93 L
CAS-SU 27935	F	253	330	12	321	10	0.020	0.46 L	0.49 R	0.91	0.91
CAS-SU 27936	F	233	328	11	321	11	0.026	0.53 (0.64) L	0.62 (0.64) R	0.94	0.94
CAS-SU 27937	F	146	326	11	316	11	0.027	0.10 L	0.22 R	0.66 (0.82) L	0.84
CAS-SU 27939	F	219	324	12	313	12	0.027	0.32	0.32	0.89	0.89
CAS-SU 27944	F	140	339	11	332	10	0.025	0.35 (0.46) L	0.39 (0.49) R	0.90 (0.94) L	0.91
CAS-SU 27938	M	225	319	13	308	14	0.031	0.08 L	0.24 R	0.70 (0.75) L	0.89 R
CAS-SU 27940	M	224	318	13	307	13	0.031	0.49 L	0.53 R	0.92	0.92
CAS-SU 27941	M	221	312	12	299	13	0.027	0.06 L	0.08 (0.16) R	0.66 (0.76) L	0.84
CAS-SU 27942	M	236	327	14	316	14	0.032	0.30 (0.45) L	0.37 (0.45) R	0.92	0.92
CAS-SU 27945	M	155	301	13	293	12	0.036	0.10 (0.33) L	0.28 (0.34) R	0.90	0.90
CAS-SU 28446	M	221	321	12	311	13	0.032	0.35 (0.43) L	0.40 (0.43) R	0.91	0.91
CAS 127973	M	192	300	12	290	13	0.026	0.39 (0.41) L	0.44 R	0.96	0.97
CAS-SU 27943	J	112	312	11	308	13	0.027	0.36 (0.45) L	0.51 R	0.94 R	0.95
CAS 139171	J	109	345	10	321	10	0.023	0.13 (0.45) L	0.44 R	0.90 L	0.91 R

it. The third upper labial contacts the postnasal in all specimens. The junction of the small intestine and colon was examined in five specimens (CAS-SU 27934, 27936, 27937, 27942, and 27944) and none have a rectal caecum. CAS-SU 27941 lacks retrocloacal sacs. Both left and right hemipenes are everted in CAS-SU 27938, 27945, and 28446. The hemipenes of CAS-SU 27938 are similar to CAS-SU 27940, except that the basal area on both hemipenes appears to be more fully everted with the posterior basal sac larger and more pronounced than in CAS-SU 27940. CAS-SU 28446 also has similar hemipenes except that the terminal disks are not as fully everted. In CAS-SU 27945, only the proximal shaft of each hemipene is everted, and the hemipenes lack the papillose disk. The tapered hemipenes have basal swellings and flounces as in CAS-SU 27940. The sulcus spermaticus extends from the base to the tip. Some papillae can be seen at the tip of the left hemipene.

Comparisons.—As a member of the *T. ruficaudus* group, *T. castanotus* differs from Indo-Australian and Philippine typhlopids (excluding members of the *T. ruficaudus* group) by the absence of a rectal caecum and by fusion of the glandular lines underlying the postnasal and preocular (see McDowell 1974, for a discussion of the characters he used to define the *T. ruficaudus* group).

The distinctive feature of a continuous, sharp-edged dark dorsal stripe contrasts with other members of the *T. ruficaudus* group, in which there is a dorsal to ventral decrease in chromatophore intensity in the dorsal stripe, and the outermost row of the dorsal stripe has unpigmented scales interspersed within it that increase in frequency posteriorly resulting in a reduction from head to tail in the number of pigmented dorsal scale rows.

Typhlops castanotus is most easily confused with *T. ruficaudus* and *T. canlaonensis,* which also are distinctly bicolored, with a dark dorsum and light venter separated by a sharp break. Besides differences noted above, *T. ruficaudus* and *T. canlaonensis* have 30–32 scale rows behind the head (instead of 28) and dorsal pigmentation that ends abruptly at the level of the vent, with an irregular middorsal band only a few scale rows wide continuing posteriorly onto the tail (in *T. castanotus,* the dorsal stripe continues past the vent onto the tail, usually to the terminal spine).

Etymology.—The specific name *castanotus* is masculine, Latinized from the Greek *kastanea* and *notos,* meaning "brown-backed."

Distribution.—In the central Philippines, known only from Inampulugan Island between Guimaras Island and Negros Island, Borocay Island off the northwest coast of Panay Island, and near the northern coast of Panay Island in the vicinity of Makato. This disjunct distribution is likely a sampling artifact, and suggests that *T. castanotus* may be more widely distributed on Panay Island and surrounding islands.

