

A revision of *Gerrhopilus inornatus* (Squamata: Gerrhopilidae) reveals a multi-species complex

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Abstract

Melanesian blindsnakes of the genus *Gerrhopilus* have been little collected or researched. I examined specimens assigned in museums to *Gerrhopilus inornatus* and found considerable morphological diversity among them that indicates the presence of multiple species. I redescribe *G. inornatus* (Boulenger) based on the holotype and one additional specimen, and I describe six new species among specimens currently subsumed under that name from Papua New Guinea: *Gerrhopilus flavinotatus* **sp. nov.**, *Gerrhopilus lorealis* **sp. nov.**, *Gerrhopilus papuanorum* **sp. nov.**, *Gerrhopilus polyadenus* **sp. nov.**, *Gerrhopilus slapcinskyi* **sp. nov.**, and *Gerrhopilus wallachi* **sp. nov.** Each species is currently known from only 1–3 specimens, and all but two are known only from single localities. In addition to traditional information on scale counts, habitus, and color patterns, I found the numbers and distributions of epidermal glands among the head shields to be especially useful for discriminating among species. The number of recognized Melanesian *Gerrhopilus* has increased tremendously in recent years, but the region has been poorly sampled for these snakes, and it is to be expected that additional species will be identified at such time as surveys can more effectively target these cryptic snakes.

Key words: Blindsnakes, head glands, Papua New Guinea, taxonomy

Introduction

The blindsnake family Gerrhopilidae comprises two genera: the monotypic *Cathetorhinus* of unknown provenance and *Gerrhopilus*, with 21 species ranging from India to western Melanesia (Wynn 2021). The systematics of the Gerrhopilidae are poorly known, with the family only having been recognized recently (Vidal *et al.* 2010), only two species of the family sampled (*G. hedraeus* [Savage, 1950], *G. mirus* [Jan, 1860]) in each of the only molecular phylogenies of Vidal *et al.* (2010) and Pyron & Wallach (2014), and only four sampled in that of Sidharthan & Karanth (2021). All of these were Asian species and uninformative as to relationships among the Melanesian species. Indeed, they are not really informative about relationships among Asian species either inasmuch as only two confidently identified species (*G. hedraeus*, *G. mirus*) have been sampled in all previous studies.

The snakes currently assigned to *Gerrhopilus* were long referred to as the *Typhlops ater* species group (e.g., McDowell 1974) and are distinct in having epidermal glands distributed across the head scales and not merely confined to the sutures at the bases of those scales (McDowell 1974; Pyron & Wallach 2014). Within *Gerrhopilus*, ten species are found on New Guinea or on adjacent islands to the southeast that were formerly part of New Guinea prior to the dismemberment of the region by opening of the Woodlark Rift within the past six million years (Taylor *et al.* 1999). This is the region of western Melanesia that lies east of Lydekker's Line and west of the Solomon Islands. Of these ten species, *G. addisoni* Kraus, 2017; *G. depressiceps* (Sternfeld, 1913); *G. eurydice* Kraus, 2017; *G. lestes* Kraus, 2017; *G. mcdowellii* (Wallach, 1996); and *G. persephone* Kraus, 2017 are distinctive in having a transverse keel on the rostral scale that imparts to the snout a beaked appearance in lateral view (Wallach 1996; Kraus 2017). As currently known, those rostrate species are arrayed along the northern coast of Papua New Guinea, on New Ireland, and on islands off the southeastern tip of New Guinea (Kraus 2017). In contrast, *G. fredparkeri* (Wallach, 1996), *G. hades* (Kraus, 2005), *G. inornatus* (Boulenger, 1888), and *G. suturalis* (Brongersma, 1934)

have a rounded snout lacking a keel on the rostral scale (Wallach 1996; Kraus 2005; Wynn 2021). These non-rostrate species have small distributions that range from Halmahera in the west to Rossel Island off the southeastern tip of New Guinea (McDowell 1974; Kraus 2005; Wynn 2021).

With respect to the Melanesian species, it is clear that such taxonomic knowledge as is currently available is quite recent, with all but two species having been described since 1996. Furthermore, most of these species have been described from small series, with numbers ranging from 1-7 and with six of the ten species having been described only from single specimens. Collections have not improved much since these original descriptions. Kraus (2017) showed that the six complete specimens then assigned to *G. depressiceps* in museums (one partial specimen was not examined by him) in truth belonged to four species. Most of the remaining species have been little collected since their original descriptions, though Shea & Wallach (2000) provided data for an additional seven specimens of *G. mcdowellii* that supplemented the three specimens of the type series (Wallach 1996), and a total of 12 specimens is now available in museums that are assigned to the species *G. inornatus*.

During the revision of Papuan blindsnakes provided by McDowell (1974) he had available for examination only a single specimen of *G. inornatus*. But this was not the holotype, and the specimen he described (BPBM 2272) differed in important ways from that described by Boulenger (1888), making it uncertain that he was dealing with the same species. During two expeditions to Papua New Guinea in 2003 and 2004 I obtained five additional snakes that are assignable to *G. inornatus* using the key provided by Wallach (1996) for the Melanesian members of this genus (referred to as the *Typhlops ater* species group at that time). However, examination of those specimens shows again that they do not comport well with either the type description nor that provided by McDowell (1974) for the specimen examined by him. Examination of the entire series of 12 specimens assigned to *G. inornatus* in museum collections indicates that—as seen earlier for *G. depressiceps* by Kraus (2017)—these individuals represent multiple species. I herein review the taxonomy of the snakes currently assigned to *G. inornatus* and describe six new species from available samples.

Materials and methods

On specimens I collected, I measured total length of freshly euthanized animals to the nearest 0.5 mm in the field with a plastic ruler, and I measured their mass to the nearest 0.1 g with a 10-g Pesola scale. For historical museum specimens, I also measured their total length and mass as above (with mass measured after dabbing specimens of excess ethanol), but the length measurements will have greater measuring error due to some shrinkage or other distortion, and the mass measurements only serve as approximate heuristics because of variable retention of preservative and addition of paper tags to the specimens. For all specimens, I made all other measurements to the nearest 0.1 mm under a dissecting scope fitted with an ocular micrometer. I determined sex by ventral dissection to identify sexual ducts. I counted numbers of longitudinal scale rows immediately behind the head, at midbody, and at one head length anterior to the vent; I counted numbers of mid-dorsal scales between the rostral and tail spine, and I excluded those two scales and intercalary scales from these counts. Separately, I recorded numbers of intercalary scales along the mid-dorsal scale row, and I recorded counts of subcaudals and dorsocaudals. Scale terminology follows Wallach (1995) except that I use the more traditional “prefrontal”, “frontal”, and “interparietal” for the first three mid-dorsal scales behind the rostral; scale descriptions and measurements are based on the shape and locations of the clear shields; gland locations are based on the underlying scale. Supralabial imbrication patterns follow Wallach (1993). Comparisons to other species are also based on data provided in McDowell (1974), Wallach (1993, 1996), and Kraus (2005). In the Comparisons sections that follow I omit comparison to the six members of the *G. depressiceps* Group because each of those species is easily distinguished from those treated herein by the transverse ventral keel on the rostral that imparts to the snout a beaked appearance.

I use the following abbreviations: EW = eye width; HW = head width, at widest point; L = total length; LSR = longitudinal scale rows, recorded one head length behind head, at midbody, and one head length anterior to vent; M = mass; PSN = pre-oral snout length, from central posteroventral point of rostral to snout tip; RW = rostral width, measured at widest point; SN = snout length from anterior margin of eye to snout tip, measured as a straight line between those points, SVL = snout-vent length; SW = snout width measured across the anterior margin of the eyes; TL = tail length, from posterior margin of anal shield to end of tail spine; TSR = transverse scale rows, between rostral and tail spine; TW = tail width, measured at mid-tail; VW = vent width, measured across the vent; W = midbody width.

I collected specimens under applicable national and provincial permits, fixed them in 10% buffered formalin, and transferred them to 70% ethanol for storage. Other relevant specimens were borrowed from the Natural History Museum, London (BMNH); Bernice P. Bishop Museum, Honolulu (BPBM); Museum of Comparative Zoology, Cambridge (MCZ); and National Museum of Natural History, Washington D.C. (USNM). Locality coordinates for the new species use GPS datum AUS 66.

Results

Characters of taxonomic value

Few characters are uniquely diagnostic of individual species within the *G. inornatus* species group, but combinations of the characters listed below provide unique diagnoses of each species treated in this account.

Scale counts. As is true for most blindsnakes, differences in the numbers of longitudinal scale rows around midbody and in numbers of transverse scale rows mid-dorsally are diagnostic of species in the *G. inornatus* species group. Numbers of scale rows behind the head are not of diagnostic value, being seen to vary in two of the species treated below. Furthermore, one species is uniquely characterized by having a loreal scale, which is absent in all other species of this group.

Head glands. The number and distribution of epidermal glands in the centers of the head shields varies considerably among members of the *G. inornatus* species group (this excludes those glands along the anterior margin of each scale, which typically fuse into a continuous row of white glandular tissue). Although intraspecific and intra-individual (bilateral) variation occurs in exact counts of glands within particular scales, differences for most scales are diagnostic of individual species.

Ventral color pattern. Most species in the *G. inornatus* species group have uniformly brown venters in preservative (the two species I have collected were black in life), but three species are white or yellow mid-ventrally on the posterior third of the body. This pale coloration seems to result from absence of melanophores on these scales, but this requires confirmation on specimens seen in life.

Tail spine. The tail spine is usually sharp and protruding in members of the *G. inornatus* species group but blunt, short, and downturned in one species. The base of the tail spine is usually brown or black in preservative but is white in one species.

Habitus. Species differ in how stout or slender they are, and this seems diagnostic for some species. Habitus is quantified by dividing the length of a specimen by its width at mid-body.

Relative tail length. This feature varies sexually dimorphically but also between species. Most specimens in this species group are female, making comparison among most species feasible.

Taxonomic accounts

Gerrhopilus inornatus

Figs. 1A, B

Typhlops inornatus Boulenger, 1888: 384.

Gerrhopilus inornatus Vidal, Wynn, Donnellan & Hedges, 2010: 560 in Vidal *et al.* 2010.

Holotype. BMNH 1946.1.11.80, collected by H.O. Forbes at “Sogere Camp” [Sogeri, 530 m a.s.l.], Central Province, Papua New Guinea.

Diagnosis. A *Gerrhopilus* species characterized by the unique combination of having a rounded snout in lateral view; LSR = 20 at midbody; TSR = 374–375; loreal absent; supralabial imbrication pattern T-V; subocular scale one; presubocular scale absent; a sharp, protruding tail spine that is white; 2–3 glands in the prefrontal, 2–3 in the supraocular, 0–6 in the ocular, 22–24 in the preocular, 0 in the frontal, 0–2 in the subocular; L/W = 36.4–47.8; TL/SVL = 0.026 in one female and 0.030 in one male; and a uniformly dark venter. Its size is small for this species group (Table 1).

Comparisons with other species. *Gerrhopilus inornatus* is distinguished from *G. fredparkeri*, *G. hades*, and

G. suturalis in having 20 longitudinal scale rows at midbody (vs 16 in *G. fredparkeri* and 18 in *G. hades* and *G. suturalis*). It is further distinguished from *G. fredparkeri* in its lower number of transverse scale rows (374–375 vs 539 in *G. fredparkeri*), from *G. hades* in having 20–22 longitudinal scale rows behind the head (vs 18 in *G. hades*) and more and smaller glands in the center of the preocular (22–24 vs 10–11 in *G. hades*), and from *G. suturalis* in having a single postocular on each side of the head (vs two in *G. suturalis*) and lacking a presubocular (vs present in *G. suturalis*).

