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A New Lizard of the Genus *Tribolonotus* (Scincidae) from New Britain

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The lizards of the genus *Tribolonotus* are bizarre, spiny skinks hitherto known from two nominal species in New Guinea and three well-distinguished species in the Solomon Islands. The capture of a *Tribolonotus* in New Britain shows that the apparent absence of this genus from at least one of the islands lying between the Solomons and New Guinea was merely a consequence of inadequate collecting. I am grateful to Dr. J. Linsley Gressitt and Miss Setsuko Nakata, of the Bernice P. Bishop Museum, for allowing me to borrow and describe the unique specimen of *Tribolonotus* from New Britain. I thank Mrs. Frances W. Zweifel for drawing figures 1 and 2, and Miss Grace Tilger for assistance in gathering and tabulating data. Without the generosity of Mr. Fred Parker, who donated large numbers of *Tribolonotus* from the Solomon Islands, this study could not have been undertaken. The Papuan specimens came from several sources: the Archbold expeditions, through Dr. Leonard Brass and Mr. Hobart M. Van Deusen; the Reverend O. Shelly; and the late Dr. E. Thomas Gilliard. Dr. Ernest E. Williams kindly read and criticized the manuscript.

Scale counts were standardized in the following ways: In those species with two rows of enlarged middorsal scales, the count begins on the nape where the rows are in juxtaposition on the midline and terminates at the level of the rear margin of the hind limb. For the species with only a

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single row of enlarged middorsals, the count begins with the first obviously enlarged scale on the nape. The count of ventral plus gular scales is initiated with the first scale behind the enlarged, paired chin shields that lie behind the postmental and terminates at (but does not include) the enlarged, paired preanal scales.

Tribolonotus annectens, new species

HOLOTYPE: Bernice P. Bishop Museum No. 1001, collected by J. Sedlacek on Mt. Sinewit, New Britain, at an elevation between 1000 and 1200 meters, on November 15, 1962. Mt. Sinewit, elevation 8000 feet (2400 meters), is on the Gazelle Peninsula 25 miles (40 kilometers) south and 14 miles (22 kilometers) west of Rabaul.

DIAGNOSIS: This new species is most closely related to the three species found in the Solomon Islands. *Tribolonotus blanchardi* is readily distinguished from *T. annectens* in having only one row of enlarged vertebral scales, whereas *annectens* has two. *Tribolonotus schmidti* resembles *annectens* in having two rows of enlarged dorsals, but in *schmidti* the rows commence on the nape directly posterior to the enlarged shields of the head, whereas in *annectens* the two juxtaposed rows of enlarged dorsal scales originate well back on the nape, just anterior to the insertions of the forelegs. *Tribolonotus ponceleti* and *T. annectens* are similar in the number and disposition of the enlarged vertebral scale rows but differ in other characters of scutellation. Ventral scales number 40 in *T. annectens;* 44 to 54 (mean 48.6) in 45 specimens of *T. ponceleti.* In both species there is a prominent row of enlarged scales paralleling the much larger vertebrals, but where at midbody in *ponceleti* there is one of these smaller scales for each vertebral, *annectens* has only one for every two vertebrals. There are two primary temporal scales in *ponceleti* and three in *annectens.* A sublabial scale in *annectens* lies between the first infralabial and the gulars and is wholly separated from the margin of the lip. The corresponding scale in *ponceleti* borders partly on the lip and is, therefore, the second infralabial.

DESCRIPTION: The type specimen is an adult female (containing one large egg evidently nearly fully developed) 49 mm. in length from snout to vent, with a complete tail 53 mm. long. The head is 8.5 mm. wide and 13.2 mm. long (to the posterior edge of the jaw).

The dorsal and lateral head scales are rugose, each with one or more heavy longitudinal ridges, and the margins of the scales are in many instances difficult to discern. The nostrils are in single nasals which are in contact with the rostral, loreal, frontonasal, and first supralabial. There are no supranasals. The large frontonasal is in contact with the elongate frontal; there are no prefrontals. There are four enlarged supraoculars.