Habitat data are available for all but one specimen (from Inampulugan Island). Specimens from Inampulugan Island were collected in either "hardwood forest" or "original hardwood forest," except CAS-SU 27937, which is from a "bamboo grove and hardwood forest." The specimen from Borocay Island was collected "along [the] edge of [a] coconut grove and rough clearing," and the specimen from Panay Island is from a "forest remnant."

Discussion.—McDowell (1974) described the hemipenes of *T. ruficaudus* and *T. kraali* as having "claw-shaped (but soft) papillae on the distal half of the organ," apparently similar to the hemipenes of *T. castanotus.* Although a male, the specimen of *T. ruficaudus* (MCZ 25594) that McDowell lists does not have everted hemipenes, and we have not seen his specimens of *T. kraali.* In contrast, McDowell found a specimen of *T. luzonensis* (MCZ 79698) to have smooth hemipenes, suggesting that the *T. ruficaudus* group is composed of two subgroups. Our

observations of MCZ 79698 indicate that its hemipenes are not fully everted; rather, they are similar to the hemipenes of CAS-SU 27945 suggesting that a papillose terminal disk may be hidden within the tapering shaft.

Typhlops collaris, new species
Fig. 3

Holotype.—UF 55123, an adult male from Anuling Mt. (150 m elev.), Caramoan Municipality, Camarines Sur, Luzon Island, Philippines, collected by Walter Auffenberg on 29 Jul 1982 (see Auffenberg 1988, for additional information on this and the following localities).

Paratypes (10).—UF 52866, 23 Jul 1982, UF 54186 and USNM 319549 (formerly UF 54187), 11 Oct 1982, base camp (Barrio Terogo, about 2 km north of Caramoan; Auffenberg 1988); UF 54188, 8 Aug 1982, Kasini Mt. (250 m elev.); UF 54189, 22 Jul 1982, Ilawod; UF 54192, 26 Jul 1982, UF 55644 and USNM 319550 (formerly UF 55645), 27 Jul 1982, UF 55646, 7 Jul 1982, Anuling Mt. (150 m elev.); UF 55648, 29 Jul 1982, Anuling Mt. (200 m elev.). All collected by Walter Auffenberg in Caramoan Municipality, Camarines Sur, Luzon Island, Philippines, except UF 52866, collected by Walter Auffenberg et al.

Diagnosis.—A slender, moderate-sized member of the *Typhlops ruficaudus* group having more than 400 middorsal and more than 390 midventral scale rows, and a light collar of unpigmented scales behind the head.

Description of holotype.—Total length (TL), 226 mm; tail length, 4 mm; mid-body diameter (MBD), 5.5 mm; body diameter at vent, 4.5 mm; TL/MBD, 41; 427 middorsal scale rows; 412 midventral scale rows; 12 mid-subcaudal scales; 11 mid-dorsocaudal scales; 28 scale rows around the body anteriorly reducing to 26 scale rows posteriorly; head (viewed from above) tapered; in profile, snout rounded, projecting anteriorly above mouth, without transverse rostral keel; nostrils lateral, near tip of snout; eyes dorsolateral, visible beneath ocular shield, posterior edge of preocular covering anterior third of eye on left and anterior quarter of eye on right, diameter of both eyes 15% of distance from anterior edge to tip of snout; rostral oval, extending from upper lip ventrally to a level just anterior to eyes on dorsum, about ½ head width, widest just posterior to level of nostrils, bordered laterally by the nasals and by the prefrontal posteriorly; nasals incompletely divided into pre- and postnasals, suture dividing each nasal originating ventrally at second upper labial, then extending dorsally and anteriorly to nostril, beyond nostril