Redescription of the holotype. Female, with ventral cut ~70% of way down body; body soft around ventral cut. L = 177 mm, SVL = 172.5 mm, TL = 4.5 mm, HW = 3.7 mm, SN = 1.9 mm, SW = 3.0 mm, PSN = 1.0 mm, RW = 1.5 mm, EW = 0.3 mm, W = 3.7 mm, VW = 3.6 mm, TW = 3.2 mm, L/W = 47.8, TL/SVL = 0.026. Head slightly wider than neck. Snout rounded in dorsal and lateral views. Snout anterior to lower jaw angled slightly ventrally. Rostral moderately large (RW/HW = 0.41), oval dorsally, lateral margins convex, posterior border extending approximately half way between naris and eye, posterior margin straight; ventrally surface papillose, with sides slightly diverging anteriorly and posterior margin straight. Nasals separated dorsally by prefrontal (Fig. 1A); superior nasal large, with slightly sinuous posterior margin, concave dorsally, convex ventrally (Fig. 1B). External naris semicircular, oriented obliquely, close to rostral, anterior half covered by inferior nasal; superior nasal suture extending anterodorsally from naris to rostral; inferior nasal suture complete, contacting second supralabial well posterior to latter's contact with first supralabial. Prefrontal, frontal, and supraoculars subequal in size, larger than parietals and interparietal, which are also subequal in size. Preocular large, triangular; larger than ocular but smaller than superior nasal. Ocular large, smaller than preocular, extending dorsally well above preocular, extending ventrally to ~2/3 depth of preocular, bordered posteroventrally by subocular of less than half its size. Eye obscure, with indistinct margin and small pupil, situated above widest point of ocular and approximately midway along its height, anterior half covered by preocular plate in lateral view. Four postoculars bordering ocular and subocular between parietal and fourth supralabial. Four supralabials, third the largest, all with long axis oblique to long axis of body, first approximately rectangular. Supralabial imbrication pattern T-V, posterior border of second supralabial overlaps anteroventral margin of preocular, that of third supralabial overlaps anteroventral margin of subocular and ends at level of rear margin of preocular. Mental hexagonal, wider than long, projecting slightly beyond curve of lower jaw and fitting into notch on upper lip when mouth is closed. Infralabials two on each side, second much longer.

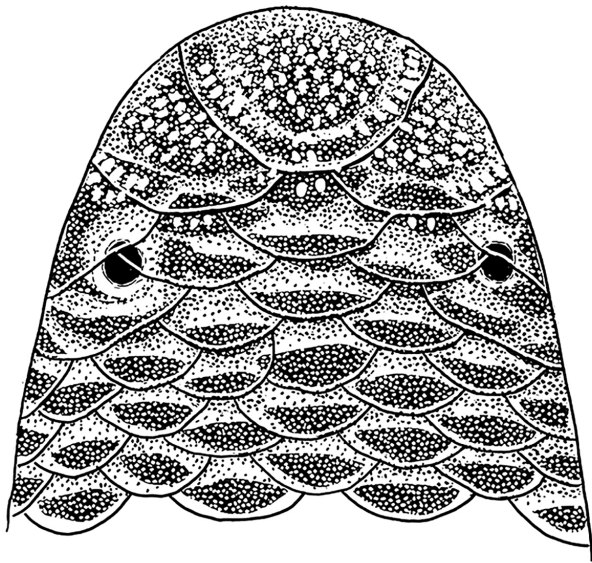
Longitudinal scale rows 22 behind head, 20 at midbody, and 20 anterior to vent; transverse scale rows 375, six intercalary scales along vertebral row; subcaudals 12; dorsocaudals 15; apical region with sharp, transverse, slightly downturned spine that extends well past last scales.

Rostral, nasals, and preoculars densely covered in pale glands; oculars with 2 (R) and 0 (L) glands, preoculars with 22 (R) and 23 (L), supraoculars with 2 (R) and 3 (L), prefrontal with 2; frontal and suboculars without glands.

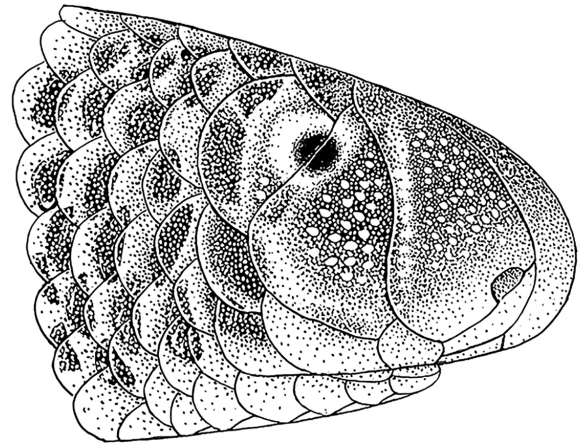
In preservative, 136–137 years after its preservation, dorsum dark brown (black in life, cf. Boulenger, 1888), gradually fading laterally to slightly paler brown on venter; no sharp distinction between dorsal and ventral coloration; each dorsal scale uniformly dark; each ventral scale slightly darker anteriorly. Anterior third of rostral, area around nares, first two supralabials, mental, and center of throat to five scales behind mental pale straw yellow; third and fourth supralabials pale straw yellow with brown along dorsal margins. Head glands pale straw yellow; tail spine and adjacent scales white, spine with corneus brown tip. Iris dark gray, obscure; pupil pale gray.

Variation. The sole additional specimen (USNM 213488) differs from the holotype in being male, slightly shorter (L = 171 mm, SVL = 166 mm, TL = 5 mm, Table 1), relatively wider (W = 4.7 mm, L/W = 36.4), with a longer tail (TL/SVL = 0.030), and in having 20–20–20 longitudinal scale rows, with no reduction from the head to midbody. It has 374 transverse scale rows, ten intercalary scales, 17 subcaudals, 16 dorsocaudals, the third supralabial extending posterior to the posterior margin of the preocular, the eye half covered by the preocular, oculars with 6 (R) and 2 (L) glands, preocular with 22 (R) and 24 (L), supraoculars with 2 on each side, prefrontal with 3, frontal with 0, and suboculars with 2 glands on each side. It is obvious that variation between these two specimens is minimal. The pale straw yellow on the chin extends to four scales behind mental; base of the tail spine is black, and the tip is white.

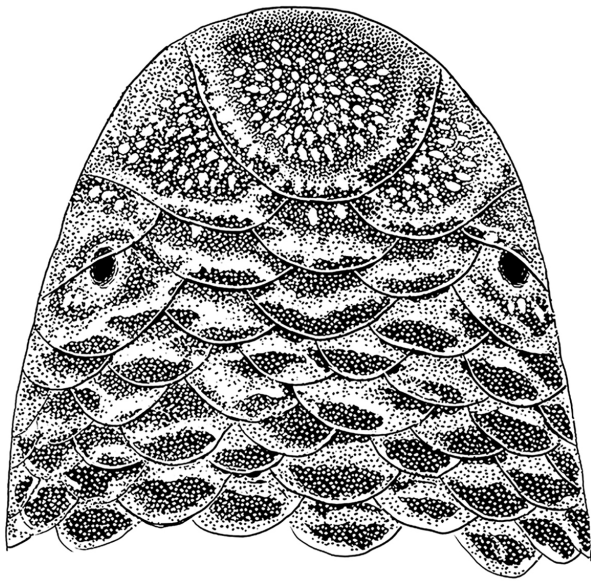
Distribution. Known only from Sogeri (9.42° S, 147.42° E) and from 4 km N of Sogeri at McDonald's Corner, 9.3849° S, 147.427° E (Fig. 2). Given the imprecision of named 19th Century collecting localities, these are effectively the same location.



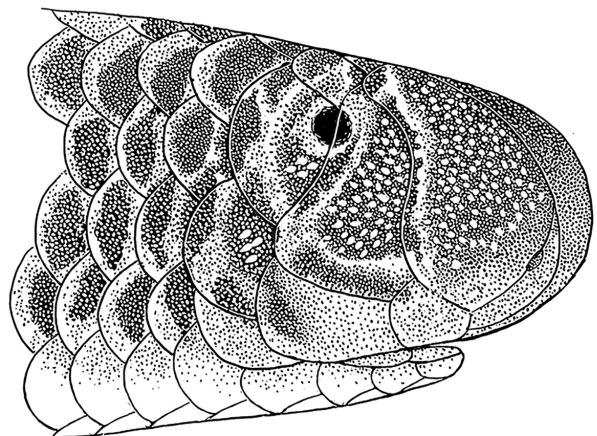
A



B



C



D

FIGURE 1. Dorsal and lateral views of heads for members of the *Gerrhopilus inornatus* Group having 20 midbody scale rows. **A, B** holotype of *Gerrhopilus inornatus* (BMNH 1946.1.11.80); **C, D** holotype of *Gerrhopilus slapcinskyi* (BPBM 18944).

Ecology. USNM 213488 was collected under tin in a rubber plantation of very mature trees, near a stream. The native habitat around Sogeri is now highly disturbed but would have been lower-elevation hill forest, as still can be found in nearby Varirata National Park (Fig. 3A).

Remarks. The holotype of *G. inornatus* was originally catalogued as BMNH 88.3.21.6 and noted as collected

by and purchased from H.O. Forbes, who maintained a camp at Sogeri from October 1885 to April 1886 (Forbes 1888), during which period the specimen would have been collected. The USNM specimen was collected by C. Ross on 25 March 1978. The holotype was described by Boulenger (1888), within three years of its collection, as uniformly black. Twenty-nine years later de Rooij (1917) noted the specimen to be black above and a little lighter below, showing the typical pattern of fading I have seen in snakes of this complex..

Subsequent to the original description, the holotype was reported on only by de Rooij (1917). The second specimen (USNM 213488) was, however, examined by Wallach (1996). All subsequent treatments of *Gerrhopilus inornatus* have been based on specimens from some of the species described below.

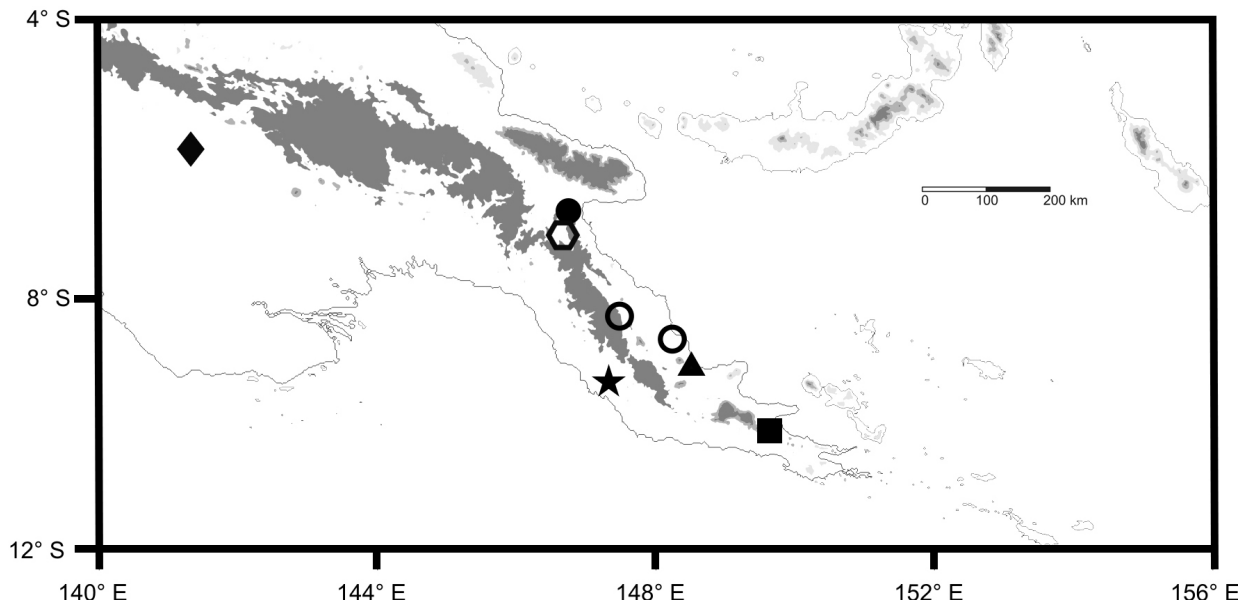


FIGURE 2. Map of southern Papua New Guinea showing collecting localities for *Gerrhopilus inornatus* (star), *G. flavinotatus* (diamond), *G. lorealis* (hexagon), *G. papuanorum* (square), *G. polyadenus* (open circles), *G. slapcinskyi* (filled circle), and *G. wallachi* (triangle).