The frontal is followed by a pair of small frontoparietals, and these in turn are followed by a large parietal shield that covers much of the back of the head. Burt and Burt (1932), in describing the scutellation of *T. blanchardi* and *T. schmidti,* referred to this shield as the interparietal, but in *annectens* as well as in many specimens of the three species of the Solomon Islands there is a median suture that is most distinct at the posterior margin of the shield and becomes obscured shortly posterior to the pineal opening. Thus, the shield may represent the fusion of parietals and interparietal rather than being a large interparietal. The enlarged parietal is flanked by smaller parietal scales, two on each side. Three irregular rows of heavily keeled occipital scales lie behind the parietals.

The scales of the side of the head are illustrated in figure 1A. The first supralabial is a long, splintlike scale that extends to beneath the center of the orbit. The second supralabial is a large scale that lies above the first and has only a small part of its posterior lower margin in the border of the lip. There are three additional supralabials. If the scales immediately lateral to the enlarged parietal are considered as parietals, then there are three primary temporals: an upper one about twice as long as wide, a large middle one, and a smaller lower one. A row of five smaller secondary temporals follows the primary scales, with the lower secondaries being interposed between the primaries and the small scales surrounding the tympanum.

The first infralabial resembles the first supralabial in being long and slender and extends posteriorly to about the same point on the lip. The second through fifth infralabials are small, the fifth being somewhat smaller than the other three. The second lies largely beneath the first and barely enters the margin of the lip. There is a large postmental, and a pair of large chin shields are in contact behind the postmental. An elongate sublabial lies beneath the first supralabial, lateral to the postmental and first chin shield. The enlarged chin shields are followed by a smaller pair separated medially by five scales, and this pair is followed by a slightly smaller pair. The keeled scales of the throat are largest medially and grade gradually into smaller scales laterally.

The ventral scales are in eight rows at midbody, reducing to four posteriorly where they touch the two enlarged preanals. All scales except those in a small median patch that corresponds to the glandular area of male *Tribolonotus* (Parker, 1940) are heavily keeled and bear a small posterior projection. There are 40 longitudinal rows of scales, including those on the throat.

On the nape there are four ill-defined rows of enlarged, spiny scales projecting nearly vertically from a background of granular scales. Two