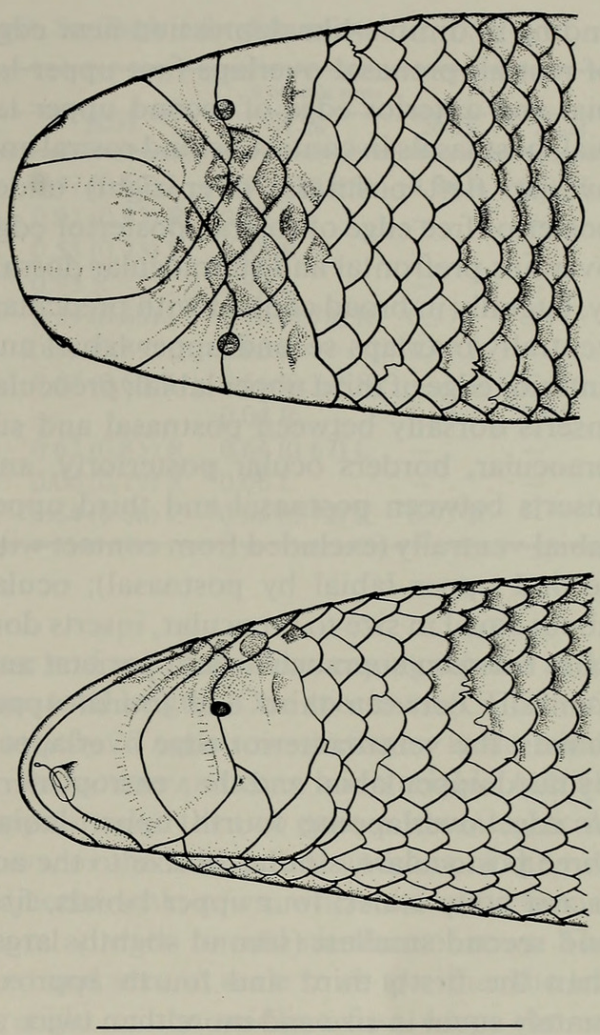

Fig. 3. Holotype (UF 55123) of *Typhlops collaris*: left lateral view (below) and dorsal view (above) of head. The bar represents 5 mm.

ending in dimple-like depression near edge of rostral; prenasal overlaps first upper labial and anterior edge of second upper labial; postnasals in contact behind rostral and overlap (left postnasal over right) under posterior free edge of rostral, posterior edge overlaps prefrontal and supraocular dorsally, laterally in broad contact with preocular, ventrally overlaps second upper labial and anterior edge of third upper labial; preocular inserts dorsally between postnasal and supraocular, borders ocular posteriorly, and inserts between postnasal and third upper labial ventrally (excluded from contact with second upper labial by postnasal); ocular about equal in size to preocular, inserts dorsally between supraocular and parietal and ventrally between third and fourth upper labials, the ventroanterior edge overlapped by third upper labial and the ventroposterior edge overlapping fourth upper labial; three postoculars, similar in size to the adjacent body scales; four upper labials, first and second smallest (second slightly larger than the first), third and fourth approximately equal in size and more than twice as large as second; two middorsal scales posterior to rostral (prefrontal and frontal) slightly larger than the succeeding body scales, interparietal equal in size to the succeeding body scales; one supraocular on each side, each about 1.5 times the width of a body scale; one parietal on each side, each almost twice the width of a body scale and oriented obliquely to the body axis.

All head scales except the rostral have basal glands forming a glandular line which is overlapped by the posteriorly projecting free edge of the preceding scale; glands lying along internasal suture between the nostril and second upper labial expand into a striated organ; glands lying under posterior edge of postnasal and preocular fuse at base of third upper labial (under imbricate posterior edge of postnasal); basal glands of scales on body occupy anterior ⅓ of the scale (excluding posterior free edge of scale).

Posterior to the head shields, there are 26 scale rows around the body, increasing to 27 rows at 7 mm body length, and 28 rows at 11 mm body length; the number of scale rows then reduces in one pair of reductions from 28 to 26 rows as follows: at 13 mm body length the first and second para-midventral scale rows on the right fuse (followed by a variable region in which this scale row divides and refuses up to 42 mm body length), and at 14 mm body length the first and second para-midventral scale rows on the left fuse; there are 26 scale rows for the remainder of the body length, although about 3 mm anterior to the vent the two para-midventral rows on the right fuse, then after three transverse scale rows divide again.

Light pigmentation, consisting of a fine network of chromatophore reticulations, covers non-glandular portions of dorsal head scales (the three middorsal scales posterior to the rostral; supraoculars; parietals; and dorsal portions of the rostral, postnasals, preoculars, and oculars); posterior to these head scales, the scale inserted between the interparietal and parietal, and the scale between the parietal and ocular are pigmented on both sides of the head; posterior to these pigmented scales is an unpigmented band four scale rows wide middorsally and three to four rows wide laterally; there are 15 lightly pigmented longitudinal rows of dorsal scales posterior to the collar reducing to 11 pigmented rows before the vent due to gradual loss of pigmented scales in the lateral-most row (row 7) over the body length, and reduction in pigmentation density in row 6 just before the vent; posterior to the vent nine dorsal longitudinal scale rows are pigmented on the anterior two-thirds of tail, but unpigmented scales in the lateral-most row and a band of four unpigmented middorsal scales produce a mottled appearance; pigmented scales end about four transverse scale rows anterior to the terminal spine; terminal spine pigmented.

