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# A New Genus for the *Ramphotyphlops subocularis* Species Group (Serpentes: Typhlopidae), with Description of a New Species

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***Abstract.***—A new genus, *Acutotyphlops*, is established for McDowell's *Ramphotvphlops subocularis* species group (minus *R. willeyi* which is transferred to the *R. flaviventer* group) based on a parietal bone projection, head shield fragmentation, and a V-shaped lower jaw. Two species are revalidated, *A. infralabialis* and *A. solomonis*, and a new species is described from Bougainville Island, *A. kunuaensis*. *Acutotyphlops kunuaensis*, represented by more than 250 specimens, is distributed throughout Bougainville, both in the coastal lowlands and the interior highlands. Sexual dimorphism is present in certain scutellation and proportional characters. At least five species of typhlopids are now known to inhabit Bougainville Island.

*Key words: Ramphotyphlops subocularis* group, *Acutotyphlops*, *A. kunuaensis*, *A. subocularis*, *A. infralabialis*, *A. solomonis*, *Typhlops adamsi*, *T. bergi*, Papua New Guinea, Bougainville

## Introduction

McCoy (1970), McDowell (1974), and Hahn (1980) listed three species of *Typhlina* (= *Ramphotyphlops*) inhabiting Bougainville Island in the Solomons: *Ramphotyphlops braminus*, *R. flaviventer* (= *R. depressus fide* Wallach, in prep.), and *R. subocularis*. In his thorough review of the typhlopids of New Guinea and the Solomon Islands, McDowell (1974) defined the *Ramphotyphlops subocularis* species group as lacking a rectal caecum and exhibiting a wedge-shaped lateral snout profile. He recognized two species in the group, *Ramphotyphlops subocularis* (Waite, 1897) and *R. willeyi* (Boulenger, 1900), considering the latter to be the most primitive member, scarcely differing from *R. flaviventer* (Peters, 1864) of the *Ramphotyphlops flaviventer* species group except in the wedge-shaped snout and absence of a caecum. *Ramphotyphlops subocularis* was described as differing from *R. willeyi* in the more specialized fragmentation of the lateral head shields (multiple preoculars and suboculars vs. a single preocular and no subocular), increased number of midbody scale rows (26-36 vs. 20-22), and the acute mandibular symphysis (V-shaped vs. U-shaped). *Ramphotyphlops willeyi* also differs from *R. subocularis* in the presence of a unicameral right lung (vs. multicameral), a convoluted and multisegmented liver (vs. straight and unsegmented), and absence of frontorostral and paired prefrontals on the dorsum of the head (pers. obs.).

McDowell (1974) placed five nominal taxa in the synonymy of *Ramphotyphlops subocularis*, stating that the number of valid species remained to be determined but based upon published data there was no evidence to suggest that more than one variable species was involved. The taxa synonymized with *R. subocularis* were *Typhlops infralabialis* Waite, 1918, *Typhlops solomonis* Parker, 1939, *Typhlops bergi* Peters, 1948, *Typhlops keasti* Kinghorn, 1948, and *Typhlops adamsi* Tanner, 1951 (see McDowell, 1974, for complete synonymy). An examination of the types of all of the above taxa, plus the majority of *Ramphotyphlops subocularis* material in museum collections indicates that the *R. subocularis* complex consists of at least four valid species (*R. subocularis*, *R. infralabialis*, *R. solomonis*, and an undescribed species that forms the topic of this paper). A description of the cranial osteology, internal anatomy, and geographic variation in the *Ramphotyphlops subocularis* group, with emphasis on the new species, will be the subject of a future paper (Wallach, Wong and Meszoely, in prep).

## Methods

All traceable museum specimens of the *Ramphotyphlops subocularis* group (> 325 specimens) were examined, including the

types of all nominal taxa. Due to misidentifications in collections, some specimens may have been overlooked. Specimens were examined with an Olympus binocular dissecting microscope and measurements were made to the nearest 0.5 mm, including total length (LOA), tail length (TL), midtail diameter (MTD), anterior (ABD), midbody (MBD) and posterior (PBD) body diameters, and diameter in the nuchal region (ND). Total middorsals or transverse scale rows (TSR) were counted between the rostral and terminal spine, dorsocaudals (DC) along the midline in a perpendicular plane to the anterior ventrolateral edge of the vent to the apical spine, and subcaudals (SC) between the vent and the spine. Five longitudinal scale row (LSR) counts were made: postcephalic or anterior (ASR) scale rows were counted at the level of the 20th scale caudad of the mental, midbody (MSR) rows at midbody, and precloacal or posterior (PSR) rows were counted at the level of the l0th scale craniad of the anals; two further values were calculated by adding the midbody and posterior counts (MPSR) and also the anterior, midbody and posterior counts (AMPSR). Relative tail length ratio (TL/LOA) is the length of the tail from posterior border of vent to tip of apical spine divided by overall length, body proportion ratio (LOA/MBD) is overall length divided by midbody diameter, and tail proportion ratio (TL/MTD) is length of tail divided by the midtail diameter.

Due to state of preservation and injection of preservative (either lack thereof or overinjection), not to mention health of the animal at time of preservation, both body and tail proportion figures only approximate the condition in life and were thus rounded to the nearest integer (except in the case of type specimens); carrying out the calculations to one decimal point infers a precision that is unrealistic. Care must be taken especially in interpreting the tail proportion ratios as injection of tail with preservative probably leads to a distortion of the true values but the data are presented in the hope that all tails have been similarly biased and therefore of comparative value. Head width (HW) is diameter of head at midocular level; head length (HL) is distance from tip of snout to midocular level. All diameter measurements were made in either dorsal or ventral view.

Statistics were calculated with the Macintosh Statview program. Mean values are presented with their standard errors (SE) and ranges (r); CV represents the coefficient of variation. Probability values in the Tables refer to the student's *t*-test of sample means. In Tables 4-5 data are presented by sex and both sexes combined; when a statistically significant difference exists between the means of the male and female samples, the probability value is given in place of the data for the sexes combined. Tables 6-7 summarize only the combined sex samples as no statistically significant sexual difference was found to be present.

Due to inconsistencies in the literature, clarification is given for terminology of the head shields in the *Ramphotyphlops subocularis* group as the fragmentation of cephalic scutes is a diagnostic character. As discussed by Parker (1939) and Kinghorn (1948), the proliferation of head shields in the *R. subocularis* group has led to confusion and uncertainty as to correct homologies. Kinghorn (1948) proposed the most logical system of nomenclature for these shields and his system is followed here with minor changes. Proliferation of the lateral head shields is the result of division of the ocular and preocular shield of typical typhlopids. The *Ramphotyphlops subocularis* group exhibits two patterns of preocular (PR) arrangement: a single large preocular (*R. infralabialis* and new species) or a longitudinally divided shield with a large superior preocular and a smaller inferior preocular (*R. subocularis* and *R. solomonis*). Division of the typical typhlopid ocular shield has produced an anterior (AO) and posterior ocular (O) and suboculars (S). The suboculars are arranged in one or two horizontal rows between the oculars and supralabials (L) and termed superior and inferior, and considered vertically in one to three columns as anterior, middle and posterior. Postoculars (T) are defined as all scales in contact with

TABLE 1. Variation in the holotypes of the *Ramphotyphlops suboculariS* species group [1]

| Character | *subocularis* | *keasti* | *solomonis* | *infralabialis* | *adamsi* | *bergi* | *kunuaensis* |
|---|---|---|---|---|---|---|---|
| MUS | AMS | AMS | IRSNB | AMS | MVZ | UMMZ | MCZ |
| NO | R2202 | R12856 | 2029 | R4609 | 40753 | 95445 | 76964 |
| S | M | M | F | F | F | M | M |
| LOA | 361 | 373 | 427 | 305 | 150.5 | 171 | 221 |
| TL | 19 | 21 | 15 | 6 | 4.5 | 9 | 10.5 |
| TSR | 472 | 403 | 366 | 476 | 493 | 418 | 385 |
| LSR | 40-34-30 | 40-34-30 | 36-32-26 | 32-26-24 | 34-26-22 | 32-26-25 | 38-32-28 |
| MPSR | 64 | 64 | 58 | 50 | 48 | 51 | 60 |
| AMPSR | 104 | 104 | 94 | 82 | 82 | 83 | 98 |
| SC | 24 | 21 | 19 | 15 | 17 | 24 | 21 |
| DC | 25 | 22 | 20 | 17 | 18 | 26 | 22 |
| TL/LOA | 5.3 | 5.6 | 3.5 | 2.0 | 3.0 | 5.3 | 4.8 |
| TL/MTD | 2.1 | 3.0 | 1.7 | 1.0 | 1.0 | 2.0 | 2.3 |
| LOA/MBD | 30.1 | 35.5 | 34.2 | 50.8 | 43.0 | 34.2 | 36.8 |
| PROC | 2 | 2 | 2 | 1 | 1 | 1 | 1 |
| OC | 1 | 1 | 1 + 1 | 1 + 1 | 1 + 1 | 1 + 1 | 1 + 1 |
| SOC | 2+2+2:3/2 | 2+2+2 | 2 | 1 + 2 | 1 + 2 | 1 + 2 | 1 + 2 |
| PTOC | 4 | 4 | 4 | 4 | 3 | 3:4 | 3:4 |
| SNS | 0.5 | 0.5 | 0.5 | 0.5 | 1.0 | 0.5 | 0.5 |
| INS | SL2 | SL2 | SL2 | SL1 | SL2 | SL2 | SL2 |
| SIP | T-0 | T-0:T-III | T-III | T-III | T-III | T-III | T-III |
| SL | 4 | 4:5 | 4 | 4 | 4 | 4 | 4 |
| IL | 6:5 | 7 | 6:7 | 6 | 7 | 7 | 6 |
| AS | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| ABD | 11.5 | 7.5 | 12 | 6 | 4 | 5 | 5 |
| ND | 13 | 13 | 15 | 7 | 4.5 | 5.5 | 6 |
| MBD | 12 | 10.5 | 12.5 | 6 | 3.5 | 5 | 6 |
| PBD | 12.5 | 10 | 11 | 7 | 3.5 | 5 | 5 |
| HW/HL | 1.50 | 1.27 | 1.58 | 1.50 | 1.44 | 1.45 | 1.00 |
| DOR | uniform | uniform | uniform | lineate | lineate | lineate | uniform |
| PRD | 13-15-15 | 15-15-14 | 14-14-12 | ? | 17-17-17 | 13-15-17 | 18-18-17 |
| URV | 27-19-15 | 25-19-16 | 22-18-14 | ? | 5-5-5 | 5-5-5 | 20-14-11 |