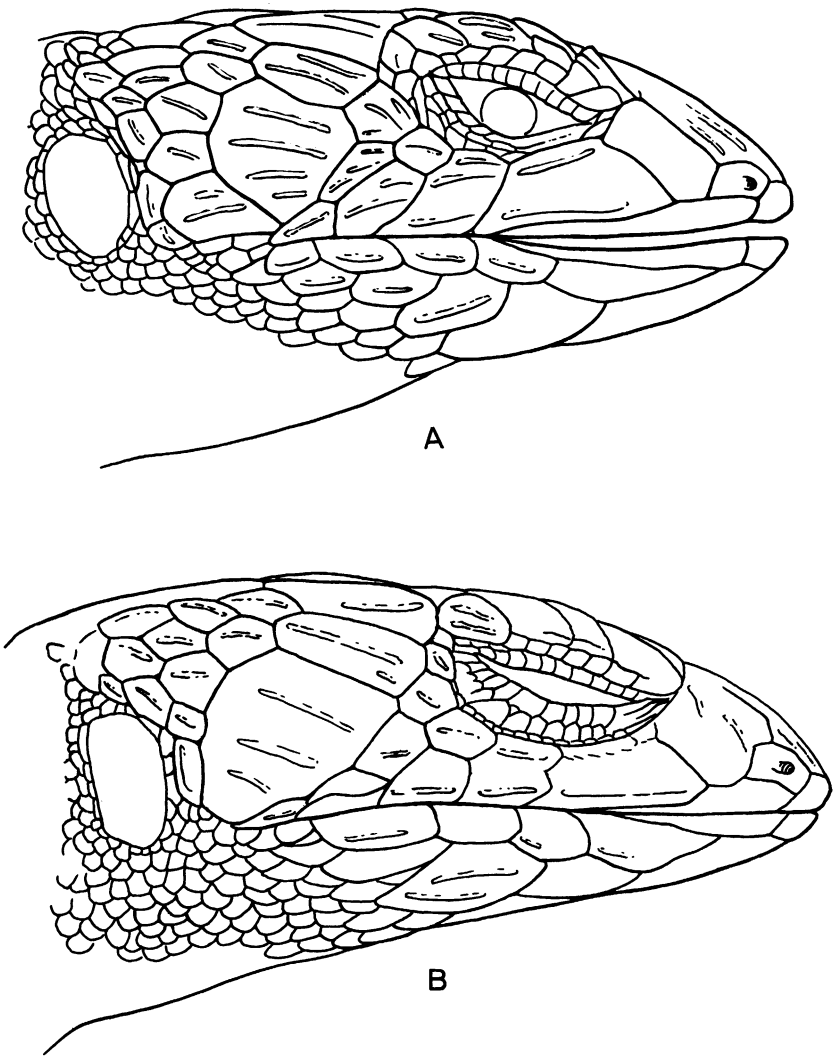

FIG. 1. A. Type specimen of *Tribonolotus annectens,* Bishop Museum No. 1001; right side of head. B. *Tribolonotus ponceleti,* A.M.N.H. No. 92039; right side of head.

juxtaposed rows of large, flattened, and heavily keeled scales begin on the nape just anterior to a point between the insertions of the forelimbs and continue to the posterior end of the body where they pass without interruption and with minor modification onto the tail (fig. 2A). There are

21 pairs of scales between the nape and the posterior edge of the hind limbs. Except for the paired vertebral rows, the scutellation of the dorsal surface of the body consists of a granular background interrupted by enlarged, vertically projecting scales similar to those on the nape. The most prominent of these enlarged scales are in a row paralleling the vertebral row on each side (fig. 2A). In the middorsal region there is one scale for every two in the vertebral series, but the smaller scales are more numerous in the region of the shoulder. There is no definite pattern in the occurrence of enlarged scales elsewhere on the dorsum. The tail is covered with

TABLE 1
SCUTELLATION AND MAXIMUM SIZE IN FOUR SPECIES OF *Tribolonotus*

	annectens 1	*ponceleti* 45	*schmidti* 35	*blanchardi* 5
Dorsal scale rows, occiput to rump				
Mean $\pm \sigma_m$	21	23.1±0.1	31.7±0.2	23.8±0.4
Range	—	22–25	29–35	23–25
Gular and ventral scale rows				
Mean $\pm \sigma_m$	40	48.6±0.3	38.3±0.3	40.0±0.5
Range	—	44–54	35–43	39–41
Subdigital lamellae, fourth toe				
Mean $\pm \sigma_m$	21	24.7±0.3	17.6±0.2	22.2±0.6
Range	—	21–28	16–20	21–24
Maximum snout-vent length, in mm.	49	59	41	38

whorls of enlarged keeled scales. The scales are in 10 rows at the most posterior point reached by the adpressed hind limb.

There are 21 subdigital lamellae on the fourth toe; most are smooth, but those near the base of the toe are somewhat knobby. The palms and soles are covered with knobby, granular scales. The anterior and posterior surfaces of the forelegs have large, keeled scales, but there are granular scales on the lower surfaces. The anterior surfaces of the hind limbs have similar large, keeled scales, but the posterior and ventral surfaces have a mixture of granular and keeled scales.

The color of the dorsal surfaces is dark brown, that of the venter much paler but still with a brown tint. There are two parallel, diagonal, light lines on the side of the neck. The upper and lower lips are slightly darker than the rest of the head, but this darkness is broken by two light lines that pass nearly vertically from the orbit over the lips. Additional obscure light marks are present in the loreal region.