Scales in the dorsal stripe have a basal

Table 2.—Scale row reduction patterns in *Typhlops collaris*. See Table 1 for discussion.

Museum #	Sex	TL	MD	MDC	MV	MSC	Tail/TL	# of scale rows			
								28–27	27–26	26–25	25–24
UF 54186	F	244	457	12	447	11	0.016	0.47 (0.52) L	0.52 (0.55) R	0.96 R	0.96 L
UF 54188	F	255	457	11	444	12	0.020	0.91 (0.93) R	0.92 L	—	—
UF 54189	F	255	460	11	448	10	0.014	0.55 (0.75) L	0.88 R	—	—
UF 54192	F	233	441	11	429	12	0.017	0.93 R	0.93 L	—	—
UF 55644	F	227	458	11	448	10	0.015	0.59 (0.65) L	0.74 (0.78) R	0.97	0.97
USNM 319550	F	255	434	10	427	9	0.016	0.58 (0.89) L	0.93 R	0.97 R	—
UF 55648	F	232	434	11	426	11	0.017	0.57 (0.63) L	0.66 (0.74) R	—	—
UF 52866	M	203	422	12	408	11	0.020	—	0.04 R	0.91	0.91
USNM 319549	M	207	412	12	396	13	0.024	0.62 (0.85) R	0.64 (0.67) L	—	—
UF 55123	M	226	427	11	412	12	0.018	0.06 (0.19) R	0.06 L	—	—
UF 55646	M	210	461	13	449	12	0.019	0.54 (0.68) L	0.56 (0.72) R	0.97 R	—

gland lightly covered by chromatophores; posterior to the basal gland, chromatophores are usually concentrated into a narrow dark line, with a fine network of chromatophores on the remainder of the scale. The middorsal and adjacent scale rows are most darkly pigmented, with the concentration of chromatophores decreasing laterally. The ventral scales lack chromatophores. To the unaided eye, the back is light brown and there is no sharp demarcation of the dorsal stripe.

Variation.—The sex ratio in our sample is four males, seven females. Total length ranges from 203–226 mm ($\bar{X}$ = 212 mm) in males and 227–255 mm ($\bar{X}$ = 243 mm) in females (Table 2). The number of middorsal scale rows varies from 412–461 ($\bar{X}$ = 430) in males and 434–460 ($\bar{X}$ = 449) in females; males have 11–13 ($\bar{X}$ = 12) middorsocaudal scales and females 10–12 ($\bar{X}$ = 11), and tail length (as percent total length) is 0.018–0.024 ($\bar{X}$ = 0.020) in males and 0.014–0.020 ($\bar{X}$ = 0.016) in females, suggesting tail length is sexually dimorphic.

Ten of 11 specimens have 28 scale rows posterior to the head (although UF 54192 has an irregular ventral scale pattern for 11 mm posterior to the head with up to 30 scale rows, and UF 55648 has an irregular pattern in which both ventral and lateral scale rows fuse and split before becoming regular at 35 mm total length). One specimen (UF 52866) has only 27 scale rows posterior to the head.

Reduction patterns are variable but always involve the two para-midventral scale rows, or the midventral and one of the two adjacent scale rows, when the reduction is from an even to odd number of rows. The first and second scale rows to either the left or right of the midline fuse when the reduction is from an odd to even number of rows. The number of scale rows around the body reduces in two pairs of reductions from 28 scale rows behind the head to 24 rows in front of the tail in only two specimens (Table 2). Six specimens have only one pair of reductions (from 28 to 26) and two specimens have one pair (28 to 26) followed by a single reduction (26 to 25). In UF 52866 the single anterior reduction (27 to 26) is followed by a pair of reductions to 24. In the holotype (UF 55123) and UF 52866 the first reduction occurs anteriorly (6% and 4% TL, respectively); in all other specimens the first pair of reductions occurs near midbody or on the posterior half of the body (47–93% TL). The first pair of reductions is offset in ten specimens, the first reduction occurring to the left of the middorsal in six of these and to the right in four. All reductions from 26 to 25, or 26 to 24 scale rows occur

at 91–97% TL. At midbody (50% TL ± 10%) three specimens have 28 scale rows, and two have 26 rows. The remaining six specimens have either 28–26 or 28–27 scale rows at midbody, depending on exactly where the count is made.