[1] MUS = museum, NO = catalogue number, S = sex (M = male, F = female), LOA = total length (mm), TL = tail length (mm), TSR = transverse scale rows, LSR = longitudinal scale rows, MPSR = midbody and posterior scale row sum, AMPSR = anterior, midbody and posterior scale row sum, SC = subcaudals, DC = dorsocaudals, TL/LOA = relative tail length, TL/MTD = tail length/midtail diameter, LOA/MBD = total length/midbody diameter, PROC = preoculars, OC = oculars, SOC = suboculars (colon separates values from left/right side of head), PTOC = postoculars (colon separates values from left/right side of head), SNS = nostril-rostral division by superior nasal suture, INS = supralabial contact of inferior nasal suture, SIP = supralabial imbrication pattern (colon separates pattern on left/right side of head), SL = supralabials (colon separates values from left/right side of head), IL = infralabials (colon separates values on left side from right side), AS = anal shields, ABD = anterior body diameter, ND = nuchal diameter, MBD = midbody diameter, PBD = posterior body diameter, HW/HL = head width/head length, DOR = dorsum pattern, PRD = pigmented rows of dorsum, URV = unpigmented rows of venter

the ocular and/or suboculars between the parietal and fourth supralabial. In addition to the ocular fragmenting into preoculars and suboculars, there are three shields (a median azygous shield bordered laterally by a pair of larger shields) located on the dorsum of the snout between the rostral/postnasals and supraoculars (SO). In reference to the azygous shield typically known as the prefrontal in typhlopids, Kinghorn (1948) termed it the frontonasal while the pair laterally bordering the frontonasal were

TABLE 2. Qualitative characters of the *Ramphotyphlops suboculars* species group [1]

| Species | DP | LP | RS | SN | IP | P | CS | AS |
|---|---|---|---|---|---|---|---|---|
| *infralabialis* | P | P | N | 0 | 0 | D | R | S |
| + *adamsi* | P | P | N | 0 | + | D | R | 0 |
| + *bergi* | P | P | M | 0 | + | E | H | S |
| *kunuaensis* n. sp. | P | P | M | 0 | + | D | R | S |
| *solomonis* | R | R | N | 0 | 0 | D | H | S |
| *subocularis* | R | W | B | + | + | E | H | T |
| + *keasti* | R | P | B | + | 0 | D | H | T |

[1] DP = dorsal snout profile (R = rounded, P = pointed), LP = lateral snout profile (R = rounded, W = wedge-shaped, P = pointed), SN = supranasals, IP = interparietal, P = parietals (E = enlarged, D = divided), CS = costal shape (R = rounded, H = subhexagonal), AS = apical spine (T = thornlike, S = spinelike, 0 = absent), RS = rostral size (N = narrow, M = moderate, B = broad)

called prefrontals (PF). Preference is here given to the term frontorostral (FR) for the azygous shield, a term that better describes its position as it is located between the rostral (R) and frontal (F). Peters (1948) erroneously suggested that the prefrontals of *Typhlops bergi* were the first of three pairs of supraoculars. The shields that Kinghorn (1948) termed the internasals in *Typhlops keasti* (also present in *R. subocularis*) are here referred to as supranasals (SN), following Brongersma (1934) and McDowell (1974). The median shield that Kinghorn (1948) referred to as a parietal in *T. keasti* is here called the postfrontal (FL) as some species in the *R. subocularis* group retain paired, enlarged parietals (P) in addition to a median postfrontal and interparietal (IP). See Fig. 1 for identification of the head shields in the *Ramphotyphlops subocularis* species group.

Supralabial imbrication patterns (SIP) follow Wallach (1993a) with the addition of the following prefixes for multiple preocular, ocular, and subocular shields: A = anterior, M = median, and P = posterior. *In situ* hemipenes were observed to determine the number of coils in the retracted organ but this was difficult to objectively evaluate as, in addition to simple coils, all manner of twists, partial loops, and zig-zag folds occur. Single folds or zig-zags and half loops were scored as half coils. All counts were made on the left organ. Museum acronyms follow Leviton et al. (1985). Catalogue entries for Bougainville localities with different spelling from those on recent maps include Melilup (= Melelup), Mutahi (= Mutuhai), Topanas (= Topanos), and Torakina (= Torokina). Data from specimens of the new species from the following localities were combined and analyzed as single units: Kieta and North Nasioi (= Kieta); Buin, Malabita and Turiboiru (= Buin); Torokina, Cape Torokina, Piva and Empress Augusta Bay (= Torokina); Mutuhai and Melelup (= Mutuhai). Elevations determined from government topo maps with 50 m contour lines prefaced with "ca."; NSL represents an elevation near sea level.

## Results

### *Redescription of holotypes*

Comparative data for the types of all nominal taxa in the *Ramphotyphlops subocularis* group are presented in Tables 1-2. Only those features not listed in Table 1 or previously mentioned in the literature are discussed below.

*Typhlops subocularis*.—The holotype of *T. subocularis* (AMS R2202; Figs. 1a-c, 2a-b) was erroneously reported by Waite (1897) to have 36 midbody scale rows (34 in the paratype, which is now missing *fide* Cogger, 1979, and not available for examination) but there are 34 rows at midbody. The apical spine is large with a