Because this lizard is a female, it lacks the plantar pores (similar to the femoral pores of lizards of other families) that led Roux (1930) to

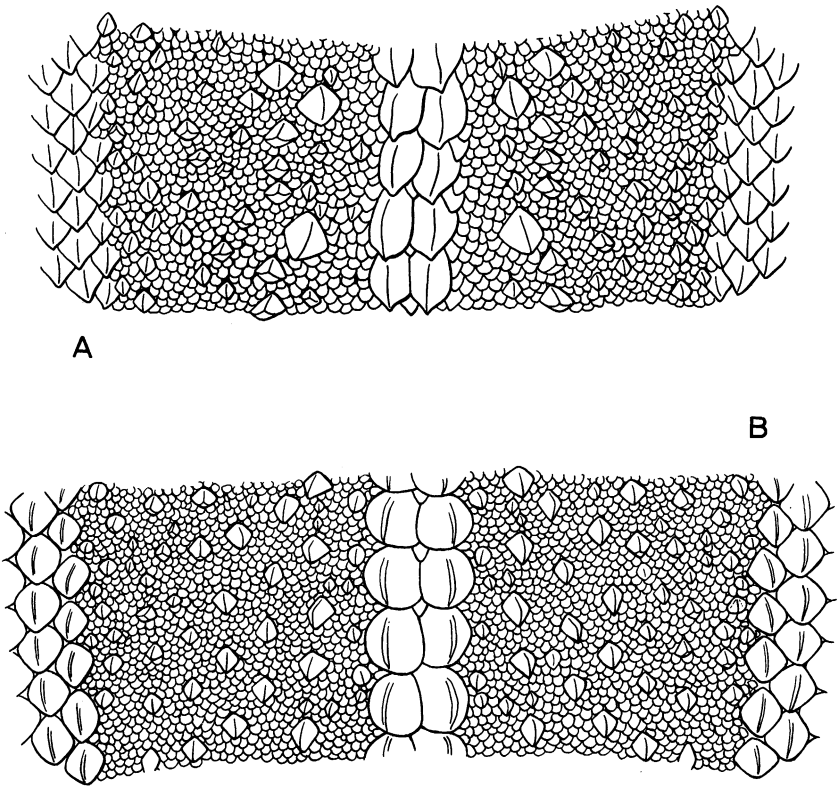

FIG. 2. A. Type specimen of *Tribolonotus annectens,* Bishop Museum No. 1001; dorsal scutellation at midbody, including peripheral ventral scale rows. B. *Tribolonotus ponceleti,* A.M.N.H. No. 92039; dorsal scutellation at midbody, including peripheral ventral scale rows.

propose the new genus *Pediporus* for *Tribolonotus schmidti.* Upon discovering that such pores were present also in males of *T. novaeguineae,* Roux (1934) synonymized his genus with *Tribolonotus.*

COMPARISONS: *Tribolonotus annectens* resembles *T. blanchardi* in the longitudinal number of enlarged dorsal scales, number of gular and ventral rows, and number of lamellae under the fourth toe (table 1). The presence of only a single row of enlarged dorsals (fig. 3A) sets *blanchardi* apart from *annectens* and from all other species of *Tribolonotus.* Probably *blanchardi* is a smaller lizard than *annectens,* for the largest of five specimens measures only 38 mm. from snout to vent, whereas the only specimen of *annectens* is 49 mm. in length.