Gerrhopilus slapcinskyi sp. nov.

Figs. 1C, D

Holotype. BPBM 18944 (field tag FK 8467), collected 20 October 2003 by John Slapcinsky along Dunch River, 5.6 km (by air) NW of Mt Shungol summit, 6.816° S, 146.692° E, 750 m elevation, Morobe Province, Papua New Guinea.

Paratype. BPBM 18945, same data as holotype.

Diagnosis. A *Gerrhopilus* species characterized by the unique combination of having a rounded snout in lateral view; LSR = 20 at midbody; TSR = 298–318; loreal absent; supralabial imbrication pattern T-V; subocular scale one; presubocular scale absent; a sharp, protruding, tail spine that is black basally and white distally; 1–2 glands in the prefrontal, 0–3 in the supraocular, 4–9 in the ocular, 35–39 in the preocular, 0 in the frontal, 3–4 in the subocular; L/W = 35.5–38.6; TL/SVL = 0.034 in one female and 0.043 in one male; and a uniformly dark-brown venter. Its size is small to moderate for this species group (Table 1).

Comparisons with other species. *Gerrhopilus slapcinskyi* is distinguished from *G. fredparkeri*, *G. hades*, and *G. suturalis* in having 20 longitudinal scale rows at midbody (vs 16 in *G. fredparkeri* and 18 in *G. hades* and *G. suturalis*). It is further distinguished from *G. fredparkeri* in its lower number of transverse scale rows (298–318 vs 539 in *G. fredparkeri*), from *G. hades* in having 22 longitudinal scale rows behind the head (vs 18 in *G. hades*) and more and smaller glands in the center of the preocular (35–39 vs 10–11 in *G. hades*), and from *G. suturalis* in having a single postocular on each side of the head (vs two in *G. suturalis*) and lacking a presubocular (vs present in *G. suturalis*). *Gerrhopilus slapcinskyi* differs from *G. inornatus* in having fewer or more transverse scale rows (298–318 vs 374–375 in *G. inornatus*), a greater number of glands in the preocular (35–39 vs 22–24 in *G. inornatus*), and longer tail (TL/SVL = 0.034 vs 0.026 in female and 0.043 vs 0.030 in male *G. inornatus*).

Description of the holotype. Female. L = 195.5 mm, SVL = 189 mm, TL = 6.5 mm, HW = 4.3 mm, SN = 1.9 mm, SW = 3.5 mm, PSN = 1.0 mm, RW = 1.8 mm, EW = 0.4 mm, W = 5.5 mm, VW = 4.3 mm, TW = 3.8 mm, L/W = 35.5, TL/SVL = 0.034. Head slightly wider than neck. Snout rounded in dorsal and lateral views. Snout anterior to lower jaw angled slightly ventrally. Rostral moderately large (RW/HW = 0.42), oval dorsally, lateral margins convex, posterior border extending approximately two-thirds way between naris and eye, posterior margin straight; ventrally surface papillose, with straight sides and posterior margin concave. Nasals separated dorsally by prefrontal (Fig. 1C); superior nasal large, with sinuous posterior margin, concave dorsally, convex ventrally (Fig. 1D). External naris semicircular, oriented obliquely, close to rostral, anterior half covered by inferior nasal; superior nasal suture extending anterodorsally from naris to rostral; inferior nasal suture complete, contacting second supralabial well posterior to latter's contact with first supralabial. Prefrontal and supraoculars subequal in size, latter wider, same size as frontal but larger than parietals and interparietal, which are also subequal in size. Preocular large, triangular; larger than ocular but smaller than superior nasal. Ocular large, smaller than preocular, extending dorsally well above preocular, extending ventrally to ~2/3 depth of preocular, bordered posteroventrally by subocular of less than half its size. Eye distinct, with large distinct pupil, situated at widest point of ocular and closer to its dorsal than ventral margin, anterior 40% covered by preocular plate in lateral view. Four postoculars bordering ocular and subocular between parietal and fourth supralabial. Four supralabials, third the largest, all with long axis oblique to long axis of body, first approximately rectangular. Supralabial imbrication pattern T-V, posterior border of second supralabial overlaps anteroventral margin of preocular, that of third supralabial overlaps anteroventral margin of subocular and ends just posterior to rear margin of preocular. Mental crescentic, wider than long, projecting slightly beyond curve of lower jaw and fitting into notch on upper lip when mouth is closed. Infralabials two on each side, second much longer.

Longitudinal scale rows 22 behind head, 20 at midbody, and 20 anterior to vent; transverse scale rows 318, ten intercalary scales along vertebral row; subcaudals 15; dorsocaudals 15; apical region with sharp, slightly downturned spine that extends 0.4 mm past last scales.

Rostral, nasals, and preoculars densely covered in pale glands; oculars with 4 (R) and 9 (L) glands, preoculars with 35 (R) and 37 (L), supraoculars with 0 (R) and 1 (L), prefrontal with 2; suboculars with 4 (R) and 3 (L), and frontal without glands.

In preservative, 19 years after preservation, body dark brown above and below but somewhat paler below; no sharp distinction between dorsal and ventral shading; each scale uniformly dark. Anterior tip and margins of rostral, area around nares, first and second supralabials, mental, infralabials, and center of throat to three scales behind mental white; second supralabials white with brown along dorsal margins. Head glands white; tail spine dark brown basally, white distally. Iris dark gray; pupil paler gray. In life, the holotype was black.

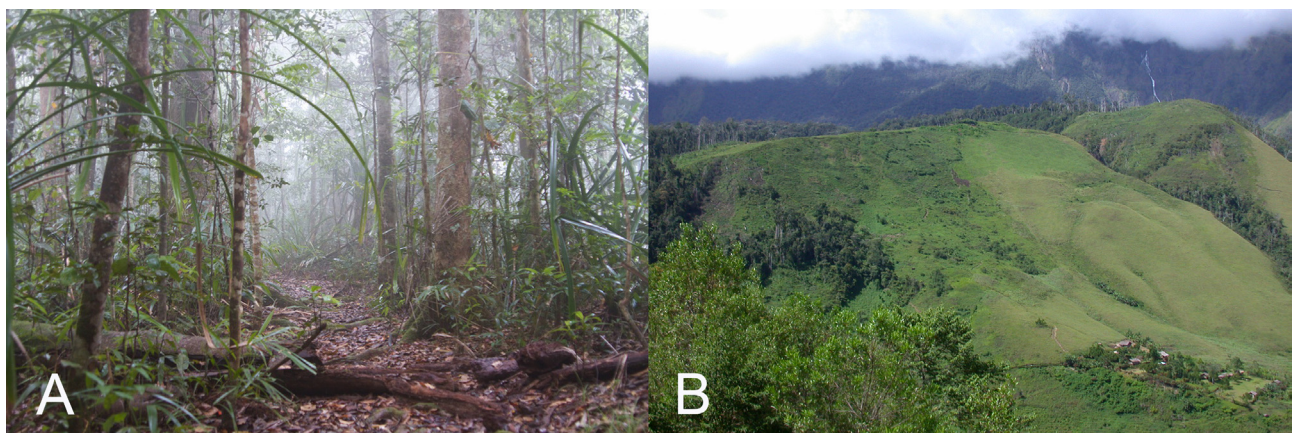


FIGURE 3. Habitats for members of the *Gerrhopilus inornatus* Group. **A** Forest at Varirata National Park, very near the type locality of *G. inornatus* (photo M. O'Shea); **B** the hills around Bunisi and Siyomu from which *G. papuanorum* was collected (photo F. Kraus).

Variation. The paratype (BPBM 18945) differs from the holotype in being male, somewhat shorter (L = 170 mm, SVL = 163 mm, TL = 7 mm, Table 1), approximately the same width (W = 4.4 mm, L/W = 38.6), and with a longer tail (TL/SVL = 0.043). It too has 22-20-20 longitudinal scale rows, 298 transverse scale rows, nine

intercalary scales, 16 subcaudals, 16 dorsocaudals, the eye one-third covered by the preocular, oculars with 8 (R) and 9 (L) glands, preocular with 36 (R) and 39 (L), supraoculars with 3 (R) and 2 (L), prefrontal with 1, frontal with 0, and suboculars with 4 (R) and 3 (L) glands. Like the holotype, it was black in life. The holotype has greater asymmetry in ocular gland numbers and slightly more mid-dorsal scale rows, but otherwise variation between the two specimens is slight.

Etymology. This species is named for malacologist John Slapcinsky, who collected the type specimens and proved a great field companion on several of my expeditions to Papua New Guinea.

Distribution. Known only from the type locality, west of Lae (Fig. 2).

Ecology. Both specimens were taken at night in primary lowland hill rainforest with a canopy of approximately 30 m height and a moderately dense understory. One of the specimens was found while climbing on the trunk of a tree.

Gerrhopilus papuanorum sp. nov.

Figs. 4A, B

Holotype. BPBM 17236 (field tag FK 7488), obtained 22 February 2003 by Fred Kraus from a local collector at Bunisi Village, NE slope Mt Simpson, 10.0171° S, 149.6002° E, 1420 m a.s.l., Milne Bay Province, Papua New Guinea.

Paratypes. BPBM 17237, Siyomu Village, NE slope Mt Simpson, 10.0145° S, 149.5970° E, 1300 m a.s.l., Milne Bay Province, Papua New Guinea, 23 February 2003; BPBM 17238, Ikara Village, NE of Mt Simpson, 9.9801° S, 149.6311° E, 800 m a.s.l., Milne Bay Province, Papua New Guinea, 2 March 2003

Diagnosis. A *Gerrhopilus* species characterized by the unique combination of having a rounded snout in lateral view; LSR = 22 at midbody; TSR = 407–414; loreal absent; supralabial imbrication pattern T-V; subocular scale one; presubocular scale absent; a sharp, protruding, tail spine that is black basally and corneous distally; 1–5 glands in the prefrontal, 0–4 in the supraocular, 0–3 in the ocular, 18–28 in the preocular, 0 in the frontal, 0–2 in the subocular; L/W = 51.2–53.5; TL/SVL = 0.021–0.026; and a uniformly dark-brown venter. Its size is large for this species group (Table 1).

Comparisons with other species. *Gerrhopilus papuanorum* is distinguished from *G. fredparkeri*, *G. hades*, *G. inornatus*, *G. slapcinskyi*, and *G. suturalis* in having 22 longitudinal scale rows at midbody (vs 16 in *G. fredparkeri*, 18 in *G. hades* and *G. suturalis*, and 20 in *G. inornatus* and *G. slapcinskyi*). It is further distinguished from *G. fredparkeri* in its lower number of transverse scale rows (407–414 vs 539 in *G. fredparkeri*); from *G. hades* in having 22–24 longitudinal scale rows behind the head (vs 18 in *G. hades*) and more and smaller glands in the center of the preocular (18–28 vs 10–11 in *G. hades*); from *G. inornatus* in having more transverse scale rows (407–414 vs 374–375 in *G. inornatus*) and in being more slender (L/W = 51.2–53.5 vs 36.4–47.8 in *G. inornatus*); from *G. slapcinskyi* in having more transverse scale rows (407–414 vs 298–318 in *G. slapcinskyi*), fewer glands in the ocular (0–3 vs 4–9 in *G. slapcinskyi*) and preocular (18–28 vs 35–39 in *G. slapcinskyi*), and in being more slender (L/W = 51.2–53.5 vs 35.5–38.6 in *G. slapcinskyi*) and having a shorter tail (TL/SVL = 0.021–0.026 vs 0.034–0.043 in *G. slapcinskyi*); and from *G. suturalis* in having a single postocular on each side of the head (vs two in *G. suturalis*) and lacking a presubocular (vs present in *G. suturalis*).