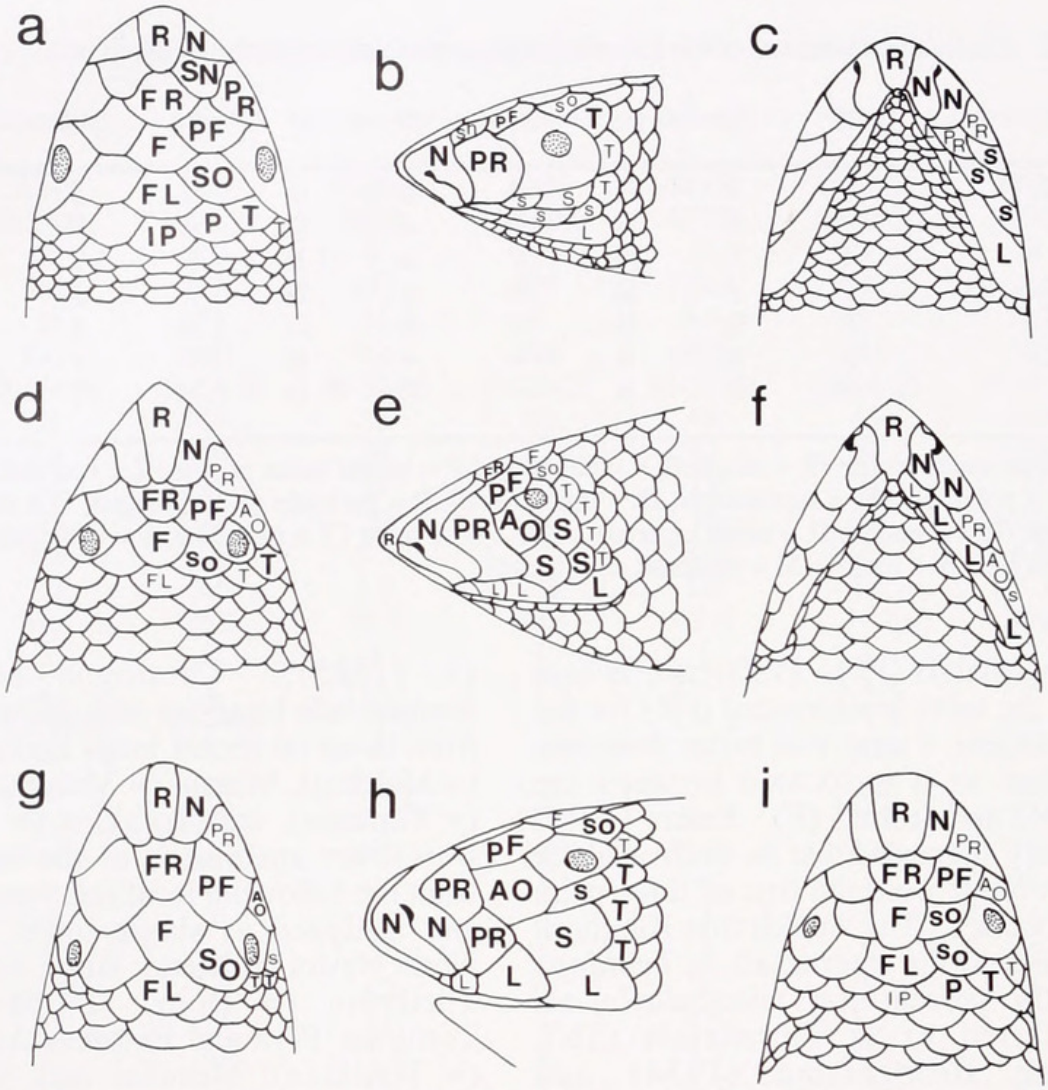


FIG. 1. Head shield terminology of the *Ramphotyphlops subocularis* species group. Head of holotype of *T. subocularis* (after Waite, 1897): a) dorsal view, b) lateral view, c) ventral view; head of holotype of *T. infralabialis* (after Waite, 1918): d) dorsal view, e) lateral view, f) ventral view; head of holotype of *T. solomonis* (after Parker, 1939): g) dorsal view, h) lateral view; head of holotype of *T. bergi* (after Peters, 1948): i) dorsal view. AO = anterior ocular, F = frontal, FL = postfrontal, FR = frontorostral, IP = interparietal, L = supralabial, N = nasal, P = parietal, PF = prefrontal, PR = preocular, PT = postfrontal, R = rostral, S = subocular, SN = supranasal, SO = supraocular, T = postocular, stippled eye shield = ocular (*T. subocularis*) or posterior ocular (*T. infralabialis*, *T. solomonis*)

broad base (aptly described as thorn-like by Waite) and it points upward as the tail is flexed dorsally. Whether this is an artifact of preservation (injection with preservative) or a characteristic of the *R. subocularis* group is unknown, but this dorsal flexure of the tail tip was commonly observed in other specimens. The nostril is half-moon shaped, oriented at 45° to the vertical, and directed laterally. The SIP is T-0 (Nl/SLl, PrOc/SL2, ASOc/SL3, PtOc/SL4). The first three supralabials are subequal in size and length while the fourth supralabial is more than twice as deep and long as any of the other three. The dorsum is uniformly dark brown while the venter is golden-yellow. A sharp demarcation separates the two colors with only an occasional brown scale appearing in the uppermost yellow scale row.

*Typhlops keasti*.—The status of *T. keasti* (AMS R12856) is uncertain. Other than the distinctive depression of the head with its laterally pointed snout and strongly tapered head in dorsal aspect there is nothing to separate *T. keasti* from *R. subocularis*. Kinghorn (1948) erroneously reported the

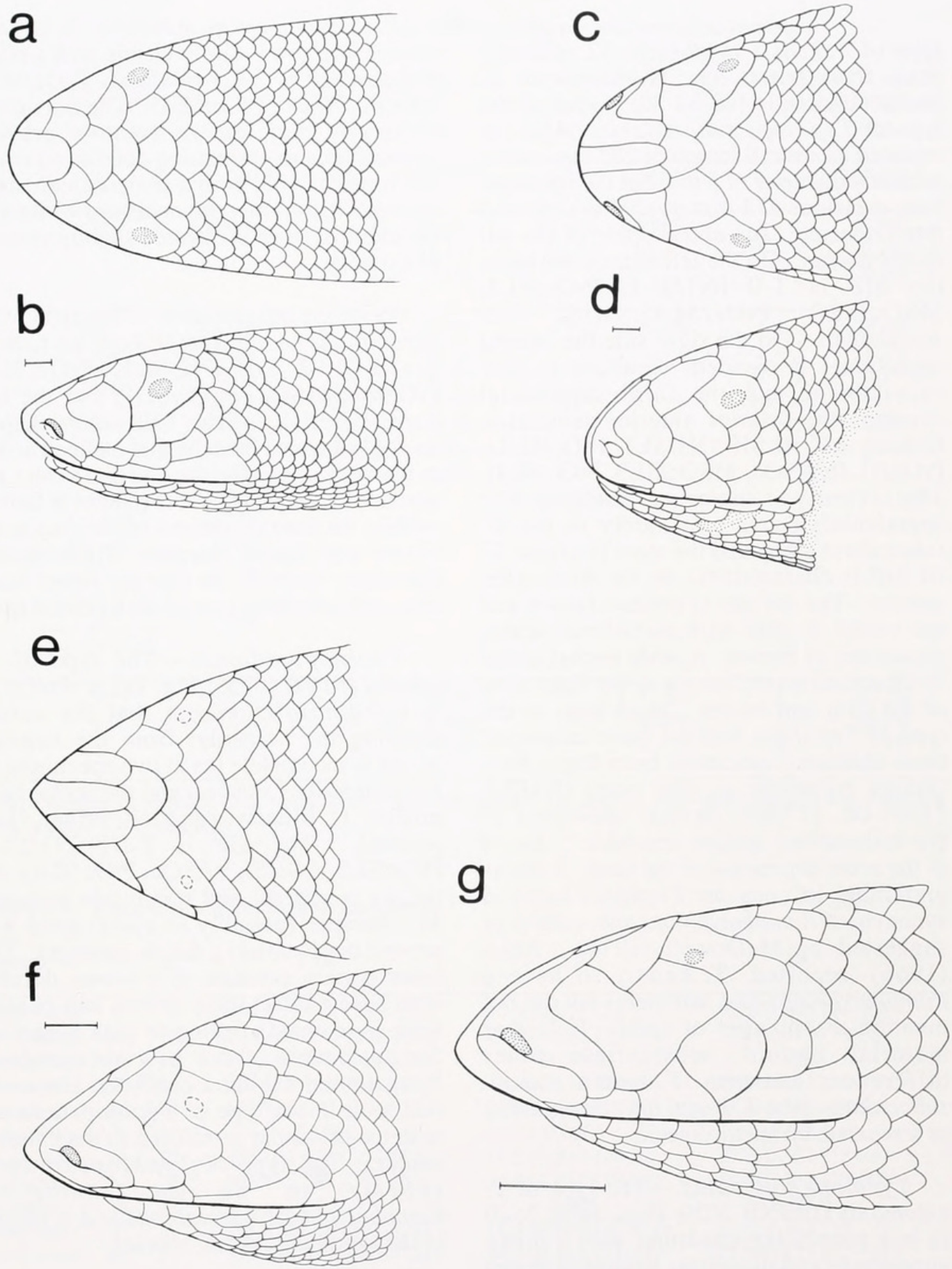


FIG. 2. Head of holotype of *Typhlops subocularis* (AMS R2202): a) dorsal view, b) lateral view; head of holotype of *Typhlops solomonis* (IRSNB 2029): c) dorsal view, d) lateral view; head of holotype of *Typhlops infralabialis* (AMS R4609): e) dorsal view, f) lateral view; head of holotype of *Typhlops adamsi* (MVZ 40753): g) lateral view. Bar = 1 mm.

type of *T. keasti* to possess 32 midbody scale rows but it has 34 rows with an identical formula (40-34-30) to that of the type of *Typhlops subocularis*. Also, he reported an overall length of 285 mm with a midbody diameter of 5 mm but the specimen now measures 373 mm overall with a 10.5 mm diameter. The apical spine of the tail flexes dorsad. On the left side of the head, the SIP is T-0 (N1/SL1, PrOc/SL2, MSOc/SL3, PtOc/SL4) with four supralabials. On the right side the second supralabial is divided, resulting in five supralabials, and the third supralabial overlaps the inferior anterior subocular, forming a T-III SIP (N1/SL1, PrOc/SL2a, PrOc/SL2b/ASOc, MSOc/SL3, PtOc/SL4). This is clearly an anomalous condition: five supralabials occur only rarely in the *R. subocularis* group and the more primitive T-III SIP is characteristic of the three other species. The dorsum is reddish-brown and the venter is gold with occasional scales pigmented in brown. A wide nuchal collar (6-10 scales) is confluent with the light color of the chin and venter. In addition to the type of *Typhlops keasti* I have examined three additional specimens from Papua New Guinea referrable to this taxon (NMBA 11705-06, 11708). Several specimens of the undescribed species resemble *T. keasti* in the acute depression of the head. It seems preferable to consider *Typhlops keasti* a synonym of *Ramphotyphlops subocularis* as suggested by McDowell (1974). Robb (1966) reported *T. keasti* to have a *Ramphotyphlops*-like hemipenis but did not mention the number of coils. If further material should substantiate other differences between *T. keasti* and *R. subocularis*, then *T. keasti* may be regarded as a separate sympatric species.

*Typhlops solomonis*.—The type of *T. solomonis* (IRSNB 2029; Figs. 1g-h, 2c-d) is in a premolting condition with a milky appearance and numerous sloughing scales along various portions of the body, a factor making an accurate middorsal count difficult. Prominent gland depressions are present along the head shield margins. A large circular nostril is obliquely oriented in a semidivided nasal and just visible from above. The eye is dimly visible with a pupil and the SIP is T-III (N1/SL1, PrOc/SL2, PrOc/SL3/SOc, PtOc/SL4). The dorsum is uniformly dark brown (with a grayish overcast due to premolting condition) while the venter is gold with a sharp demarcation between them. Several anals are white and the terminal spine is directed slightly ventrad and orange.