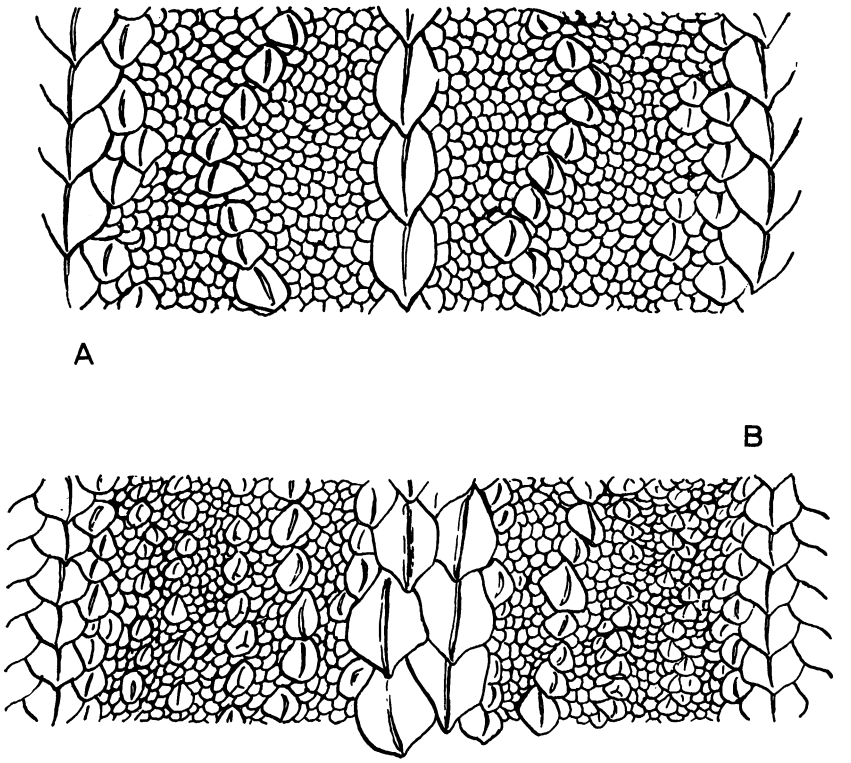

FIG. 3. A. Type specimen of *Tribolonotus blanchardi,* A.M.N.H. No. 43922; dorsal scutellation at midbody, including peripheral ventral scale rows (copied from Burt and Burt, 1932, fig. 23). B. Type specimen of *Tribolonotus schmidti,* A.M.N.H. No. 41860; dorsal scutellation at midbody, including peripheral ventral scale rows (copied from Burt and Burt, 1932, fig. 24).

Tribolonotus schmidti resembles *T. annectens* in having two rows of enlarged vertebrals (fig. 3B) and in the number of ventral and gular scale rows, but differs significantly in other respects. The most obvious difference is that the rows of enlarged vertebrals in *schmidti* commence well forward on the nape, even touching the enlarged parietal scale, whereas in *annectens* the nape is largely covered by granular or spinose scales, and the vertebral rows begin only shortly anterior to the forelimbs. Lateral to the enlarged vertebral scales of *schmidti* is a wavy or scalloped row of spiny scales, quite different from the series of large, separated, spiny scales seen in this region of *annectens.* A difference in size between the two species also is evident. Among 35 specimens of *schmidti,* the six largest (all males)

measure approximately 41 mm. from snout to vent, whereas the only specimen of *annectens* is 8 mm. longer. The number of subdigital lamellae probably is fewer in *schmidti* (table 1).

Tribolonotus annectens is clearly most closely related to *T. ponceleti.* An important difference is in the nature of the row of large scales paralleling the enlarged vertebrals. In *ponceleti* there is one enlarged scale for each pair of vertebrals in the middorsal region, whereas these scales are only half as numerous in *annectens* (fig. 2A, B). Other differences in scutellation also are present. Both enlarged vertebrals and ventral and gular scales are less numerous in *annectens* than in *ponceleti,* and the number of subdigital lamellae on the fourth toe falls at the lower limit observed in *ponceleti* (table 1). In *ponceleti* there are two primary temporal scales (fig. 1B), but in *annectens* a third temporal is present (fig. 1A). This character is invariable in my series of 45 *ponceleti,* but two of five *blanchardi* have the large primary temporal divided by a horizontal suture, rather than a diagonal one as in *annectens.* The first infralabial of *annectens* is elongate and completely excludes the sublabial below it from the margin of the lip (fig. 1A). The first infralabial of *ponceleti* is also long and thin, but it is relatively shorter than that of *annectens.* As a result, the posterior dorsal edge of the scale of *ponceleti* homologous with the sublabial of *annectens* lies on the free margin of the lip (fig. 1B), and the scale is to be regarded as the second infralabial rather than as a sublabial. Therefore, the second infralabial of *annectens* is homologous with the third of *ponceleti,* and so on. In only one of 45 specimens of *ponceleti* is this second infralabial excluded from the lip, and in that instance just barely (both sides of the specimen are symmetrical in this respect). Another specimen has the second and third infralabials fused on both sides of the head.