Description of the holotype. Female. L = 235.5 mm, SVL = 230 mm, TL = 5.6 mm, HW = 4.0 mm, SN = 2.3 mm, SW = 3.5 mm, PSN = 1.0 mm, RW = 1.9 mm, EW = 0.4 mm, W = 4.4 mm, VW = 3.9 mm, TW = 3.4 mm, L/W = 53.5, TL/SVL = 0.024. Head slightly wider than neck. Snout rounded in dorsal and lateral views. Snout anterior to lower jaw horizontal. Rostral moderately large (RW/HW = 0.48), oval dorsally, lateral margins convex, posterior border extending slightly more than halfway between naris and eye, posterior margin straight; ventrally surface papillose, with straight sides and posterior margin concave. Nasals separated dorsally by prefrontal (Fig. 4A); superior nasal large, with sinuous posterior margin, concave dorsally, convex ventrally (Fig. 4B). External naris semicircular, oriented obliquely, close to rostral, anterior half covered by inferior nasal; superior nasal suture extending anterodorsally from naris to rostral; inferior nasal suture complete, contacting second supralabial well posterior to latter's contact with first supralabial. Prefrontal and supraoculars subequal in size, slightly larger than frontal, parietals, and interparietal, which are also subequal in size. Preocular large, triangular; larger than ocular but smaller than superior nasal. Ocular large, smaller than preocular, extending dorsally well above preocular, extending

ventrally to ~2/3 depth of preocular, bordered posteroventrally by subocular of approximately half its size. Eye small and rather ill defined, with indistinct iris margin and large pupil, situated at widest point of ocular and approximately midway along its height, anterior third covered by preocular plate in lateral view. Five postoculars bordering ocular and subocular between parietal and fourth supralabial. Four supralabials, third the largest, all with long axis oblique to long axis of body, first approximately rectangular. Supralabial imbrication pattern T-V, posterior border of second supralabial overlaps anteroventral margin of preocular, that of third supralabial overlaps anteroventral margin of subocular and ends at rear margin of preocular. Mental crescentic, wider than long, projecting slightly beyond curve of lower jaw and fitting into notch on upper lip when mouth is closed. Infralabials two on each side, second much longer.

Longitudinal scale rows 24 behind head, 22 at midbody, and 22 anterior to vent; transverse scale rows 408, no intercalary scales along vertebral row; subcaudals 15; dorsocaudals 14; apical region with sharp apical spine that extends only short distance (0.2 mm) past last scales.

Rostral, nasals, and preoculars densely covered in pale glands; oculars and frontal without glands, preoculars with 28 (R) and 26 (L), supraoculars with 2 (R) and 4 (L), prefrontal with 5; and suboculars with 2 glands.

In preservative, 19 years after preservation, body dark brown above and below, venter slightly lighter; no sharp distinction between dorsal and ventral shading; each scale uniformly dark. Anterior half of rostral, area around nares, first supralabials, mental, first infralabials, and center of throat to 1.5 scales behind mental pale straw yellow; second and third supralabials pale straw yellow ventrally, brown dorsally. Head glands pale straw yellow; tail spine black basally, corneus brown distally. Iris pale gray distally, dark gray adjacent to pupil, distal margins indistinct; pupil paler gray.

Variation. Both paratypes too are female, but they have 22 longitudinal scale rows behind the head and throughout the body (Table 1). BPBM 17237 is smaller ($L = 215$ mm) than the holotype; BPBM 17238 is larger ($L = 262$ mm). Their L/W ratios are virtually the same (51.2, 52.4, respectively) to the holotype, as are their relative tail lengths ($TL/SVL = 0.026$ and 0.021 , respectively) and number of transverse scale rows (407, 414, respectively). The eye is half covered by the preocular scale in BPBM 17237 and half to two-thirds covered in BPBM 17238. Glands are uniformly absent from the frontal in the type series and from the ocular in BPBM 17237, but BPBM 17238 has two glands in the right ocular and three in the left. Glands in the preocular vary from 18–24 in the two paratypes, those in the subocular from 0–1, in the supraocular from 0–2, and in the prefrontal from 1–4. The rostral is slightly narrower in BPBM 17237 ($RW/HW = 0.43$) than in BPBM 17238, which is identical to the holotype. Color pattern is identical in all specimens.

Etymology. The species name is a genitive plural honorific for the people of Papua New Guinea, the generosity and friendliness of many of whom made my expeditions to that country most pleasant and rewarding.

Distribution. Known only from the northern slope of Mt Simpson, Milne Bay Province, PNG, at elevations from 800–1420 m a.s.l. (Fig. 2).

Ecology. Each of the three specimens was brought to the author by local villagers. It seems most likely that each was uncovered while the villagers were working their gardens during the day. The areas around each village are now widely cleared for gardens or converted to grasslands for hunting (Fig. 3B) but would have comprised lower-montane rainforest originally.

Gerrhopilus polyadenus sp. nov.

Figs. 4C, D

Typhlops inornatus de Rooij 1917: 14.

Gerrhopilus inornatus Pyron & Wallach 2014: 79.

Holotype. BMNH 1901.11.27.10, collected at Mt Albert Edward, Papua New Guinea by H.S. Rohu.

Paratype. MCZ 140728, collected at Sangara [8.76° S, 148.18° E], 120 m a.s.l., Oro Province, Papua New Guinea.

Diagnosis. A *Gerrhopilus* species characterized by the unique combination of having a rounded snout in lateral view; $LSR = 22$ at midbody; $TSR = 320$; loreal absent; supralabial imbrication pattern T-V; subocular scale one; presubocular scale absent; a sharp, protruding tail spine that is dark brown with a white or corneous-brown tip; 29 glands in the prefrontal, 8–9 in the supraocular, 22–23 in the ocular, 46–50 in the preocular, 6 in the frontal,

16 in each subocular; $L/W = 36.2\text{--}36.3$; $TL/SVL = 0.028\text{--}0.036$; dorsum and venter uniformly pale brown with a contrasting dark-brown patch around tail spine. Its size is moderate for this species group (Table 1).

Comparisons with other species. *Gerrhopilus polyadenus* is distinguished from *G. fredparkeri*, *G. hades*, *G. inornatus*, *G. slapcinskyi*, and *G. suturalis* in having 22 longitudinal scale rows at midbody (vs 16 in *G. fredparkeri*, 18 in *G. hades* and *G. suturalis*, and 20 in *G. inornatus* and *G. slapcinskyi*). It is further distinguished from *G. fredparkeri* and *G. inornatus* in having fewer transverse scale rows (294–320 vs 539 in *G. fredparkeri* and 374–375 in *G. inornatus*); from *G. hades* in having 22 longitudinal scale rows behind the head (vs 18 in *G. hades*); and from *G. suturalis* in having a single postocular on each side of the head (vs two in *G. suturalis*) and lacking a presubocular (vs present in *G. suturalis*). *Gerrhopilus polyadenus* is readily distinguished from *G. inornatus*, *G. slapcinskyi*, and *G. papuanorum* by its pale-brown color (dark brown or black in the other species), dark-brown scales around the tail spine (area black or white in the other species), and much greater number of glands in the ocular (11–23 vs 0–6 in *G. inornatus*, 4–9 in *G. slapcinskyi*, and 0–3 in *G. papuanorum*), preocular (42–50 vs 22–24 in *G. inornatus*, 35–39 in *G. slapcinskyi*, and 18–28 in *G. papuanorum*), prefrontal (11–29 vs 2–3 in *G. inornatus*, 1–2 in *G. slapcinskyi*, and 1–5 in *G. papuanorum*), supraocular (5–9 vs 2–3 in *G. inornatus*, 0–3 in *G. slapcinskyi*, and 0–4 in *G. papuanorum*), and subocular (5–16 vs 0–2 in *G. inornatus*, 3–4 in *G. slapcinskyi*, and 0–2 in *G. papuanorum*). It is further distinguished from *G. papuanorum* by its stouter habitus ($L/W = 36.2\text{--}36.3$ vs $51.2\text{--}53.5$ in *G. papuanorum*) and longer tail ($TL/SVL = 0.028\text{--}0.036$ vs $0.021\text{--}0.026$ in *G. papuanorum*).

Description of the holotype. Female. $L = 199$ mm, $SVL = 193.5$ mm, $TL = 5.5$ mm, $HW = 10.1$ mm, $SN = 5.5$ mm, $SW = 8.6$ mm, $PSN = 2.4$ mm, $RW = 3.7$ mm, $EW = 0.8$ mm, $W = 10.6$ mm, $VW = 8.7$ mm, $TW = 7.2$ mm, $L/W = 39.0$, $TL/SVL = 0.028$. Head slightly wider than neck. Snout rounded in dorsal and lateral views. Snout anterior to lower jaw horizontal, parallel to body axis. Rostral rather narrow ($RW/HW = 0.36$), oval dorsally, lateral margins convex, posterior border extending approximately half way between naris and eye, posterior margin straight; ventrally surface papillose, with sides slightly diverging anteriorly and posterior margin straight. Nasals separated dorsally by prefrontal (Fig. 4C); superior nasal large, with slightly sinuous posterior margin, concave dorsally, convex ventrally (Fig. 4D). External naris semicircular, oriented obliquely, close to rostral, anterior half covered by inferior nasal; superior nasal suture extending anterodorsally from naris to rostral; inferior nasal suture complete, contacting second supralabial just posterior to latter's contact with first supralabial. Prefrontal larger than supraoculars, which are larger than parietals and interparietal, which are subequal in size. Frontal fused with both parietals. Preocular large, triangular; larger than ocular but smaller than superior nasal. Ocular large, smaller than preocular, extending dorsally well above preocular, extending ventrally to $\sim 2/3$ depth of preocular, bordered posteroventrally by subocular of approximately two-thirds its size. Eye distinct, with pale pupil, situated at widest point of ocular and approximately midway along its height, anterior $1/4$ (R) or $1/3$ (L) covered by preocular plate in lateral view. Four postoculars bordering ocular and subocular between parietal and fourth supralabial. Four supralabials, third the largest, all except first with long axis oblique to long axis of body, first approximately square. Supralabial imbrication pattern T-V, posterior border of second supralabial overlaps anteroventral margin of preocular, that of third supralabial overlaps anteroventral margin of subocular and extends posterior to rear margin of preocular. Mental hexagonal, wider than long, projecting slightly beyond curve of lower jaw and fitting into notch on upper lip when mouth is closed. Infralabials two on each side, second much longer.

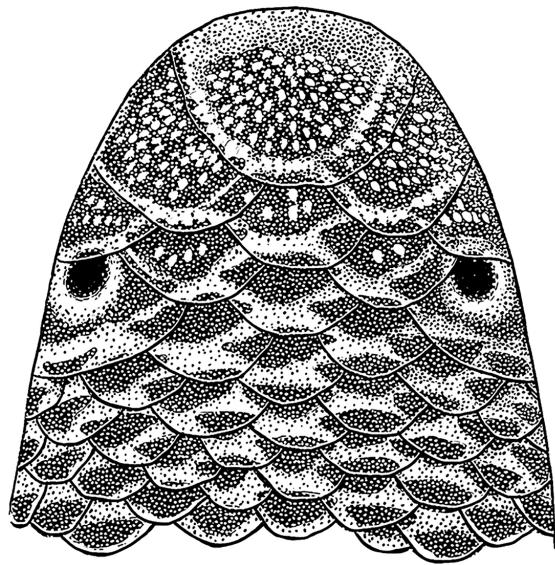
Longitudinal scale rows uniformly 22 behind head, at midbody, and anterior to vent; transverse scale rows between rostral and tail tip 320, six intercalary scales along vertebral row; subcaudals 16; dorsocaudals 16; apical region with blunt spine that barely extends past last scales.

Rostral, nasals, and preoculars densely covered in large pale glands; oculars with 22 (R) and 23 (L) glands, preoculars with 50 (R) and 46 (L), supraoculars with 8 (R) and 9 (L), prefrontal with 29; frontal with 6, and suboculars with 16.