*Typhlops infralabialis*.—The type of *T. infralabialis* (AMS R4609; Figs. 1d-f, 2e-f) has a T-III SIP (N2/SL1, PrOc/SL2, PrOc/SL3/ASOc, PSOc/SL4) and the tail curves ventrally. The half-moon shaped nostril is directed laterally and inclined at 45° to the body axis. The dorsum and venter are severely faded but a lineate pattern is faintly visible; the central portions of each scale are brown with lighter margins. Pigmentation decreases ventrally so that the lower scale rows are light with a small dark central spot.

*Typhlops adamsi*.—The type of *T. adamsi* (MVZ 40753; Fig. 2g) is similar to *T. infralabialis* except that the suture dividing the preocular from the anterior ocular is incomplete (as in two specimens of the undescribed species) and the dorsal head profile is bluntly rounded rather than pointed. The SIP is T-III (N1/SL1, PrOc/SL2, AOc/SL3/ASOc, PtOc/SL4); the tail tip is straight and terminates in a soft protuberance (possibly an apical spine was present but is missing due to damage). The color pattern consists of a brown dorsum with lineate effect (only central half of each scale pigmented), fading to pink ventrally. Six specimens of the new species from Bougainville exhibit a condition similar to that seen in the type of *Typhlops adamsi* with the preocular semifused to the anterior ocular. The type of *Typhlops adamsi* appears to be an anomalous *Ramphotyphlops infralabialis* and is placed in the synonymy of that species.

*Typhlops bergi*.—The type of *T. bergi* (UMMZ 95445; Fig. 1h) exhibits a T-III SIP (N1/SL1, PrOc/SL2, PrOc/SL3/ASOc, PtOc/SL4). The half-moon shaped nostril is inclined at 45° and directed laterally. The inferior nasal suture contacts SL2 near its

TABLE 3. Variation in the ocular shields of the *Ramphotyphlops subocularis* species group [1]

| | *subocularis* (n = 58) | | *solomonis* (n = 62) | | *infralabialis* (n = 24) | | *kunuaensis* n. sp. (n = 510) | |
|---|---|---|---|---|---|---|---|---|
| Shield | no. | freq. | no. | freq. | no. | freq. | no. | freq. |
| PR | 2 | 100.0% | 2 | 100.0% | 1 | 100.0% | 1 | 100.0% |
| 0 | 1 | 100.0% | 1 + 1 | 82.8% | 1 + 1 | 100.0% | 1 + 1 | 98.2% |
| 0 | | | 1 + 2 | 14.1% | | | 2 + 1 | 1.6% |
| 0 | | | 1 + 3 | 3.1% | | | 1 + 2 | 0.2% |
| S | 3/2 | 43.1% | 2 | 84.4% | 1 + 2 | 100.0% | 1 + 2 | 98.0% |
| S | 2 + 2 | 27.6% | 1 + 2 | 6.2% | | | 1 + 3 | 1.2% |
| S | 2/3 | 6.9% | 1 + 2 | 6.2% | | | 1 + 1 | 0.2% |
| S | 3 + 3 | 5.2% | 2/1 + 2 | 3.1% | | | 1 + 2/1 | 0.2% |
| S | 2 + 2 + 2 | 3.5% | 3/2 | 3.1% | | | 1 + 1/2 | 0.2% |
| S | 2/2 | 3.5% | 2 + 3 | 1.6% | | | 2 | 0.2% |
| S | 3 + 2 + 2 | 1.7% | 1/2 | 1.6% | | | | |
| S | 1 + 2 + 2 | 1.7% | | | | | | |
| S | 1 + 2/2 | 1.7% | | | | | | |
| S | 1/2 + 2 | 1.7% | | | | | | |
| S | 2 / 1 + 1 + 2 | 1.7% | | | | | | |
| S | 2 / 1 + 1+ 1+ 2 | 1.7% | | | | | | |
| PT | 3 | 5.2% | 3 | 7.8% | 3 | 37.5% | 3 | 40.2% |
| PT | 4 | 75.8% | 4 | 78.1% | 4 | 50.0% | 4 | 56.1% |
| PT | 5 | 19.0% | 5 | 14.1% | 5 | 12.5% | 5 | 3.7% |

[1] no. = number or formula, freq. = frequency (each side counted separately), PR = preoculars, O = oculars, S = suboculars, PT = postoculars

TABLE 4. Transverse scale rows of *Acutotyphlops* [1]

| Species | S | n | TSR | SC | DC |
|---|---|---|---|---|---|
| *infralabialis* | F | 6 | 469.0±13.084 (422-511) | 15.0±0.577 (13-17) | 16.8±0.946 (14-18) |
| *infralabialis* | M | 6 | 484.8±15.294 (418-526) | 22.0±0.683 (20-24) | 24.8±0.872 (23-28) |
| *infralabialis* | B | 12 | 476.9±9.888 (418-526) | 0.0005 | 0.005 |
| *kunuaensis* | F | 141 | 421.6±3.190 (360-542) | 13.9±0.172 (10-20) | 15.0±0.141 (11-19) |
| *kunuaensis* | M | 114 | 405.7±3.039 (360-532) | 21.6±0.190 (17-28) | 23.1±0.240 (19-31) |
| *kunuaensis* | B | 255 | 0.0005 | 0.0005 | 0.0005 |
| *solomonis* | F | 22 | 388.1±3.453 (362-424) | 18.5±0.353 (16-22) | 20.7±0.361 (18-24) |
| *solomonis* | M | 9 | 363.4±5.762 (334-381) | 24.8±1.051 (19-29) | 28.0±0.732 (25-30) |
| *solomonis* | B | 31 | 0.025 | 0.005 | 0.0005 |
| *subocularis* | F | 12 | 398.8±6.028 (363-428) | 16.4±0.802 (12-22) | 20.3±1.382 (14-23) |
| *subocularis* | M | 17 | 399.6±6.392 (363-472) | 24.3±0.541 (21-28) | 25.6±0.833 (22-31) |
| *subocularis* | B | 29 | 399.3±4.427 (363-472) | 0.0005 | 0.005 |

[1] mean ± SE (range), S = sex (F = female, M = male, B = both sexes combined or *p* value when significant difference exists between means of each sex), TSR = transverse scale rows, SC = subcaudals, DC = dorsocaudals

TABLE 5. Proportional characters of *Acutotyphlops* [1]

| Species | S | n | TL/LOA | LOA/MBD | TL/MTD |
|---|---|---|---|---|---|
| *infralabialis* | F | 6 | 2.1±0.292 (1.0-3.1) | 44.5±3.611 (33.4-50.8) | 1.3±0.126 (1.0-1.7) |
| *infralabialis* | M | 6 | 4.2±0.293 (3.2-5.3) | 45.7±2.674 (34.2-53.1) | 2.1±0.095 (1.7-2.3) |
| *infralabialis* | B | 12 | 0.005 | 45.1±2.151 (33.4-57.4) | 1.7±0.140 (1.0-2.3) |
| *kunuaensis* | F | 141 | 2.7±0.032 (1.8-3.8) | 37.1±0.494 (22.4-57.6) | 1.5±0.021 (1.0-2.1) |
| *kunuaensis* | M | 114 | 4.9±0.054 (3.4-6.7) | 36.5±0.494 (26.8-52.1) | 2.1±0.031 (1.2-3.3) |
| *kunuaensis* | B | 255 | 0.0005 | 36.9±0.351 (22.4-57.6) | 0.0005 |
| *solomonis* | F | 22 | 3.9±0.117 (2.9-4.9) | 32.4±1.321 (18.2-42.5) | 2.1±0.079 (1.3-3.1) |
| *solomonis* | M | 9 | 6.8±0.280 (5.2-7.7) | 29.3±0.841 (23.6-33.0) | 2.7±0.160 (2.0-3.0) |
| *solomonis* | B | 31 | 0.0005 | 31.5±0.993 (18.2-42.5) | 0.01 |
| *subocularis* | F | 12 | 3.7±0.146 (3.0-4.5) | 32.0±1.524 (23.2-39.7) | 1.7±0.097 (1.2-2.3) |
| *subocularis* | M | 17 | 5.5±0.205 (3.0-6.3) | 32.3±1.240 (25.6-43.8) | 2.5±0.127 (1.8-3.7) |
| *subocularis* | B | 29 | 0.0005 | 32.2±0.945 (23.2-43.8) | 0.005 |

[1] mean ± SE (range), S = sex (F = female, M = male, B = both sexes combined or *p* value when significant difference exists between means of each sex), TL/LOA = tail length/total length, LOA/MBD = total length/midbody diameter, TL/MTD = tail length/midtail diameter

TABLE 6. Longitudinal scale rows of *Acutotyphlops* [1]

| Species | n | ASR | MSR | PSR |
|---|---|---|---|---|
| *infralabialis* | 12 | 34.0±0.492 (32-36) | 27.0±0.302 (26-28) | 25.0±0.369 (22-26) |
| *kunuaensis* | 255 | 37.5±0.103 (34-42) | 32.4±0.074 (30-36) | 28.4±0.083 (26-33) |
| *solomonis* | 31 | 33.7±0.246 (30-36) | 32.0±0.182 (29-34) | 26.6±0.190 (24-28) |
| *subocularis* | 29 | 40.0±0.314 (36-44) | 34.5±0.251 (32-36) | 30.8±0.250 (28-34) |

[1] mean ± SE (range), ASP = anterior scale rows, MSR = midbody scale rows, PSR = posterior scale rows

TABLE 7. Miscellaneous characters of *Acutotyphlops* [1]

| Species | n | MPSR | AMPSR | LOA |
|---|---|---|---|---|
| *infralabialis* | 12 | 52.0±0.640 (48-54) | 85.8±1.006 (82-90) | 254.0 (115-372) |
| *kunuaensis* | 255 | 60.7±0.127 (56-68) | 98.2±0.210 (90-110) | 237.0 (104-373) |
| *solomonis* | 31 | 58.5±0.274 (55-61) | 92.3±0.447 (85-96) | 357.6 (164-487) |
| *subocularis* | 29 | 65.3±0.442 (60-70) | 105.3±0.659 (98-111) | 270.0 (191-394) |

[1] mean ± SE (range), MPSR = midbody and posterior scale row sum, AMPSR = anterior, midbody and posterior scale row sum, LOA = total length

junction with SL1 and partially covers an inferior nasal pit. The dorsum is brown with light scale margins forming a lineate pattern. The inferior nasal pit is not unique to *T. bergi* as nearly 10% of the sample of the undescribed Bougainville species possesses it. The paired supraoculars are distinctive although aberrantly present in three individuals (1.2%) of the new species. Scale counts, body proportions, and color pattern suggest that the type of *T. bergi* is an anomalous *T. infralabialis*. Should further material display the paired supraoculars, *T. bergi* might be considered subspecifically distinct.