The *Tribolonotus* species of New Guinea, *T. novaeguineae* and *T. gracilis,* are distinct from the other species in a number of ways, including larger size (greater than 90 mm. from snout to vent) and the number and nature of the enlarged dorsal scales. In the Papuan forms there are four rows of enlarged scales, each scale rising in a prominent, hooked fashion in contrast to the somewhat flattened, keeled morphology of the homologous scales in the other four species.

REMARKS: Although *Tribolonotus annectens* comes from an island between the Solomon Islands and New Guinea, it is not morphologically intermediate between the species of those two areas. Rather, it appears to be closest to *T. ponceleti.* It would be of considerble interest to know if *Tribolonotus* occurs on New Ireland to the north and west of New Britain, or on Umboi (Rooke) Island between New Britain and New Guinea.

The specific name of the new form refers to its geographic position,

forming a link between the other species in New Guinea and the Solomon Islands.

STATUS OF THE PAPUAN SPECIES: Some authors have specifically or by implication questioned the validity of *Tribolonotus gracilis* de Rooy, 1909. Vogt (1911, pp. 415–416) believed that *gracilis* was based on a variant individual of *Tribolonotus novaeguineae* (Schlegel), 1834. Burt and Burt (1932, p. 551) wrote, "The status of *T. gracilis* De Rooij is not clear to us," and Loveridge (1948, p. 338) thought that the two forms were close enough to be regarded as subspecies except that there were records in the literature of sympatry.

De Rooy (1909) described *Tribolonotus gracilis* from one specimen, though in her later work (1915, p. 282) she referred additional specimens from different localities to the species. The chief differences between the supposed species (1915, p. 280) are these: the spines of the tail point upward in *gracilis* and to the rear in *novaeguineae,* the first pair of chin shields is as long as the postmental in *novaeguineae* but much longer in *gracilis;* a red half-ring under the orbit is present in *gracilis* but is lacking in *novaeguineae.* The first of these characters is difficult to evaluate objectively. For example, Loveridge (1948, p. 338) remarked of a specimen he referred to *novaeguineae,* "caudal spines more or less directed upwards." Similarly, Burt and Burt (1932, p. 551) stated, "The caudal spines in the single specimen at hand are pointing neither directly upward nor directly backward, but at an angle between the two." A color character such as the red half-ring under the orbit may be a valid specific character but is of little or no use in preserved specimens.

The only supposed difference amenable to objective treatment in preserved specimens is the relative size of the chin and postmental shields. I measured the length of the postmental and anterior gular scales in 33 specimens of *Tribolonotus* from localities ranging from Lae in the Territory of New Guinea to the Idenburg River in West New Guinea. The ratio of the length of the postmental scale to the length of the longest anterior gular scale ranges from 62 per cent to 97 per cent, mean 77 per cent. Twenty-eight of the 33 values fall in the range from 69 per cent to 85 per cent. Only two specimens with ratios of 90 and 97 per cent approximate the condition stated for *novaeguineae.* There is no indication of bimodality such as might be expected if two distinct species, even with overlapping ranges of variation, were present in similar numbers in the sample. Thus, if *gracilis* is a valid species characterized by relatively longer gular scales, *novaeguineae* is represented in my sample by only one or two specimens that are not obviously different in other ways. I doubt that *gracilis* deserves recognition, but, as I have not examined the type

specimens and have seen relatively few others, I do not wish to propose synonymizing *gracilis* with *novaeguineae.*