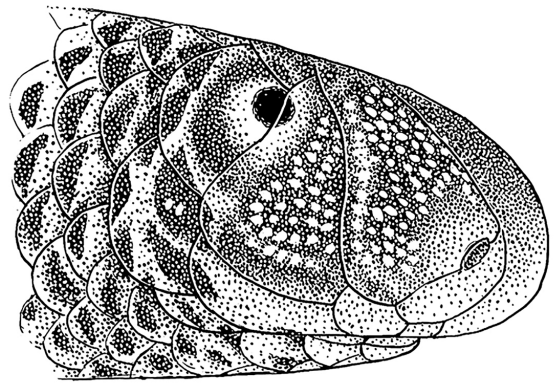
In preservative, ~ 121 years after preservation, dorsum faded medium brown, gradually fading laterally to paler brown on venter; no sharp distinction between dorsal and ventral coloration; each dorsal scale uniformly dark; each ventral scale slightly darker anteriorly. Anterior half of rostral, area around nares, first supralabial, mental, and center of throat to six scales behind mental pale straw yellow; second, third, and fourth supralabials pale straw yellow with brown along dorsal margins. Head glands pale straw yellow; tail spine and adjacent scales dark brown (darker than rest of body), spine with white tip. Iris dark gray; pupil pale gray.

Variation. The paratype is an immature female and differs from the holotype in being shorter ($L = 138$ mm, $SVL = 133$ mm, $TL = 5$ mm, Table 1), the same relative width ($W = 3.8$ mm, $L/W = 36.3$), and with a longer tail

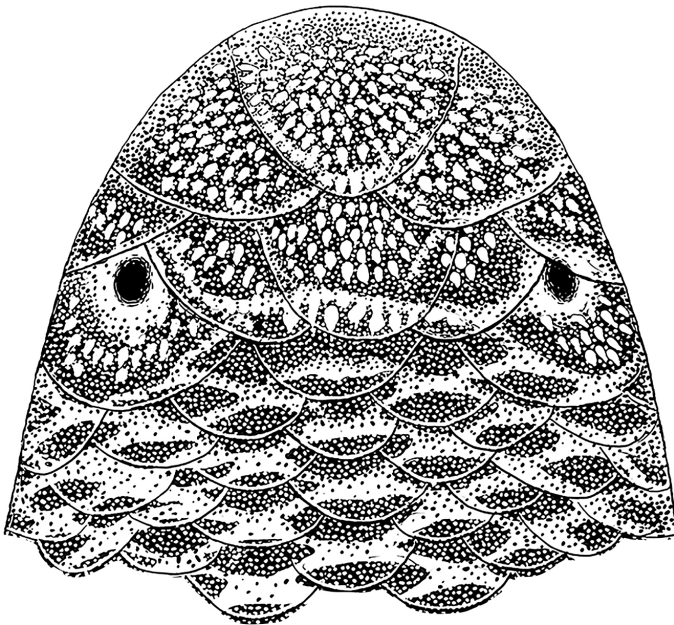
(TL/SVL = 0.038). It has 294 transverse scale rows, 15 subcaudals and dorsocaudals, and fewer head glands than the holotype, with 11 (R) and 16 (L) glands in the oculars, 42 (R) and 43 (L) in the preoculars, 5 (R) and 6 (L) in the supraoculars, 11 in the prefrontal, 0 in the frontal, and 5 (R) and 8 (L) in the subocular. It has a sharp, protruding tail spine that is longer than that in the holotype; base of spine and adjacent scales dark brown, but the tip of the spine is corneous brown.



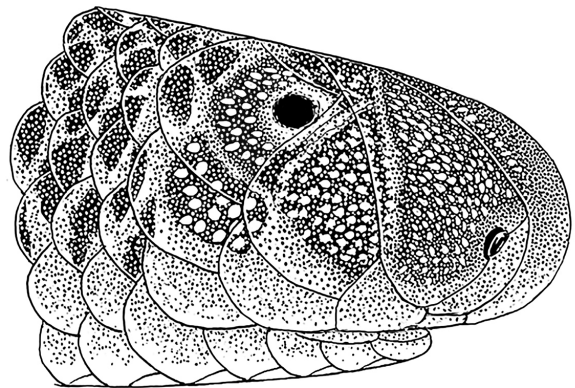
A



B



C



D

FIGURE 4. Dorsal and lateral views of heads for members of the *Gerrhopilus inornatus* Group having 22 midbody scale rows and uniformly dark venters. **A, B** holotype of *Gerrhopilus papuanorum* (BPBM 17236); **C, D** holotype of *Gerrhopilus polyadenus* (BMNH 1901.11.27.10).

Etymology. The specific epithet is a masculine Latinized compound adjective, from the Greek *poly-*, meaning *many*, and *adeno*, meaning *gland*.

Distribution. Known from the type locality at an unspecified location on Mt Albert Edward and from the nearby lowlands of Oro Province, Papua New Guinea (Fig. 2).

Remarks. The BMNH catalogue for the holotype states that it was purchased from Mr. H.S. Rohu of Stepney, a district on the east end of London. This catalogue states that the specimen came from “not less than 6000 ft.” on the Albert Edward Range, but this information is doubtful for two reasons. First, Wichmann (1912: 754) states that Rohu’s expedition up Mt Albert Edward reached no farther than a height of 6000 ft. (“...dort bis in die Höhe von 6000 feet gelangte.”). Wichmann does not state the source of his information, but he may have been in direct correspondence with Rohu on the matter. Rohu was an overseer on the Tamata Station, along the Mambare River (Administrator, British New Guinea 1902), which lies on the northern versant in what is now Oro Province, PNG. He quit service at Tamata Station on 18 October, 1900, and his expedition would thus have occurred in late 1900 or the first part of 1901 in order for the specimens to have reached BMNH in time to be catalogued in late November, 1901. Mt Albert Edward is one of the higher peaks of the Owen Stanley Range; it now lies largely within Central Province, PNG, but straddles the division between the northern and southern versants of the Owen Stanley Mts. Given Rohu’s residence at Tamata Station, I presume he made his ascent from the east (Oro Province), which is consistent with the paratype being from Sangara, 50–60 km S of the Mambare River in the same province. Inasmuch as the paratype came from an elevation of approximately 120 m a.s.l., I presume that the holotype did not, in fact, come from as high as “not less than” 6000 ft. (1830 m), as stated in the BMNH catalogue, and that Wichmann’s (1912) account is correct. Second, the BMNH accession of Rohu’s herpetological material includes 24 specimens of 15 species. Of these, at least four (e.g., *Cornufer papuensis*, *Emoia jakati*, *Palaia pulchra*, *Prasinohaema semoni*) are lowland species that are not found as high as 1800 m a.s.l., much less occurring “not less than that elevation”. Several of the other species are also predominantly lowland inhabitants though they may attain elevations as high as 1800 m a.s.l. Hence, the exact elevational provenance of the holotype is uncertain, but it seems to have been collected at a relatively low elevation. Zweifel (1979) makes this same inference that the reported elevation for the syntypes of *Palaia pulchra*, collected by Rohu on the same expedition, is erroneous.

The holotype of this species was examined and referred to *Typhlops inornatus* by de Rooij (1917), who, however, did not remark on the differences between this specimen and the holotype of *G. inornatus*. The paratype was examined by Wallach (1996) and Pyron & Wallach (2014), who listed it as *Typhlops inornatus*.

***Gerrhopilus wallachi* sp. nov.**

Figs. 5A, B

Typhlops inornatus Wallach 1996: 113.

Gerrhopilus inornatus Pyron & Wallach 2014: 79.

Holotype. MCZ 140724 (field tag Y-14092), collected on 24 April 1973 by Fred Parker at Afore, 9.14 S, 148.39 E, 760 m a.s.l., Oro Province, Papua New Guinea.

Diagnosis. A *Gerrhopilus* species characterized by the unique combination of having a rounded snout in lateral view; LSR = 22 at midbody; TSR = 430; loreal absent; supralabial imbrication pattern T-V; subocular scale one; presubocular scale absent; a short, blunt, scale on the tail tip that is light brown and downturned; 9 glands in the prefrontal, 3–5 in the supraocular, 9–11 in the ocular, 33–35 in the preocular, 0 in the frontal, and 3–4 in the subocular; L/W = 42.6; TL/SVL = 0.036; and a dark-brown venter with scattered white scales mid-ventrally on the posterior half of the body. Its size is large for this species group (Table 1).

Comparisons with other species. *Gerrhopilus wallachi* is distinguished from *G. fredparkeri*, *G. hades*, *G. inornatus*, *G. slapcinskyi*, and *G. suturalis* in having 22 longitudinal scale rows at midbody (vs 16 in *G. fredparkeri*, 18 in *G. hades* and *G. suturalis*, and 20 in *G. inornatus* and *G. slapcinskyi*). It is further distinguished from *G. fredparkeri*, *G. polyadenus*, and *G. slapcinskyi* in having fewer transverse scale rows (430 vs 539 in *G. fredparkeri*, 294–320 in *G. polyadenus*, and 298–318 in *G. slapcinskyi*); from *G. inornatus* in having more transverse scale rows (430 vs 374–375 in *G. inornatus*), a short, blunt, downturned tail spine (vs sharp and protruding in *G. inornatus*) more glands in the prefrontal (9 vs 2–3 in *G. inornatus*), ocular (9–11 vs 0–6 in *G. inornatus*) and preocular (33–35

vs 22–24 in *G. inornatus*); from *G. papuanorum* in having a short, blunt, downturned tail spine (vs sharp and protruding in *G. papuanorum*), more glands in the ocular (9–11 vs 0–3 in *G. papuanorum*) and preocular (33–35 vs 18–28 in *G. papuanorum*), and a longer tail ($TL/SVL = 0.036$ vs $0.021–0.026$ in *G. papuanorum*); from *G. hades* in having 24 longitudinal scale rows behind the head (vs 18 in *G. hades*); and from *G. suturalis* in having a single postocular on each side of the head (vs two in *G. suturalis*) and lacking a presubocular (vs present in *G. suturalis*). It is further distinguished from all of these species in having a venter that is brown with white (possibly yellow in life) mid-ventral scales throughout the posterior third of the body (vs venter uniformly brown in all the other species).

Description of the holotype. Female. $L = 217.5$ mm, $SVL = 210$ mm, $TL = 7.5$ mm, $HW = 4.1$ mm, $SN = 1.7$ mm, $SW = 3.5$ mm, $PSN = 1.2$ mm, $RW = 2.0$ mm, $EW = 0.5$ mm, $W = 5.1$ mm, $VW = 4.4$ mm, $TW = 3.8$ mm, $L/W = 42.6$, $TL/SVL = 0.036$. Head slightly wider than neck. Snout rounded in dorsal and lateral views. Snout anterior to lower jaw angled slightly ventrally. Rostral moderately large ($RW/HW = 0.49$), oval dorsally, lateral margins convex, posterior border extending approximately two-thirds way between naris and eye, posterior margin straight; ventrally surface papillose, with straight sides and posterior margin concave. Nasals separated dorsally by prefrontal (Fig. 5A); superior nasal large, with sinuous posterior margin, concave dorsally, convex ventrally (Fig. 5B). External naris semicircular, oriented obliquely, close to rostral, anterior half covered by inferior nasal; superior nasal suture extending anterodorsally from naris to rostral; inferior nasal suture complete, contacting second supralabial well posterior to latter's contact with first supralabial. Prefrontal and supraoculars subequal in size, larger than frontal, parietals, and interparietal, which are also subequal in size. Preocular large, triangular; larger than ocular but smaller than superior nasal, posterior margin sinuous. Ocular large, smaller than preocular, extending dorsally well above preocular, extending ventrally to $\sim 2/3$ depth of preocular, bordered posteroventrally by subocular of less than half its size. Eye obscure, with indistinct margin and large but obscure pupil, situated at widest point of ocular and approximately midway along its height, anterior half covered by preocular plate in lateral view. Four postoculars bordering ocular and subocular between parietal and fourth supralabial. Four supralabials, third the largest, all with long axis oblique to long axis of body, first approximately rectangular. Supralabial imbrication pattern T-V, posterior border of second supralabial overlaps anteroventral margin of preocular, that of third supralabial overlaps anteroventral margin of subocular and ends just posterior to rear margin of preocular. Mental crescentic, wider than long, projecting slightly beyond curve of lower jaw and fitting into notch on upper lip when mouth is closed. Infralabials two on each side, second much longer.

Longitudinal scale rows 24 behind head, 22 at midbody, and 22 anterior to vent; transverse scale rows 430, 15 intercalary scales along vertebral row; subcaudals 15; dorsocaudals 14; apical region with short, blunt, downturned scale that extends only short distance past last scales.