*Revalidation of Taxa*

The summarized data in Tables 1-7 demonstrate the distinctness of the four species here considered valid (*R. subocularis*, *R. solomonis*, *R. infralabialis*, and the new species). The *R. subocularis* group is characterized by six uniquely derived features unknown among other typhlopids. An osteological synapomorphy of all species is the presence of an acuminate parietal projection separating the posterior frontals. This median middorsal "spike" of the parietal bone, wedged between the posterior portions of the frontals, has not been reported in any other scolecophidian. Examination of six skulls reveals the parietal spike to extend for the following distances along the interfrontal suture: 0.20-0.25 in *R. solomonis*, 0.33 in *R. subocularis* and the undescribed species, and 0.40 in *R. infralabialis*. Multiple preocular, ocular and/or subocular shields (Table 3), a V-shaped lower jaw with 5-7 infralabials (Figs. 1c, f), and a frontorostral shield bordered by a pair of enlarged prefrontals (Figs. 1a, d, g, i) are other synapomorphies of the group as here defined with the exclusion of *Ramphotyphlops willeyi*. Additional derived characters present in the *R. subocularis* group (but not exclusively so) include lack of a rectal caecum, a uropeltid-like nuchal expansion such that the greatest diameter of the body is behind the head, a high number of longitudinal scale rows (≥ 26 midbody rows present in 27 species of African and Asian *Typhlops* and 15 species of *Rhinotyphlops*), sexual dimorphism in relative tail length and number of subcaudals and dorsocaudals (i.e., Perry, 1985, for *Typhlops vermicularis*), a multicameral right lung (present in *Rhinotyphlops* and some *Typhlops*), and a straight unsegmented liver (present also in *Rhinotyphlops*). *Ramphotyphlops willeyi* is thus transferred to the *R. flaviventer* species group, which possesses a unicameral right lung. It is considered a derived member of that group based upon the wedge-shaped snout and absence of a rectal caecum (McDowell, 1974).

Due to the uniqueness of the *R. subocularis* group, which is distinguished from all other typhlopids by no fewer than six synapomorphies and has been previously suggested as worthy of separate generic status (Dunn and Tihen, 1944; McDowell, 1974), a new genus is established to contain the four species discussed herein. The removal of these species, having 26-36 midbody scale rows, from *Ramphotyphlops* leaves all members of that genus but one with 16-24 midbody scale rows, the sole exception being the Philippine *Ramphotyphlops cumingii* (24-28 rows). The new genus may be known as

***Acutotyphlops* gen. nov.**

*Type species.*—*Acutotyphlops kunuaensis* sp. nov.

*Diagnosis.*—Distinguished from all other typhlopid genera by any of the following characters: a middorsal parietal spike partially separating the frontal bones, a V-shaped lower jaw, two or more subocular shields, a frontorostral shield bordered by a pair of prefrontals, five or more infralabial shields, and sum of preocular and ocular shields three or more.

*Etymology.*—From the Latin *acutus*, meaning pointed, in reference to both the parietal spike of the skull and the symphysis of the lower jaw of the four included species, plus the dorsal and lateral head profiles of the type species.

*Description.*—Acuminate projection of parietal bone separating posterior frontals along 0.2-0.4 of the interfrontal suture; 4-5 maxillary teeth (4 in *A. subocularis* and *A. solomonis*; 5 in *A. infralabialis* and undescribed species); 2-4 dorsal foramina in nasal bone; cephalic glands confined to bases of shields beneath sutures; widest part of body in nuchal region due to expanded axial musculature, presumably adaptive for burrowing and similar to condition in the Uropeltidae *fide* Gans, 1976, and Gans et al., 1978; rostral narrow and short, extending halfway to the level of the eyes; median azygous frontorostral bordered by paired prefrontals; superior nasal suture

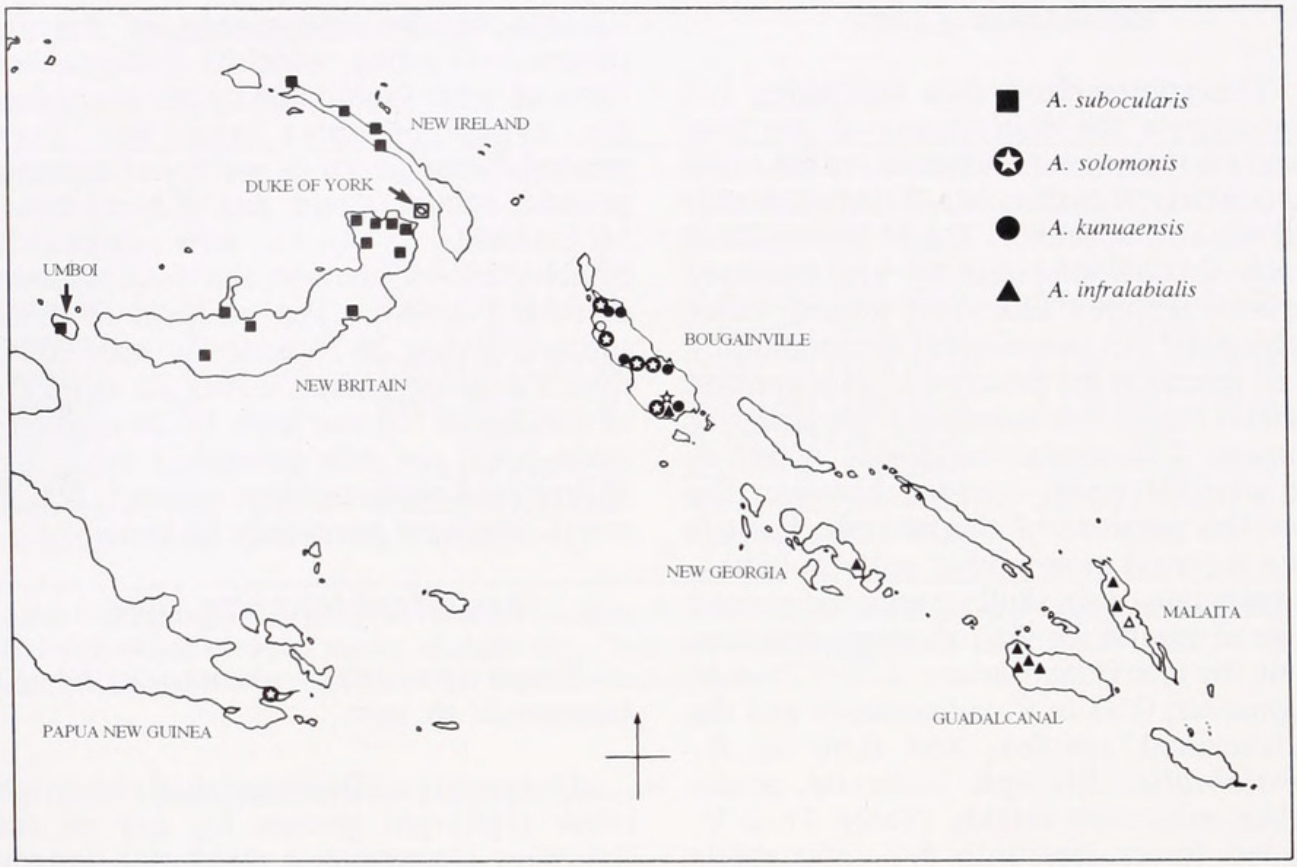


FIG. 3. Distribution of *Acutotyphlops* n. gen.. Solid symbols represent specimens examined, open symbols denote type localities.

incomplete; caudal border of nasal concave; inferior nasal suture contacting second supralabial; preocular single or divided longitudinally; ocular single or divided transversely (if divided, small eye with visible pupil present beneath posterior ocular); sum of preocular and ocular shields 3-6; 2-7 suboculars; 4 supralabials with fourth 2-3 times as long as deep and twice as long as any of the other three; 5-7 infralabials; longitudinal scale rows with anterior and posterior reductions; 26-36 midbody scale rows; sum of anterior, midbody and posterior scale rows 88-110; lower jaw V-shaped; right lung multicameral; liver straight and unsegmented (as in Alethinophidia); rectal caecum absent (as in most Alethinophidia); lateral tongue papillae absent; *Ramphotyphlops*-like hemipenis with 3-9 coils in retracted position; sexual dimorphism in relative tail length and both subcaudal and dorsocaudal scale counts; moderate-sized scolecophidians with maximum length of 400 mm (except *A. solomonis* at 500 mm) and moderate length/width ratios of 25-50.