ILLUSTRATIONS: Brongersma (1958, fig. 13) provided a photograph of *Tribolonotus novaeguineae.* A drawing of *T. gracilis* appeared in de Rooy (1915, fig. 98), and there are drawings of the chin shields of both "species" in de Rooy (1909). Roux (1930, pl. 3) offered excellent illustrations of *T. schmidti,* including a dorsal view of the whole animal and enlargements of various aspects of scutellation. Drawings of the dorsal scutellation of *T. blanchardi* and *T. schmidti* presented by Burt and Burt (1932, figs. 23 and 24) are reproduced here as figure 3. These authors also illustrated the ventral scutellation of *blanchardi* (fig. 25), the anal region of *blanchardi* (fig. 26), and the head of *schmidti* (fig. 27; fig. 27a shows a transverse suture dividing the frontal, but there is no such suture in the specimen). Photographs of the dorsal and ventral surfaces of the whole animal and enlarged views of the side and top of the head of *T. ponceleti* appear in Kinghorn's original description (1937, pl. 1).

KEY TO THE SPECIES OF *Tribolonotus*

1. Enlarged dorsal scales in four rows, projecting spines present on posterior dorsal margin of head (New Guinea) ..... *gracilis* and *novaeguineae*
   Enlarged dorsal scales in one vertebral row or in two rows juxtaposed along the midline; posterior margin of head without projecting spines (Solomon Islands and New Britain) 2
2. Enlarged dorsal scales in a single row (fig. 3A) ..... *blanchardi*
   Enlarged dorsal scales in two rows (figs. 2A, 2B, 3B,) 3
3. Juxtaposed rows of enlarged dorsal scales commence on nape immediately posterior to the enlarged scales of head ..... *schmidti*
   Juxtaposed rows of enlarged dorsal scales commence on posterior part of nape, most of neck being covered with granular or spiny scales 4
4. Spiny, enlarged scales in rows closest to enlarged vertebral rows numerous, approximately one scale for each enlarged middorsal scale (fig. 2B); two primary temporal scales (fig. 1B) ..... *ponceleti*
   Spiny, enlarged scales in rows closest to enlarged vertebral rows less numerous, approximately one scale for every two enlarged middorsal scales (fig. 2A); three primary temporal scales (fig. 1A) ..... *annectens*

SPECIMENS EXAMINED

All catalogue numbers except the number of the type specimen of *Tribolonotus annectens* are for specimens in the collection of the American Museum of Natural History. The three species of the Solomon Islands are known to occur only on the islands cited.

Tribolonotus annectens: New Britain: Mt. Sinewit, between 1000 and 1200 meters (Bishop Museum No. 1001, type specimen).

Tribolonotus blanchardi: Solomon Islands: Guadalcanal Island (No. 41855); Florida Island (No. 41856); Choiseul Island (No. 43922, type specimen); Bougainville Island, Kunua (Nos. 92024, 92025).

Tribolonotus novaeguineae and *T. gracilis:* West Irian (West New Guinea): Bernhard Camp, Idenburg River, 75 meters (Nos. 62359–62361); Sukarna Pura (Hollandia) (Nos. 61817–61820, 61822–61839). Territory of New Guinea: Wewak (Nos. 74968, 74969); Adelbert Mountains, Maratambu, 2300 feet (Nos. 82361–82365); Lae (No. 92318 + 1 untagged); 1.5 miles west of Lae (No. 92319); Umi River, upper Markham River Valley (Nos. 92666, 92667).

Tribolonotus ponceleti: Solomon Islands: Bougainville Island (No. 42007, paratype of *T. schmidti*), Boku (No. 89433), Kunua (Nos. 92026–92058 + 10 untagged); Buka Island (No. 89434).

Tribolonotus schmidti: Solomon Islands: Beagle Island (No. 41860, type specimen); Guadalcanal Island (Nos. 40328, 65491–65495 + 20 untagged, 66219–66221, 66240–66245).

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