Rostral, nasals, and preoculars densely covered in small pale glands; oculars with 11 (R) and 9 (L) glands, preoculars with 35 (R) and 33 (L), supraoculars with 5 (R) and 3 (L), prefrontal with 9; suboculars with 4 (R) and 3 (L), and frontal without glands.

In preservative, 49 years after preservation, body dark brown above and below; no sharp distinction between dorsal and ventral shading; each scale uniformly dark. Venter with mid-ventral line of scattered white scales on posterior half of body, only single scale wide except one small blotch that is 2–3 scales wide, these joining into a discontinuous line of white scales on portion of posterior third of body but becoming only scattered white scales again before vent; vent bordered anteriorly by white blotch two scales wide; row of four white blotches under tail that are 1–2 scales wide. Anterior tip and margins of rostral, area around nares, first supralabial, mental, infralabials, and center of throat to two scales behind mental pale straw yellow; second, third, and fourth supralabials pale straw yellow with brown along dorsal margins. Head glands pale straw yellow; tail tip corneous brown, paler than remaining body scales. Iris dark gray, obscure; pupil paler gray.

Etymology. The species name is a genitive singular honorific for Van Wallach in recognition of his numerous contributions to the systematics of blindsnakes.

Distribution. Known only from the type locality (Fig. 2).

Remarks. The sole specimen was examined by Wallach (1996) and Pyron & Wallach (2014) who listed it as *Typhlops inornatus*.

***Gerrhopilus flavinotatus* sp. nov.**

Figs. 5C, D

Typhlops inornatus Wallach 1996: 113.

Gerrhopilus inornatus Pyron & Wallach 2014: 79.

Holotype. MCZ 175100 (field tag Y-31495), collected on 29 March 1969 by Fred Parker at Menemsore, 5.88 S, 141.23 E, 1830 m a.s.l., Western Province, Papua New Guinea.

Diagnosis. A *Gerrhopilus* species characterized by the unique combination of having a rounded snout in lateral view; LSR = 22 at midbody; TSR = 327; loreal absent; supralabial imbrication pattern T-V; subocular scale one; presubocular scale absent; a sharp, protruding spine on the tail tip that is white; 3 glands in the prefrontal, 6–8 in the supraocular, 0 in the ocular and frontal, 24–28 in the preocular, and 0–4 in the subocular; L/W = 26.6; TL/SVL = 0.037; and a dark-brown venter with 2–4 rows of yellow scales mid-ventrally on the posterior half of the body with brown scales scattered in this yellow field. Its size is small for this species group (Table 1).

Comparisons with other species. *Gerrhopilus flavinotatus* is distinguished from *G. fredparkeri*, *G. hades*, *G. inornatus*, *G. slapcinskyi*, and *G. suturalis* in having 22 longitudinal scale rows at midbody (vs 16 in *G. fredparkeri*, 18 in *G. hades* and *G. suturalis*, and 20 in *G. inornatus* and *G. slapcinskyi*). It is further distinguished from *G. fredparkeri* in having fewer transverse scale rows (327 vs 539 in *G. fredparkeri*), as it is from *G. papuanorum* and *G. wallachi* (407–414 rows in *G. papuanorum* and 430 rows in *G. wallachi*) and apparently from *G. inornatus* (374–375 rows in *G. inornatus*). It is further distinguished from *G. inornatus* in being more robust (L/W = 26.6 vs 36.4–47.8 in *G. inornatus*); from *G. slapcinskyi* in lacking glands in the ocular (vs 4–9 in *G. slapcinskyi*), having more glands in the supraocular (6–8 vs 0–3 in *G. slapcinskyi*), fewer glands in the preocular (24–28 vs 35–39 in *G. slapcinskyi*), and a white tail spine (vs black in *G. slapcinskyi*); from *G. papuanorum* in being more robust (L/W = 26.6 vs 51.2–53.5 in *G. papuanorum*) and having a longer tail (TL/SVL = 0.037 vs 0.021–0.026 in *G. papuanorum*); from *G. hades* in having 22 longitudinal scale rows behind the head (vs 18 in *G. hades*); from *G. suturalis* in having a single postocular on each side of the head (vs two in *G. suturalis*) and lacking a presubocular (vs present in *G. suturalis*); and from *G. wallachi* in having a sharp, protruding tail spine (vs short, blunt, and downturned in *G. wallachi*), lacking glands in the ocular (vs 9–11 in *G. wallachi*), and having fewer glands in the prefrontal (3 vs 9 in *G. wallachi*) and preocular (24–28 vs 33–35 in *G. wallachi*). *Gerrhopilus flavinotatus* is distinguished from *G. polyadenus* in lacking glands in the ocular (vs 11–23 in *G. polyadenus*) and having fewer glands in the subocular (0–4 vs 5–16 in *G. polyadenus*) and preocular (24–28 vs 42–50 in *G. polyadenus*). *Gerrhopilus flavinotatus* is further distinguished from all other Melanesian *Gerrhopilus* except *G. wallachi* in having a venter that is brown with yellow mid-ventral scales throughout the posterior third of the body (vs venter uniformly brown in all the other species).

Description of the holotype. Immature female. L = 154.5 mm, SVL = 149 mm, TL = 5.5 mm, HW = 4.1 mm, SN = 1.6 mm, SW = 3.3 mm, PSN = 1.1 mm, RW = 1.6 mm, EW = 0.3 mm, W = 5.8 mm, VW = 4.3 mm, TW = 3.5 mm, L/W = 26.6, TL/SVL = 0.037. Head slightly wider than neck. Snout rounded in dorsal and lateral views. Snout anterior to lower jaw horizontal, parallel to body axis. Rostral rather narrow (RW/HW = 0.39), oval dorsally, lateral margins convex, posterior border extending approximately two-thirds way between naris and eye, posterior margin convex; ventrally surface papillose, with sides and posterior margin straight. Nasals separated dorsally by prefrontal (Fig. 5C); superior nasal large, with slightly sinuous posterior margin, concave dorsally, convex ventrally (Fig. 5D). External naris semicircular, close to rostral, anterior half covered by inferior nasal; superior nasal suture extending anterodorsally from naris to rostral; inferior nasal suture complete, contacting second supralabial posterior to latter's contact with first supralabial. Prefrontal subequal to supraoculars. Supraoculars wider than long, longest at medial third, tapering toward eye, larger than parietals and interparietal, which are subequal in size. Frontal divided into two scales, left overlapping right, subequal in size to parietals. Preocular large, triangular; somewhat larger than ocular but smaller than superior nasal. Ocular large, smaller than preocular, extending dorsally well above preocular and to center of suproculars, extending ventrally to ~2/3 depth of preocular, bordered posteroventrally by subocular of approximately half its size. Eye fairly obscure, with pale pupil, situated at widest point of ocular and approximately midway along its height, anterior half covered by preocular plate in lateral view. Four postoculars bordering ocular and subocular between parietal and fourth supralabial. Four supralabials, third the largest, all except first with long axis oblique to long axis of body, first approximately square. Supralabial imbrication pattern T-V, posterior border of second supralabial overlaps anteroventral margin of preocular, that of third supralabial overlaps anteroventral margin of subocular and extends posterior to rear margin of preocular. Mental hexagonal, wider than long, projecting

slightly beyond curve of lower jaw and fitting into notch on upper lip when mouth is closed. Infralabials two on each side, second much longer.

Longitudinal scale rows uniformly 22 behind head, at midbody, and anterior to vent; transverse scale rows 327, six intercalary scales along vertebral row; subcaudals 12; dorsocaudals 12; apical region with sharp, laterally compressed, corneous spine that extends well past last scales.

Rostral, nasals, and preoculars densely covered in pale glands; oculars with 0 glands, preoculars with 24 (R) and 28 (L), supraoculars with 6 (R) and 5 (L), prefrontal with 3; frontal with 0, and suboculars with 0 (R) and 4 (L).

In preservative, 53 years after preservation, dorsum and sides uniformly brown, each scale darker anteriorly. Venter brown, with a few pale straw-yellow scales scattered mid-ventrally posterior to midbody, with posterior third of venter comprised of 2–4 mid-ventral rows of pale straw-yellow scales with brown scales scattered among them, the yellow scales becoming more continuous and predominant toward the tail. Subcaudals and tail spine pale straw yellow. Chin, mid-ventral throat, infralabials, first three supralabials, and anterior half of rostral pale straw yellow. Iris black; pupil pale gray.

Etymology. The specific epithet is a masculine compound adjective from the Latin *flavus*, meaning *yellow*, and *notatus*, meaning *mark*, in reference to the distinctive ventral color pattern.

Distribution. Known only from the type locality (Fig. 2).

Remarks. The sole specimen was examined by Wallach (1996) and Pyron & Wallach (2014) who listed it as *Typhlops inornatus*.

***Gerrhopilus lorealis* sp. nov.**

Figs. 5E, F

Holotype. BPBM 2272, collected on 14 May 1961 by H. Clissold at upper Watut River near Bulolo, 7.28 S, 146.56 E, Morobe Province, Papua New Guinea.

Diagnosis. A *Gerrhopilus* species characterized by the unique combination of having a rounded snout in lateral view; LSR = 22 at midbody; TSR = 380; loreal present; supralabial imbrication pattern T-V; subocular scale one; presubocular scale absent; a sharp, protruding spine on the tail tip that is yellow; 4 glands in the prefrontal, 8–9 in the supraocular, 4 in the ocular, 29–34 in the preocular, 0 in the frontal, and 7–8 in the subocular; L/W = 50.3; TL/SVL = 0.032; and a dark-brown venter with 1–3 mid-ventral scale rows on the posterior half of the body yellow. Its size is moderate for this species group (Table 1).

Comparisons with other species. *Gerrhopilus lorealis* is distinguished from *G. fredparkeri*, *G. hades*, *G. inornatus*, *G. slapsinskyi*, and *G. suturalis* in having 22 longitudinal scale rows at midbody (vs 16 in *G. fredparkeri*, 18 in *G. hades* and *G. suturalis*, and 20 in *G. inornatus* and *G. slapsinskyi*). It is further distinguished from *G. fredparkeri* and *G. wallachi* in having fewer transverse scale rows (380 vs 539 in *G. fredparkeri*, 430 rows in *G. wallachi*) and apparently from *G. papuanorum* (407–414 rows in *G. papuanorum*). It is further distinguished from *G. inornatus* and *G. slapsinskyi* in having more glands in the supraocular (8–9 vs 2–3 in *G. inornatus* and 0–3 in *G. slapsinskyi*) and subocular (7–8 vs 0–2 in *G. inornatus* and 3–4 in *G. slapsinskyi*); from *G. hades* in having glands in the ocular and subocular scales (vs none in *G. hades*); and from *G. suturalis* in having a single postocular on each side of the head (vs two in *G. suturalis*) and lacking a presubocular (vs present in *G. suturalis*). *Gerrhopilus lorealis* is distinguished from all other Melanesian *Gerrhopilus* in having a loreal scale; and it is distinguished from all other species except *G. flavinotatus* and *G. wallachi* in having yellow mid-ventral scales on the posterior third of the body. *Gerrhopilus lorealis* is further distinguished from *G. flavinotatus* in its much more slender habitus (L/W = 50.3 vs 26.7 in *G. flavinotatus*), in having more transverse scale rows (380 vs 327 in *G. flavinotatus*), and in having glands in the ocular (vs absent in *G. flavinotatus*); and from *G. wallachi* in having fewer transverse scale rows (380 vs 430 in *G. wallachi*), a sharp, protruding tail spine (vs short, blunt, and downturned in *G. wallachi*), and fewer glands in the ocular (4 vs 9–11 in *G. wallachi*). Among the other species with 22 longitudinal scale rows, *G. lorealis* may be further distinguished from *G. polyadenus* in its greater number of transverse scale rows (380 vs 294–320 in *G. polyadenus*), more slender habitus (L/W = 50.3 vs 36.2–36.3 in *G. polyadenus*) and far fewer glands in the ocular (4 vs 11–23 in *G. polyadenus*), preocular (29–34 vs 42–50 in *G. polyadenus*), and prefrontal (4 vs 11–29); and from *G. papuanorum* in having fewer transverse scale rows (380 vs 407–414 in *G. papuanorum*) and greater number of glands in the supraocular (8–9 vs 0–4 in *G. papuanorum*) and subocular (7–8 vs 0–2 in *G. papuanorum*).