*Content*.—Four recognized species: *Acutotyphlops subocularis* (Waite, 1897), including its synonym *Typhlops keasti* Kinghorn, 1948; *Acutotyphlops infralabialis* (Waite, 1918), including its synonyms *Typhlops bergi* Peters, 1948, and *Typhlops adamsi* Tanner, 1951; *Acutotyphlops solomonis* (Parker, 1939); and *Acutotyphlops kunuaensis* sp. nov.

*Distribution*.—Eastern Papua New Guinea and the Solomon Islands (Fig. 3). *Acutotyphlops subocularis*, the northern form, is known from eastern Papua New Guinea (one record from Morobe Province) and the Bismarck Archipelago, NSL-1065 m. The two central forms, recorded from NSL-915 m, include *Acutotyphlops kunuaensis* n. sp., endemic to Bougainville Island, and *A. solomonis*, recorded from eastern Papua New Guinea (one record from Milne Bay Province) and Bougainville.

*Artificial key to the genus Acutotyphlops*

| | | |
|---|---|---|
| 1a. | Preocular single, anterior suboculars paired, dorsal snout profile rounded | 2 |
| 1b. | Preocular divided, anterior suboculars single, dorsal snout profile pointed | 3 |
| 2a. | Supranasals present, ocular single, supralabial imbrication pattern T-0 | *A. subocularis* |
| 2b. | Supranasals absent, ocular divided, supralabial imbrication pattern T-III | *A. solomonis* |
| 3a | Midbody scale rows 26-28 | *A. infralabialis* |
| 3b. | Midbody scale rows 30-36 | *A. kunuaensis* |

*Acutotyphlops infralabialis*, the southern form, has the widest distribution, being known from Bougainville, New Georgia, Malaita, and Guadalcanal in the Solomon Islands, 15-245 m.

Specimens of *Acutotyphlops* have not been reported from some of the large islands in the Solomons (Choiseul, Florida, San Cristobal, and Santa Isabel). Thus its distribution in the southern Solomons is poorly known. More collecting is urged, not only in the southern Solomons, but also in eastern Papua New Guinea as *Acutotyphlops* may occur in other localities along the eastern coast.

*Type Species of Acutotyphlops*

The species to be designated as the type of *Acutotyphlops* has been recognized as a novel taxon for 25 years and is represented in the MCZ collection by more than 220 individuals collected by Fred Parker from August 1960 to May 1966, 180 of them from the type locality of Kunua. Several workers have borrowed the MCZ material to study but it has never been described. This blind snake was mentioned by Parker (1970) as being one of 13 new species from Bougainville that "either have been described or soon will be," based upon nine years of collecting by himself and natives. The new form is finally christened

***Acutotyphlops kunuaensis* sp. nov.**

Figs. 4a-b, 5

*Holotype*.—MCZ 76964, an adult male collected by Fred Parker (field no. X-4688) on 19 August 1963.

*Type locality*.—Kunua, coastal northwestern Bougainville Island, North Solomons Province, extreme eastern Papua New Guinea, 5°46'S, 154°43'E, elevation ca. 30 m.

*Paratypes* (n = 180).—Same locality and collector as that of the holotype (date of collection in parentheses following catalogue number): MCZ 72067-74 (21.vi.62), 72075-77 (22.vi.62), 72078 (27.vi.62), 72080 (22.vii.62), 72130 (25.xii.62), 72131-32 (24.v.62), 72133-36 (13.vi.62), 76714, 76716-26 (24.vii.63), 76926-27, 76929-30 (28.vii.63), 76931-32, 76935-39 (11.viii.63), 76950, 76955-57, 76959, 124473 (16.viii.63), 76960 (21.viii.63), 76961-65, 76967 (19.viii.63), 76968-74, 76977, 76979-80, 76982-83, 76986-89 (28.viii.63), 76990-96, 76998-7007 (29.viii.63), 77008-13 (31.viii.63), 77016-22 (5.ix.63), 77023-33, 77036, 77038 (8.ix.63), 77037 (15.ix.63), 77267-79, 77282-90 (1.ix.63), and 77292-306 (12.ix.63). Collection date unknown for the following paratypes: MCZ 76206, 76682-87, 76690-700, 76704-12, 76948.

*Etymology*.—The specific epithet is derived from the type locality, Kunua, where the entire type series originated.

*Diagnosis*.—Distinguished from all other typhlopids by the following combination of characters: snout pointed in dorsal and lateral aspects, mandibles V-

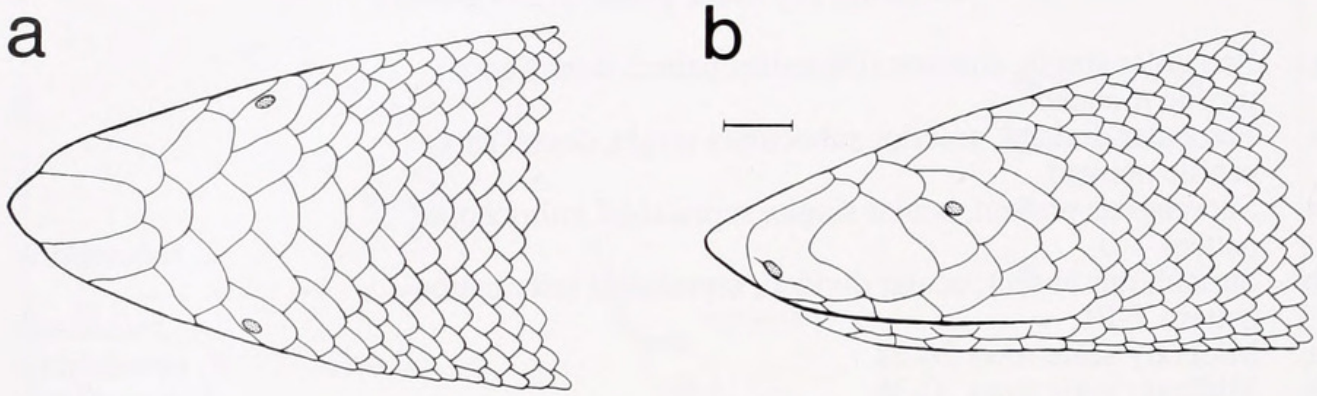


FIG. 4. Head of holotype of *Acutotyphlops kunuaensis* n. sp. (MCZ 76964): a) dorsal view, b) lateral view. Bar = 1 mm.

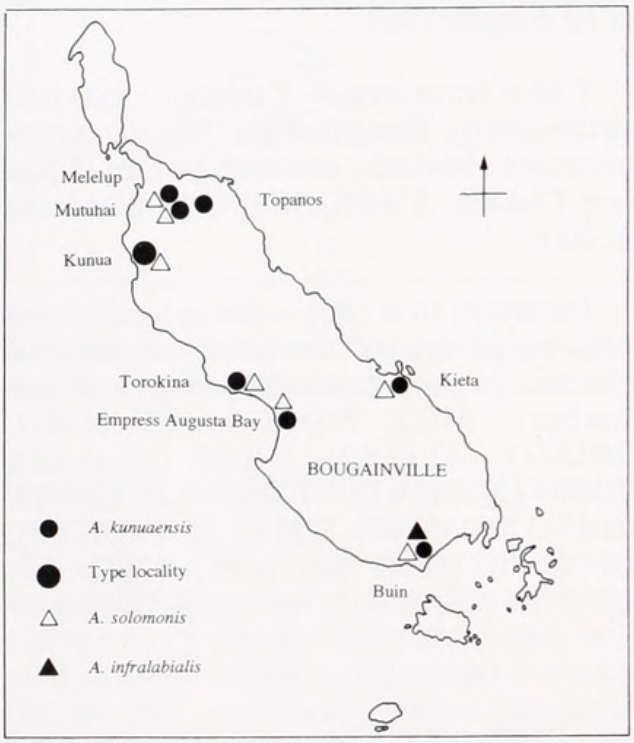


FIG. 5. Distribution of *Acutotyphlops* on Bougainville showing sympatric localities of *A. kunuaensis*, *A. solomonis*, and *A. infralabialis*.

shaped in ventral view, 30-36 midbody scale rows, and a T-III supralabial imbrication pattern. On Bougainville Island, *Acutotyphlops kunuaensis* can be identified by its pointed snout in conjunction with 30 or more midbody scale rows.

*Description of holotype*.—Total length 221 mm, tail length 10.5 mm, midtail diameter 4.5 mm, relative tail length 4.75%, tail length/width ratio 2.3. Postcephalic and precloacal body diameters 5 mm, midbody diameter 6 mm, latter contained in overall length 37 times. Widest portion of body is expanded nuchal region with diameter of 6.5 mm. Transverse scale rows 385, subcaudals 21, and dorsocaudals 22. Longitudinal scale row formula 38-32-28. Tail tip straight with spine-like apical spine.

Head much narrower than neck and body, tapering to acute point. Rostral twice as long as broad in dorsal view, bordered on either side by pair of postnasals that extend slightly beyond rostral border. Postnasals separated on midline by frontorostral, followed by slightly larger frontal, and then somewhat smaller postfrontal and interparietal, subequal in size and broader than long. Two pairs of larger shields, lateral to this series, are the anterior prefrontals and posterior supraoculars, followed by smaller parietals.