The tongue of UF 54186 is 4 mm in length, forked at 1.5 mm, and lacks lateral papillae. All specimens have an unpigmented collar immediately behind the head, beginning middorsally with the fourth, fifth, or sixth middorsal scale row and the first or second scale behind the parietal and ocular shields. Middorsally, the collar can be from one to four scale rows wide; laterally, it varies in width within individuals from one to five scale rows, generally widest at the lateralmost extent of the dorsal stripe, and bridged in two specimens by pigmented scales. Posterior to the collar, the dorsal stripe is either 17 or 15 scale rows wide. Contact between the postnasals posterior to the rostral varies. In seven specimens there is no overlap, although the postnasals touch or come close to touching behind the posterior edge of the rostral in three of these specimens; in four the postnasals overlap, the left postnasal overlapping the right in two individuals and the right overlapping the left in two. In all specimens examined, the third upper labial contacts the postnasal.

A rectal caecum is absent in the two specimens (UF 54192, 55644) examined; retrocloacal sacs are absent in UF 52866 and USNM 319549.

Comparisons.—As a member of the *T. ruficaudus* group, *T. collaris* differs from Indo-Australian and Philippine typhlopids (excluding members of the *T. ruficaudus* group) by the absence of a rectal caecum and by fusion of the glandular lines underlying the postnasal and preocular.

Typhlops collaris is similar to many other populations of the *T. ruficaudus* group in having a lightly pigmented dorsal stripe without a well defined break between the dorsal stripe and the unpigmented ventral scales. No other members of this group have the high number of middorsal transverse scale rows (>400) present in *T. collaris* or a light collar of pigmentless scales posterior to the head.

Etymology.—The specific name *collaris* is from the Latin *colare,* in reference to the light collar behind the head.

Distribution.—Known only from the eastern tip of the Caramoan Peninsula, Luzon Island, Philippines.

Preliminary Artificial Key to the Species of Blind Snakes of the Philippine Islands

The following key to Philippine scolecophidians should serve as a useful preliminary guide to the currently recognized species of *Ramphotyphlops* and *Typhlops* known from the archipelago. We hesitate to comment at this time on the status of several problematic populations since our investigations of the *T. ruficaudus* group are incomplete. For this key, we follow McDowell (1974) in including *T. luzonensis* and *T. hypogius* in *T. ruber,* and *T. jagorii* in *T. ruficaudus.* We tentatively synonymize *T. canlaonensis* with *T. ruficaudus.* Although McDowell (1974) stated that *Typhlops hedraeus* might be conspecific with *Typhlops ater,* we recognize *T. hedraeus* here as a valid species.

1. Rostral without a sharp horizontal ridge 2
– Rostral with a thickened horizontal ridge; tail at least twice as long as broad 7
2. Tail short, about as long as broad. Glands on head confined to base of scales 3
– Tail about two to three times as long as broad. Head profusely covered with glands, glands not confined to base of scales; scales in 18 rows around body ..... *Typhlops hedraeus*
3. Scales in 20 rows around body; internasal suture arising from preocular ..... *Ramphotyphlops braminus*
– Scales in 26–30 rows around ante-

rior third of body; internasal suture arising from second upper labial ... 4

4. Preocular contacts second upper labial forming a horizontal suture; scales in 26 or 28 rows behind head; 15–21 dorsal rows of darkly pigmented scales, occasionally only the centers of the scales are heavily pigmented giving rise to a lineate pattern ..... *T. ruber*

– Preocular separated from second upper labial by postnasal, not forming horizontal suture; scales in 28 or 30 rows behind head; 9–17 pigmented dorsal scale rows 5

5. Light nuchal collar present; transverse scale rows >390; 11–17 lightly pigmented dorsal scale rows ... . *Typhlops collaris*

– Light nuchal collar absent; transverse scale rows <390; 9–15 darkly pigmented dorsal scale rows 6

6. Scale rows behind head 30–32. 11–15 darkly pigmented dorsal scale rows; scales on tail without dark pigmentation except for narrow middorsal stripe ..... *Typhlops ruficaudus*

– Scale rows behind head 28. Nine or 11 darkly pigmented (usually black) dorsal scale rows; tail darkly pigmented above and on sides .... *Typhlops castanotus*

7. Scales in 20–22 rows around body .. .. *Ramphotyphlops olivaceus*

– Scales in 24–28 rows around body .. .. *Ramphotyphlops cumingii*

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