Description of the holotype. Female. L = 196 mm, SVL = 190 mm, TL = 6 mm, HW = 4.0 mm, SN = 2.2 mm, SW = 3.4 mm, PSN = 1.1 mm, RW = 1.8 mm, EW = 0.4 mm, W = 3.9 mm, VW = 4.2 mm, TW = 4.2 mm, L/W = 50.3, TL/SVL = 0.032. Head slightly wider than neck. Snout rounded in dorsal and lateral views. Snout anterior to lower jaw horizontal. Rostral moderately large (RW/HW = 0.45), oval dorsally, lateral margins convex, posterior border extending approximately two-thirds way between naris and eye, posterior margin straight; ventrally surface papillose, with straight sides and posterior margin concave. Nasals separated dorsally by prefrontal (Fig. 5E); superior nasal large, with sinuous posterior margin, concave dorsally, convex ventrally (Fig. 5F). External naris semicircular, oriented obliquely, close to rostral, anterior half covered by inferior nasal; superior nasal suture extending anterodorsally from naris to rostral; inferior nasal suture complete, contacting second supralabial just posterior to latter's contact with first supralabial. Prefrontal smaller than supraoculars, subequal to frontal, parietals, and interparietal, which are all subequal in size. Narrow, crescentic loreal between superior nasal and preocular, oriented anteroventrally to dorsoposteriorly. Preocular large, triangular; approximately same size as ocular but smaller than superior nasal. Ocular large, approximately same size as preocular, extending dorsally well above preocular, extending ventrally to ~2/3 depth of preocular, bordered posteroventrally by subocular of approximately half its size. Eye with indistinct margin and large pupil, situated at widest point of ocular and approximately midway along its height, anterior half covered by preocular plate in lateral view. Four postoculars bordering ocular and subocular between parietal and fourth supralabial. Four supralabials, third the largest, all with long axis oblique to long axis of body, first approximately rectangular. Supralabial imbrication pattern T-V, posterior border of second supralabial overlaps anteroventral margin of preocular, that of third supralabial overlaps anteroventral margin of subocular and ends just anterior to rear margin of preocular. Mental crescentic, wider than long, projecting slightly beyond curve of lower jaw and fitting into notch on upper lip when mouth is closed. Infralabials two on each side, second much longer. Ventral slit from mouth to approximately 50 scale rows posteriorly; another ventral slit on posterior third of body and another under tail.

Longitudinal scale rows 22 behind head, 22 at midbody, and 22 anterior to vent; transverse scale rows between rostral and tail tip 380, six intercalary scales along vertebral row; subcaudals 17; dorsocaudals 17; apical region with short, projecting spine.

Rostral, nasals, and preoculars densely covered in pale glands; oculars with 4 glands, preoculars with 29 (R) and 34 (L), supraoculars with 8 (R) and 9 (L), prefrontal with 4; suboculars with 7 (R) and 8 (L), and frontal without glands.

In preservative, 61 years after preservation, body medium brown above and below; no sharp distinction between dorsal and ventral shading; each scale uniformly dark. Venter with scattered mid-ventral yellow scales on anterior third of body, mid-ventral largely continuous line of yellow scales on posterior two-thirds of body, these expanding laterally to include 2–3 scale rows on posterior third of body, though many scales in these rows brown and not yellow, imparting a jagged appearance to this yellow stripe posteriorly. Anterior tip and margins of rostral, area around nares, first two supralabials, mental, first infralabials, and center of throat to four scales behind mental pale straw yellow; third and fourth supralabials pale straw yellow with brown along dorsal margins. Head glands pale straw yellow; tail spine and adjacent scales yellow. Iris dark gray, obscure; pupil paler gray.

Etymology. The species name is a Latinized masculine adjective of the English *loreal* in recognition of the most distinctive feature of this species.

Distribution. Known only from the type locality (Fig. 2).

Remarks. This is the only specimen of *Typhlops inornatus* examined by McDowell (1974), but it has not been reported on by subsequent authors. McDowell remarked that the scale he found wedged between the superior nasal and preocular—which I here refer to as a loreal—was not mentioned in the original description of *T. inornatus* (Boulenger 1888), but so few specimens of nominal *G. inornatus* were collected by that time that he was uncertain whether this scale represented “random or geographic variation”, by which I presume he meant intraspecific variation. I interpret the symmetry and regular appearance of this scale on each side of the head of BPBM 2272 to reflect that this scale is not a random anomaly, and, hence, I interpret it as diagnostic of a distinct species, a conclusion supported by a host of other features when compared to other samples of the *G. inornatus* group (see Comparisons section above). Even were the loreal scale presumed to be an individual anomaly of this specimen and not diagnostic of a separate species, the unique combination of other characters (Table 2) does not allow this specimen to be readily assigned to any of the other species recognized herein.

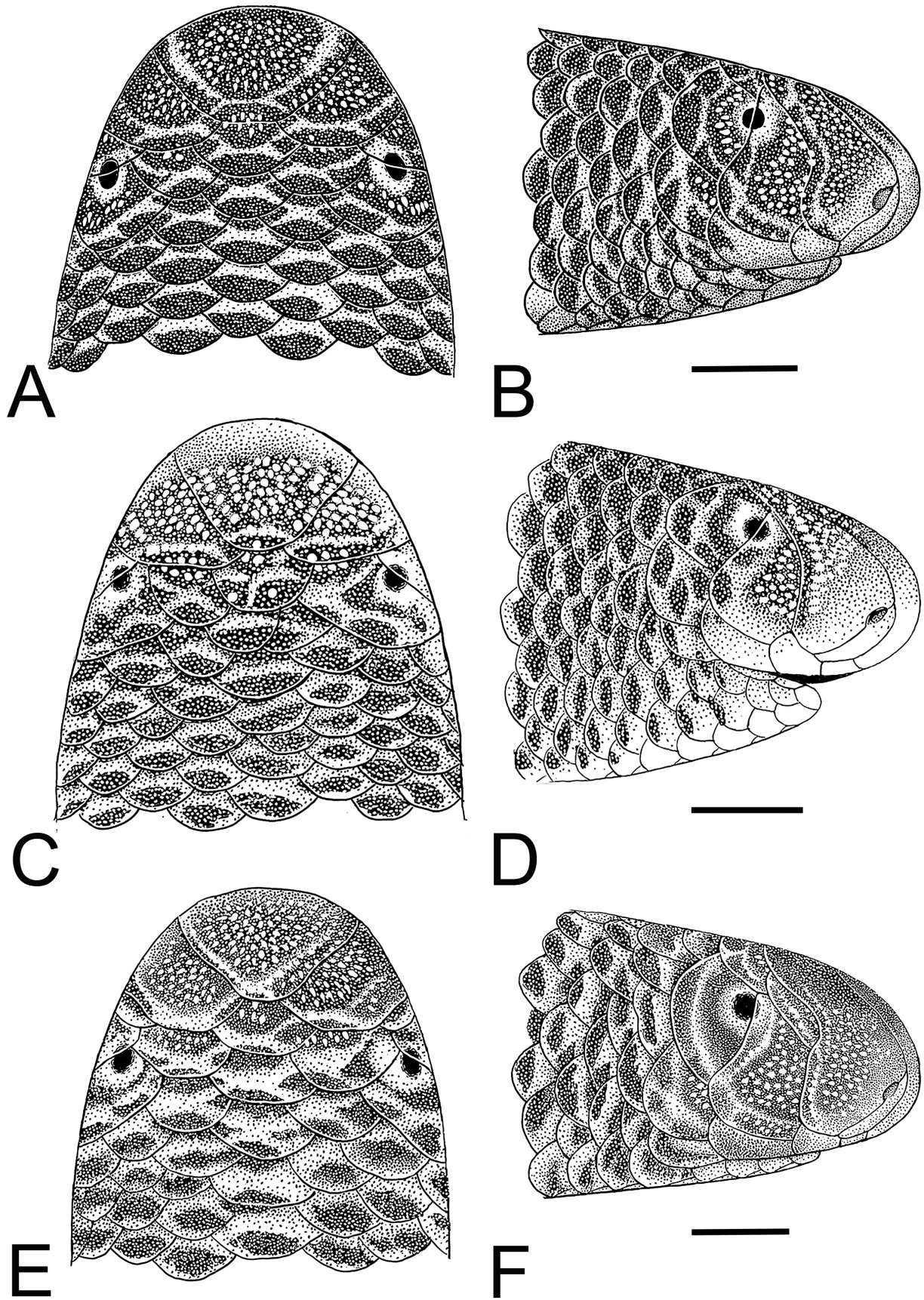


FIGURE 5. Dorsal and lateral views of heads for members of the *Gerrhopilus inornatus* Group having 22 midbody scale rows and venters marked with yellow. **A, B** holotype of *Gerrhopilus wallachi* (MCZ 140724); **C, D** holotype of *Gerrhopilus flavinotatus* (MCZ 175100); **E, F** holotype of *Gerrhopilus lorealis* (BPBM 2272).

TABLE 1. Mensural and count data for members of the *Gerrhopilus inornatus* Group. Forward slashes separate counts on the right and left sides, respectively.

Species	<i>inornatus</i>	<i>inornatus</i>	<i>flavinotatus</i>	<i>lorealis</i>	<i>papuanorum</i>	<i>papuanorum</i>	<i>papuanorum</i>
Specimen	BMNH 1946.1.11.80	USNM 213488	MCZ 175100	BPBM 2272	BPBM 17236	BPBM 17237	BPBM 17238
Sex	F	M	F	M	F	F	F
Total L (L)	177	171	154.5	196	235.5	215	262
SVL	172.5	166	149	190	230	209.5	256.5
Tail L (TL)	4.5	5	5.5	6	5.6	5.5	5.5
Mass (g)	1.75	1.8	2.05	2.45	3.4	3.1	4.75
Transverse scale rows	375	374	327	380	408	407	414
Intercalary scales	6	10	6	6	0	4	2
Longitudinal scale rows	22-20-20	20-20-20	22-22-22	22-22-22	24-22-22	22-22-22	22-22-22
Subcaudals	12	17	12	17	15	15	14
Dorsocaudals	15	16	12	17	14	15	14
Head width (HW)	3.7	3.3	4.1	4.0	4.0	4.0	4.8
Snout length (SN)	1.9	1.8	1.8	2.2	2.3	2.1	2.5
Snout width (SW)	3.0	2.8	3.3	3.4	3.5	3.4	4.1
Pre-oral snout L (PSN)	1.0	0.8	1.1	1.1	1.0	1.0	1.3
Rostral width (RW)	1.5	1.5	1.6	1.8	1.9	1.7	2.3
Eye width (EW)	0.3	0.3	0.3	0.4	0.4	0.4	0.5
Mid-body width (W)	3.7	4.3	5.8	3.9	4.4	4.2	5.0
Vent width (VW)	3.6	3.9	4.3	4.2	3.9	4.0	4.7
Tail width (TW)	3.2	3.3	3.5	4.2	3.4	3.4	3.8
Glands in ocular	2\0	6\2	0	4\4	0	0	2\3
Glands in prefrontal	2	3	3	4	5	4	1
Glands in frontal	0	0	0	0	0	0	0
Glands in supraocular	2\3	2\2	6\8	8\9	2\4	2\2	0
Glands in subocular	0	2\2	0\4	7\8	2\2	0\1	0
Glands in preocular	22\23	22\24	24\28	29\34	28\26	24\24	21\18

Continued.