Head obtusely pointed in lateral view with wedge-shaped rostral. Nasal divided into small prenasal and much larger postnasal that extends onto dorsum of head. Nostril's axis oriented at 45° angle to vertical. Inferior nasal suture contacts SL2. Superior nasal suture incomplete, extending across half the nostril-rostral distance. Preocular is large and single; ocular transversely divided into anterior and posterior shields of subequal size. Eye small with large pupil, located beneath the posterior ocular near border of anterior ocular. Three smaller suboculars present between oculars and SL4, arranged as

anterior subocular plus superior and inferior posterior suboculars. Bordering posterior ocular and suboculars, between the supraocular and SL4, are three small postoculars on left side and four postoculars on right. Supralabial imbrication pattern T-III (N1/SL1, APrOc/SL2, APrOc/SL3/PPrOc, PtOc/SL4). Fourth supralabial elongated and equal to length of first three combined. All head shields possess tiny convex tubercles irregularly scattered over their surfaces.

In ventral view snout acutely pointed and slightly trilobate, and mandibles of lower jaw acutely angled or V-shaped with slightly bulbous symphysis. Six infralabials present on each side, separated by median mental shield.

Overall coloration is dark brown dorsum and pale yellow venter with strong demarcation between the two colors. Only occasionally are there a few lightly pigmented scales in uppermost yellow row. Each dorsal scale pigmented centrally with very narrow light margin around periphery. Wide yellow nuchal collar 4-5 scales long middorsally and 8 scales midlaterally. Middorsal 18 scale rows (17 posteriorly) heavily pigmented while yellow rows occupy 20-14-11 ventral scale rows.

*Distribution.*—Endemic to Bougainville Island, Northern Solomons Province, Papua New Guinea (Fig. 4). Apparently widespread over the island as it is known from the northwestern (Kunua), west-central (Cape Torokina, Torokina, Torokina Bay, Empress Augusta Bay), east-central (North Nasioi, Kieta) and southern (Buin) coastal regions plus the northern interior (Melelup, Mutuhai, and Topanos).

*Natural history.*—The population structure of *Acutotyphlops kunuaensis* is such that juveniles and immature individuals appear to have total lengths less than 180 -220 mm. The smallest gravid females are 222 mm in length. Adults average 220-300 mm in length. Mean female length is greater than that for males. Only 3 males (2.7% of sample) have total lengths greater than 300 mm but 16 females (11.3%) have lengths between 300 and 380 mm. Females appear to lay one (n=6) or two (n=5) eggs per cycle, although one female (MCZ 72136) has four developing ova on the left side with a large egg on the right. Females with large eggs were collected on 24 July, 28-29 August and 5 September 1963, indicating that egg deposition probably occurs in August and/or September.

*Variation.*—Lateral tongue papillae are absent in nine specimens with protruded tongues (AMS 121957, 123396, 123402-03, MCZ 76695-96, 76722, 76972, 76986). An inferior nasal pit, similar to that in the type of *Typhlops bergi*, is visible in at least 21 specimens (8.2% of sample).

The mean number of helical coils in the retracted hemipenis is 5.9±0.176 SE in 68 specimens with a range of 3-9 coils and modal values of 6.5 and 7 (9 specimens each). There is a positive but weak correlation between the number of coils and total length, with regression formula for number of hemipenis coils = 0.02 LOA + 1.38 ($R^2$ = 0.29, CV = 21.2, F = 27.25 with 67 df, $p < 0.0001$). The large intraspecific variation in the number of coils in the retracted hemipenis is surprising and urges caution in using the number as a systematic character (McDowell, 1974; Wallach, 1993b). Variation in hemipenial coils should be examined in species of *Ramphotyphlops* as it may be more stable in that genus. If not, then the number of coils would appear to have little taxonomic value. The mean number of coils in the hemipenis of other members of *Acutotyphlops* is as follows: *A. solomonis* – 4.7 (r = 4.5-5, n = 6, CV = 16.1), *A. subocularis* – 5.5 (r = 4-8, n = 8, CV = 24.8), and *A. infralabialis* – 8.2 (r = 7.5-9, n = 3, CV = 9.4). In juvenile specimens the hemipenis is folded in a zig-zag configuration rather than coiled in loops. One specimen (MCZ 77306), with a tail length of 9.5 mm, has both hemipenes fully everted, the right organ measuring 43 mm in length and the left one 30 mm. The hemipenis is nude, 0.5 mm in diameter, and exhibits a *sulcus spermaticus* extending the length of the organ that is V-shaped in cross-section with a lateral flange or flap-like extension. Another specimen (UPNG

TABLE 8. Sympatric female *A. kunuaensis* and *A. solomonis* scale counts [1]

| Species | locality | n | TSR | DC | AMPSR |
|---|---|---|---|---|---|
| *kunuaensis* | Kunua | 100 | 404.4±1.746 (360-442) | 14.5±0.138 (11-19) | 98.2±0.258 (91-104) |
| *solomonis* | Kunua | 5 | 399.8±6.328 (387-424) | 20.6±0.678 (19-23) | 91.8±1.020 (88-94) |
| *kunuaensis* | Torokina | 20 | 483.5±5.486 (441-542) | 16.5±0.380 (13-19) | 101.8±0.593 (96-107) |
| *solomonis* | Torokina | 1 | 390 | 20 | 94 |
| *kunuaensis* | Kieta | 10 | 415.4±6.695 (390-453) | 15.6±0.427 (14-18) | 99.5±1.147 (93-106) |
| *solomonis* | Kieta | 6 | 393.3±4.602 (380-409) | 21.3±0.558 (19-23) | 93.0±0.894 (90-96) |
| *kunuaensis* | Mutuhai | 3 | 528.7±1.453 (526-531) | 18.3±0.667 (17-19) | 107.7±1.453 (105-110) |
| *solomonis* | Mutuhai | 3 | 398.7±3.844 (393-406) | 21.0±1.528 (19-24) | 93.7±1.202 (92-96) |
| *kunuaensis* | Buin | 1 | 525 | 16 | 95 |
| *solomonis* | Buin | 5 | 364.8±0.860 (362-367) | 19.4±0.510 (18-21) | 93.2±0.490 (92-94) |

[1] mean ± SE (range), TSR = transverse scale rows, DC = dorsocaudals, AMPSR = anterior, midbody and posterior scale row sum

TABLE 9. Sympatric male *A. kunuaensis* and *A. solomonis* scale counts [1]

| Species | locality | n | TSR | DC | AMPSR |
|---|---|---|---|---|---|
| *kunuaensis* | Kunua | 81 | 393.3±1.579 (360-442) | 22.0±0.160 (19-25) | 96.6±0.298 (90-104) |
| *solomonis* | Kunua | 4 | 366.0±4.564 (356-376) | 27.8±1.031 (25-30) | 91.3±1.493 (88-95) |
| *kunuaensis* | EAB [2] | 1 | 532 | 21 | 104 |
| *solomonis* | EAB [2] | 1 | 339 | 22 | 85 |
| *kunuaensis* | Kieta | 11 | 387.3±2.413 (372-402) | 26.6±0.453 (24-29) | 98.0±0.660 (95-101) |
| *solomonis* | Kieta | 3 | 364.0±15.044 (334-381) | 27.7±1.453 (25-30) | 92.3±1.202 (90-94) |
| *kunuaensis* | Mutuhai | 2 | 487.5±4.500 (483-492) | 25.0±1.000 (24-26) | 96.6±3.000 (104-110) |
| *solomonis* | Mutuhai | 1 | 376 | 30 | 90 |

[1] mean ± SE (range), TSR = transverse scale rows, DC = dorsocaudals, AMPSR = anterior, midbody and posterior scale row sum, EAB = Empress Augusta Bay

1101), with a tail length of 13 mm, has the right organ incompletely (?) everted to a length of 18 mm and a diameter of 0.2 mm throughout. The partially everted organ of AMS 121699 shows the terminus of the hemipenis to be slightly bulbous and containing a shallow teardrop-shaped expansion of the sulcus.

*Sympatric populations.—Acutotyphlops kunuaensis* is sympatric with *A. solomonis* at seven localities throughout the island: Kunua, Torokina, Empress Augusta Bay, Kieta, Buin, Melelup, and Mutuhai (Fig. 5). At each of these localities the two species are distinctly different in head shape, body form, and scutellation (Tables 8-9). Since sexual dimorphism is present in scale counts and tail proportions, each sex is discussed separately. At Kunua, the two species have similar TSR counts, but there are fewer DC and more AMPSR in *A. kunuaensis* than in *A. solomonis*. At Torokina, Mutuhai and Melelup, *A. kunuaensis* has a significantly higher number of TSR and AMPSR in conjunction with fewer DC than *A. solomonis*. At Kieta *A. kunuaensis* has higher TSR and AMPSR counts but lower DC counts than *A. solomonis*. In fact, *A. solomonis* is more homogeneous with respect to TSR count throughout its range than *A. kunuaensis*, and in all localities except Kieta, it has fewer TSR than *A. kunuaensis*. However, the DC number is

higher in *A. solomonis* than in *A. kunuaensis* at all sympatric localities. All three Bougainville species of *Acutotyphlops* are sympatric at Buin; unfortunately, the *A. infralabialis* sample is composed entirely of males. Nevertheless, the three species (*A. infralabialis*, *A. solomonis*, and *A. kunuaensis*, respectively) are easily distinguishable on head shape, head scutellation, coloration, and longitudinal scale rows (MSR = 28, 32, 30; AMPSR = 90, 92-94, 95), while *A. solomonis* (x = 364.8) exhibits significantly fewer middorsals than either *A. kunuaensis* (525) or *A. infralabialis* (x = 508). Because the three species retain their integrity throughout their ranges and in areas of sympatry, without any evidence of hybridization, they are justifiably recognized as valid species.