Species	<i>polyadenus</i>	<i>polyadenus</i>	<i>slapcinskyi</i>	<i>slapcinskyi</i>	<i>wallachi</i>
Specimen	BMNH 1901.11.27.10	MCZ 140728	BPBM 18944	BPBM 18945	MCZ 140724
Sex	F	imm. F	F	M	F
Total L (L)	199	138	195.5	170	217.5
SVL	193.5	133	189	163	210
Tail L (TL)	5.5	4.8	6.5	7	7.5
Mass (g)	3.1	1.5	4.2	2.15	3.2
Transverse scale rows	320	294	318	298	430
Intercalary scales	6	3	10	9	15
Longitudinal scale rows	22-22-22	22-22-22	22-20-20	22-20-20	24-22-22
Subcaudals	16	15	15	16	15
Dorsocaudals	16	15	15	16	14
Head width (HW)	5.0	3.9	4.3	4.0	4.1
Snout length (SN)	2.5	1.8	2.2	2.1	2.0
Snout width (SW)	4.0	3.0	3.5	3.3	3.5
Pre-oral snout L (PSN)	1.2	0.9	1.0	0.8	1.2
Rostral width (RW)	1.8	1.5	1.8	1.5	2.0
Eye width (EW)	0.6	0.3	0.4	0.3	0.5
Mid-body width (W)	5.5	3.8	5.5	4.4	5.1
Vent width (VW)	4.4	2.9	4.3	4.1	4.4
Tail width (TW)	3.6	2.6	3.8	3.4	3.8
Glands in ocular	5.0	3.9	4.3	4.0	4.1
Glands in prefrontal	22\23	11\16	4\9	8\9	11\9
Glands in frontal	29	11	2	1	9
Glands in supraocular	6	0	0	0	0
Glands in subocular	8\9	5\6	0\1	3\2	5\3
Glands in preocular	16\16	5\8	4\3	4\3	4\3

TABLE 2. Diagnostic features for the members of the *Gerrhopilus inornatus* species group.

	<i>G. flavinotatus</i>	<i>G. inornatus</i>	<i>G. lorealis</i>	<i>G. papuanorum</i>	<i>G. polyadenus</i>	<i>G. slapcinskyyi</i>	<i>G. wallachi</i>
Mid-body scale rows	22	20	22	22	22	20	22
Transverse scale rows	327	374–375	380	407–414	294–320	298–318	430
Loreal scale	Absent	Absent	Present	Absent	Absent	Absent	Absent
Tail spine	sharp, protruding	sharp, protruding	sharp, protruding	sharp, protruding	sharp, short or protruding	sharp, protruding	blunt, downturned
Tail spine color	white	white with corneous tip or black with white tip	yellow	black with corneous tip	dark brown with white tip	black with white tip	pale brown
Glands in ocular	0	0–6	4	0–3	11–23	4–9	9–11
Glands in prefrontal	3	3	4	1–5	11–29	1–2	9
Glands in frontal	0	0	0	0	0–6	0	0
Glands in supraocular	6–8	2–3	8–9	0–4	5–9	0–3	3–5
Glands in subocular	0–4	0–2	7–8	0–2	5–16	3–4	3–4
Glands in preocular	24–28	22–24	29–34	18–28	42–50	35–39	33–35
Habitus (L/W)	26.6	36.4–47.8	50.3	51.2–53.5	36.2–36.3	35.5–38.6	42.6
Female TL/SVL	0.037	0.026	NA	0.021–0.026	0.028–0.036	0.034	0.036
Ventral color pattern	brown with mid-ventral yellow scales on posterior third of body	uniformly brown	brown with mid-ventral yellow scales on posterior two-thirds of body	uniformly brown	uniformly brown	uniformly brown	brown with scattered white scales on posterior third of body

Discussion

Understanding of taxonomic diversity within Melanesian *Gerrhopilus* has increased dramatically in recent years despite the difficulty in sampling these cryptic snakes. In his study of scolecophidians from western Melanesia at the Bishop Museum, Honolulu, McDowell (1974) only recognized three species from the region, all then placed in the *Typhlops ater* Group: *G. depressiceps*, *G. inornatus*, and *G. suturalis* (then placed in the synonymy of *G. ater*). To this, Wallach (1996) added the two new species *G. fredparkeri* and *G. mcdowellii*, and Kraus (2005) added *G. hades*, bringing the total to six species. Kraus (2017) then examined the systematics of snakes either included under the name *G. depressiceps* or allied to it and described four additional species from that complex: *G. addisoni*, *G. eurydice*, *G. lestes*, and *G. persephone*. With the present study, the number of recognized Melanesian *Gerrhopilus* now stands at 16. Melanesian *Gerrhopilus* primarily occur on New Guinea but are found on nearby islands too, ranging from Halmahera in the west to New Ireland in the northeast and several islands of Milne Bay Province (Panaete, Normanby, Rossel, and Trobriands) in the southeast. Of these 16 species, seven are known only from their holotypes, five from two specimens, two from three, one from seven, and one from ten. The poor representation of these snakes in museums makes clear the difficulty in targeting these cryptic snakes for collection.

Most Melanesian *Gerrhopilus* species are currently known only from single localities, with only *G. depressiceps*, *G. polyadenus*, and *G. suturalis* known from multiple localities >10 km apart. Although information is currently too sparse to be certain, it is possible, if not likely, that most Melanesian members of this genus will prove to have limited distributions because New Guinea is highly mountainous, and these snakes are likely to encounter many natural barriers to dispersal. It is interesting to note that some of these species occur very near to each other. For example, *G. mcdowellii* and *G. fredparkeri* are sympatric, the type localities of *G. lorealis* and *G. slapsinskyi* are only 53 km apart, and *G. polyadenus* occurs only 47 km from the type locality of *G. wallachi*. It will be interesting to see to what extent sympatry can occur among members of Melanesian *Gerrhopilus* or whether most will prove parapatric. In the only known case of sympatry, the two species are among the more morphologically divergent members of the genus. The species pairs noted as occurring within ~50 km of each other are also rather divergent within the *G. inornatus* Group (Table 2).

Of the 16 species of Melanesian *Gerrhopilus* currently known, 12 are restricted to the geological region known as the East Papuan Composite Terrane (EPCT), which is thought to have been assembled offshore from a variety of continental and oceanic terranes and then accreted as a single unit onto the New Guinea mainland in the late Miocene (Pigram & Davies 1987; Pigram & Symonds 1991). Of the remaining species, *G. depressiceps* is known only from two localities in northeastern PNG, *G. flavinotatus* from a single locality in southwestern PNG, *G. lestes* from a single locality in southern New Ireland, and *G. suturalis* from one locality on the Bird's Head Peninsula of northwestern New Guinea as well as the islands of Waigeo, Salawati, and Halmahera. The far-flung distribution of these last four species again suggests that most of western Melanesia is very poorly sampled for these snakes, and conclusions about regional diversity within Melanesia need to be made with caution. It may be that the preponderance of species within the EPCT reflects that region's long subaerial history, providing ample time for significant speciation. However, given the poor geographical sampling of *Gerrhopilus* specimens from Melanesia, the relatively high number of species known from the EPCT may simply reflect better survey effort there in recent years. Only detailed phylogenetic analyses will clarify whether the EPCT served as a center of radiation for Melanesian *Gerrhopilus*.

Kraus (2017) noted that his review of species related to *G. depressiceps* was informed by a number of major phenotypic differences in snout shape, eye development, habitus, scale counts, and color pattern. The last three of those were also of use in assessing species diversity within the *G. inornatus* Group. Both studies found that reduction patterns in numbers of longitudinal scale rows were not taxonomically useful due to their intraspecific variation. For example, Kraus (2017) showed that *G. eurydice* varied in having either 24-22-22 rows or 24-22-20. Similarly, in this study, I have found *G. inornatus* to exhibit either 20-20-20 or 22-20-20 rows, and *G. papuanorum* to exhibit either 22-22-22 or 24-22-22 rows. But both studies confirm the taxonomic value of differences in number of longitudinal scale rows at midbody, as seen previously (e.g., Wallach 1996; Kraus 2005). Of greater interest is the novel taxonomic application herein of data on numbers of glands found within the head shields, the patterns of which have proven quite distinctive among several members of the *G. inornatus* Group and which also differ from the pattern illustrated earlier for *G. hades* (Kraus 2005). It will be interesting to see how the taxonomic usefulness of these differences fare once further specimens of each species become available, but the large differences noted here suggest that trends in gland numbers seem likely to retain their value although the range of variation in gland numbers will no doubt increase from what is seen here.

Given the large increase in Melanesian *Gerrhopilus* species attendant upon this study, it seems sensible to update the key for these snakes presented by Kraus (2017).

Key to Melanesian *Gerrhopilus*

- 1a) Rostral without transverse ventral keel; snout rounded in lateral profile 2
- b) Rostral with transverse ventral keel; snout appearing beaked in lateral profile 11
- 2a) Transverse scale rows at midbody 16 *G. fredparkeri*
- b) Transverse scale rows at midbody 18 or more 3
- 3a) Transverse scale rows at midbody 18 4
- b) Transverse scale rows at midbody 20 or 22 5
- 4a) Single postocular on each side of head; presubocular absent; mid-dorsal scale rows 343; dark dorsal color gradually transitions to paler ventral color *G. hades*
- b) Two postoculars on each side of head; presubocular present; 273–292 dorsal scale rows; dark dorsal color turns abruptly to paler ventral color on sides *G. suturalis*
- 5a) 1–4 mid-ventral scale rows yellow on posterior body 6
- b) Entire venter dark brown or black 8
- 6a) Loreal scale present; 7–8 glands in subocular *G. lorealis*
- b) Loreal scale absent; 0–4 glands in subocular 7
- 7a) Body thicker (L/W = 26.6); mid-dorsal scales 327; tail tip sharp, protruding, white; 0 glands in ocular, 3 in prefrontal, 24–28 in preocular *G. flavinotatus*
- b) Body thinner (L/W = 42.6); mid-dorsal scales 430; tail tip blunt, downturned, brown; 9–11 glands in ocular, 9 in prefrontal, 33–35 in preocular *G. wallachi*
- 8a) Transverse scale rows at midbody 20 9
- b) Transverse scale rows at midbody 22 10
- 9a) Mid-dorsal scale rows 374–375; tail tip white; 22–24 glands in preocular; tail short (TL/SVL = 0.026–0.030) *G. inornatus*
- b) Mid-dorsal scale rows 298–318; tail tip black; 35–39 glands in preocular; tail long (TL/SVL = 0.034–0.043) *G. slapcinskyi*
- 10a) Mid-dorsal scale rows 320; 22–23 glands in ocular; 29 glands in prefrontal; 16 glands in subocular; tail spine blunt, barely extends beyond last scales *G. polyadenus*
- b) Mid-dorsal scale rows 407–414; 0–3 glands in ocular; 1–5 glands in prefrontal; 0–3 glands in subocular; tail spine sharp, protruding *G. papuanorum*
- 11a) Snout angled at 10–20+ degrees from horizontal axis of body, leaving the rostral keel lying dorsal to the rictus 12
- b) Snout horizontal to axis of body, leaving the rostral keel lying even with or ventral to the rictus 14
- 12a) Mid-dorsal scale rows >700; snout rounded in dorsal view; rostral keel pointing directly downward 13
- b) Mid-dorsal scale rows 374–470; snout pointed in dorsal view; rostral keel directed anteroventrally *G. mcdowellii*
- 13a) Body very slender (L/W > 80); snout wider than long (SN/SW = 0.85); snout angled at >20° from horizontal axis of body; head same color as body *G. persephone*
- b) Body moderately robust (L/W < 60); snout longer than wide (SN/SW = 1.11); snout angled at ~10° from horizontal axis of body; dark mask-like coloration across head *G. lestes*
- 14a) Eye vestigial, with obscure margins and indistinct pupil; body very thin (L/W = 80); adult PSN/SNW = 0.44 ... *G. addisoni*
- b) Eye normal, with distinct margins and pupil; body stouter (L/W ≤ 70); adult PSN/SNW = 0.36–0.41 15
- 15a) Body slender (adult L/M = 70); preocular barely touches anterior margin of eye in lateral view; posterior margin of the rostral shallowly concave; tail spine pointed posteroventrally at 70 ° to body axis; tail longer (TL/SVL = 0.032–0.033) *G. depressiceps*
- b) Body robust (adult L/M = 44); preocular covers anterior 30–50% of eye in lateral view; posterior margin of the rostral flat or convex; tail spine pointed ventrally at 90 ° to body axis; tail longer (TL/SVL = 0.028–0.029) *G. eurydice*

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