*Anomalies of scutellation.*—In *Acutotyphlops subocularis*, Hediger (1934) and McDowell (1974) reported a specimen lacking supranasals (NMBA 11704). Although they are absent bilaterally, all of the other characters of this female are within the range of variation of *A. subocularis*. In number of anterior scale rows (40), subcaudals (14), and suboculars (2 + 2), plus the presence of a single shield between nasal and ocular, it differs from *A. solomonis* so there can be no doubt about its identity. NMBA 11709 has the supraocular fused to the ocular on the left side and NMBA 11707 has the postocular fused to the superior posterior subocular on the right side. AMS 41254 has five supralabials on the right side (resulting from division of SL3); PNGM 24601 exhibits five supralabials on both sides of the head (from division of SL4); and PNGM 24603 has the frontal divided into two shields plus five supralabials on each side of the head (from division of SL3).

In *Acutotyphlops solomonis*, NMV 10108 has five supralabials on both sides, with the second to fourth occupying positions of typical second and third; MCZ 65992, 65998, and 72138-39 have five supralabials on both sides; and MCZ 72138 has both the nasal and prefrontal semidivided on the left side.

In *Acutotyphlops infralabialis*, MCZ 72129 has the prefrontal, preocular and anterior ocular partially fused into a single shield; NMBA 10155 has the third and fourth supralabials fused on the right side and the supraocular fused to the prefrontal on the left; and AMS 71360 exhibits one supranasal on the right side.

In *Acutotyphlops kunuaensis*, five supralabials are present in two individuals (USNM 120936 and both sides of MCZ 65990), a T-V SIP in five specimens (both sides of MCZ 72067, 77295; right side only in MCZ 76957, 77003, 77298), and a T-VI SIP on both sides of MCZ 77036; two prefrontals are present in MCZ 72133, 76719, two frontals are present in MCZ 76994, a suprarostral in three specimens (MCZ 76694, 76714, 76994), and paired supraoculars in three specimens (both sides of MCZ 76994, 77006; right side only in MCZ 76697). Fusion of the preocular and anterior ocular occurs in six individuals (both sides of MCZ 76693, 76708, 76710, 77038; left side only of MCZ 76969; right side only in MCZ 76683), fusion of the preocular and anterior subocular occurs on the left side of MCZ 76683, and fusion of the preocular and postnasal occurs on the right side in MCZ 76686. The prefrontal is semidivided in three specimens (left side only in MCZ 72133, 76697; right side only in MCZ 76719) and the preocular and anterior ocular are each semidivided on both sides in MCZ 64236. The preocular is divided on the right side only in MCZ 76961 while the preocular and anterior ocular are semifused in two specimens (left side only in MCZ 77267 and 121909). Due to an apparent injury, MCZ 175085 exhibits a concavity and lacks a nostril on the right side in addition to possessing extra scales in that region. Based upon a sample of 510 (counting condition on each side of the head separately), the above cephalic scutellation anomalies occur in frequencies of 0.2-1.6% and may therefore be considered of rare occurrence. However, the increased aberrations may be related to the conditions that led to the original fragmentation of head shields within the group.

## Summary

A new genus, *Acutotyphlops*, is proposed to contain four species of highly derived blind snakes from McDowell's (1974) *Ramphotyphlops subocularis* species group (with the exclusion of *R. willeyi* and its transfer to the *Ramphotyphlops flaviventer* species group). In addition to *Acutotyphlops subocularis* (with its synonym *T. keasti*), two species are revived from synonymy (*Acutotyphlops solomonis* and *Acutotyphlops infralabialis*, the latter with its synonyms *T. bergi* and *T. adamsi*) and a new endemic species is described from Bougainville (*Acutotyphlops kunuaensis*). Unique characters for the group include a parietal spike between the frontal bones, multiple ocular, preocular and/or subocular shields, a V-shaped lower jaw, five or more infralabials, and a frontorostral shield with paired prefrontals. *Acutotyphlops* is also known for its wedge-shaped or pointed head, a high number of longitudinal scale rows, a multicameral right lung, a straight unsegmented liver, lack of a rectal ceacum, *Ramphotyphlops*-like hemipenis with 3-9 coils in retracted organ, and prominent sexual dimorphism in tail proportions and caudal counts. Five species of typhlopids are now known from Bougainville Island: *Acutotyphlops infralabialis*, *A. kunuaensis*, *A. solomonis*, *Ramphotyphlops braminus*, and *R. flaviventer* (= *R. depressus*).



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## Material Examined

*Acutotyphlops kunuaensis* (excluding type material listed above).—BOUGAINVILLE IS.: No specific locality: USNM 120211; Buin (6°50'S, 155°44'E, ca. 60 m), MCZ 65990; Cape Torokina (6°15'S, 155°02'E, NSL), USNM 120949; Empress Augusta Bay (6°25'S, 155°05'E, NSL), FMNH 44800-01; Kieta (6°13'S, 155°38'E, NSL), AMNH 87360-62; MCZ 64226-36, 72104-05; NMV 10109; Melelup (5°37'S, 154°55'E, ca. 915 m), MCZ 175089; Mutuhai (5°38'S, 154°57'E, ca. 820 m), MCZ 87605, 174754-55, 174759; North Nasioi (ca. 6°10'S, 155°30'E), MCZ 6601014; Topanos (5°38'S, 155°00'E, 150 m), MCZ 87606-07, 88049, 175082-88; Torokina Bay (6°14'S, 155°03'E, NSL), USNM 120931, 120933-34, 120935-48; Torokina: Piva (6°14'S, 155°03'E, NSL), AMS 121582-84, 121698-700, 121769, 121909, 121956-57, 123393-99, 123402-03. Skull: MCZ 76699.

*Acutotyphlops infralabialis*.—BOUGAINVILLE: Malabita (6°46'S, 155°43'E, ca. 150 m), MCZ 65991, Buin, MCZ 72129, Turiboiru (6°44'S, 155°41'E, ca. 50 m), MCZ 92504; GUADALCANAL: BYU 7040; Visale (9°15'S, 159°42'E), AMS 71360, Mt. Austen (9°29'S, 159°59'E, 245 m), AMS 77116; Makaruka (9°30'S, 160°04'E, 60 m), MCZ 110249; Nalimbu River, 1 mi. inland (ca. 9°24'S, 160°09'E, 15 m), MVZ 40753 (holotype of *T. adamsi*); MALAITA: AMS 4609 (holotype of *T. infralabialis*), vic. of Mbita'ama (8°24'S, 160°36'E), AMS 87396; Buma (8°56'S, 160°47'E), NMBA

10155; NEW GEORGIA: Segi Point, Horseshoe Reservation (8°34'S, 157°55'E), UMMZ 95445 (holotype of *T. bergi*). Skull: MCZ 64226.

*Acutotyphlops solomonis*. — BOUGAIN-VILLE: IRSNB 2029 (holotype of *T. solomonis*); Buin, AMS 11451-52, MCZ 65999, 72084; Empress Augusta Bay, FMNH 44802; Kieta, MCZ 64225, 65992-98, NMV 10108; Kunua, MCZ 72083, 72085-86, 72138-39, 72938, 73766, 76688, 175099; Melelup, MCZ 175090; Mutuhai, MCZ 174756-58, 174760; Torokina, USNM 120932, 120934. PAPUA NEW GUINEA: Alotau (10°18'S, 150°25'E, NSL), MCZ 145955. Skulls: MCZ 65597, 65993, 72084.

*Acutotyphlops subocularis*.—PAPUA NEW GUINEA: Bismarck Archipelago: ZMB 38612, 50458; NEW IRELAND: Fissoa (2°55'S, 151°27'E, NSL), NMBA 11709-10; Lemkamin (3°20'S, 151°55'E), ZMUC 5269; Medina (2° 54'S, 151° 22'E, <100 m), UPNG 5652; Radina (? = Medina), AMS 41253-54; Yalom (4°25'S, 151°45'E, 1000 m), ZMUC 5265-68; DUKE OF YORK IS. (4°10'S, 152°28'E, <50 m), AMS 2202 (holotype of *T. subocularis*); NEW BRITAIN: Iambon, S slope Whiteman Range (ca. 5°50'S, 150°00'E, 1065 m), AMNH 82317; Jacquinot Bay (5°34'S, 151°30'E), AMS 12856 (holotype of *T. keasti*), NMBA 11704; Keravat (4° 21'S, 152° 02'E, ca. 25 m), UPNG 1101; Kokopo (4°21'S, 152°16'E, NSL), ZMH 3968; Mosa, West Nakanai (5° 38'S, 150° 17'E, ca. 50 m), PNGM 24600-03; Talasea (5°17'S, 150°02'E, NSL), MCZ 175091; Wunung, Jacquinot Bay (5°37'S, 151°27'E, NSL), NMBA 11705-08; UMBOI IS.: Awelkon (5°38'S, 147°50'E, 600 m), BPBM 5457; "New Guinea," ZMB 24341. Skull: NMBA 11704. Unexamined literature record: Toma, NEW IRELAND (4°23'S, 152°10'E, 400 m).

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