

**A NEW SPECIES OF THE SNAKE GENUS *AMPHIESMA*
(SERPENTES: COLUBRIDAE: NATRICINAE)
FROM WESTERN SUMATRA, INDONESIA**

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ABSTRACT. – A new species of the natricine genus *Amphiesma* is described from the slopes of Gunung Kerinci, western Sumatra, Indonesia. *Amphiesma kerinciense* is distinguished from other species of the Sunda Region, namely West Malaysia, Sumatra and Borneo, by a combination of morphological characters. Its relationships, especially with *Amphiesma sanguineum*, are discussed, and a key to the *Amphiesma* species of the Sunda Region is provided.

KEY WORDS. – Indonesia, Sumatra, Serpentes, *Amphiesma*, *Amphiesma kerinciense* new species.

INTRODUCTION

The snake fauna of Sumatra, one of the largest islands in Indonesia (total land area 473,606 sq km), is currently composed of 128 nominal species (David & Vogel [1996], modified by unpublished data). With its high proportion (20.3%) of endemic species, the herpetofauna of this island ranks as one of the richest in Asia. While examining the herpetological collection of the Raffles Museum of Biodiversity Research (formerly the Zoological Reference Collection of the National University of Singapore), one of us (ID) encountered a colubrid snake specimen collected in Sumatra that could not fit published keys and descriptions to the snakes of the Sunda Region, namely southern Thailand, West Malaysia and the islands of the western Sundas, comprising Sumatra and Borneo (De Rooij, 1917; Smith, 1943; Taylor, 1965; Tweedie, 1983; Cox, 1991; David & Vogel, 1996; Manthey & Grossmann, 1997).

Although this specimen shows the typical characters of the genus *Amphiesma* Duméril, Bibron & Duméril, 1854, including features of dentition, general meristic characteristics and pattern, we regard it as representing an undescribed species on the basis of a combination of several characters in scalation and pattern different from those of other known species. This specimen serves as the holotype of a new species, which we describe below. We discuss its

possible relationships with congeners from Thailand, Sumatra, West Malaysia and the island of Borneo, and provide an artificial key to the species of the genus *Amphiesma* known from the Sunda Region.

MATERIALS AND METHODS

The description is based on external morphological characters regarded as taxonomically significant in the genus *Amphiesma* as defined by Malnate (1960) and Malnate & Underwood (1988). The uniqueness of the specimen precluded any investigation of the skull. Its maxillary teeth were counted by removing the exterior gum surfaces of the jaw *in situ*. Dentitional features of preserved specimens of congeners were either examined in the same way or on specimens for which the maxilla was already prepared (tooth sockets were included in the counts in cases of tooth loss.) Specimens examined for comparison are listed in the Appendix.

Measurements, except body and tail lengths, were taken with a slide-caliper to the nearest 0.1 mm; all measures on body were measured to the nearest millimeter. The number of ventral scales is counted according to Dowling (1951). The numbers of dorsal scale rows are given at one head length behind head, at midbody (i.e. at the level of the ventral plate

corresponding to half number of the total ventral number), and at one head length before vent respectively. The terminal scute is not included in the number of subcaudals. Values for symmetric head characters are given in left/right order.

Abbreviations of measures and other meristic characters used in the text are:

Measures and ratios: HL: head length; SVL: snout-vent length; TaL:tail length; TL:total length; TaL/TL: ratio tail length/total length. Meristic characters: ATe: anterior temporals; DSR:formula of dorsal scale rows; MSR:number of dorsal scale rows at midbody; PoO: postoculars; PrO: preoculars; PTe: posterior temporals-PSR:number of dorsal scale rows before vent; IL:infralabials; SC: subcaudals; SL: supralabials; SpO: supraoculars; VEN: ventrals.

Museum abbreviations are as follows:

BMNH: The Natural History Museum, London, formerly the British Museum of Natural History, London, United Kingdom; MNHN: Muséum National d'Histoire Naturelle, Paris, France; RMNH: Nationaal Natuurhistorisch Museum, formerly the Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands; ZRC: Zoological Reference Collection of the Raffles Museum of Biodiversity Research, National University of Singapore, Singapore.

TAXONOMY

Amphiesma kerinciense new species

(Figs. 1-4)

Material examined. – Holotype – adult female (ZRC 2.3521), Sungai Jalnei Dalam, at base of Gunung Tugu (or Tujuh) [= Mt. Tugu or Tujuh] (01°42'59.0"S-101°21'43.1"E), Gunung Kerinci [= Mt. Kerinci], Sumatera Barat Province, Sumatra Island, Indonesia, coll. Darren Yeo & Heok Hui Tan, 12 Jun. 1996.

Diagnosis. – A species of the genus *Amphiesma*, characterized by: (1) a stout body; (2) a moderately large eye (see below); (3) 19 scale rows at midbody, strongly keeled on upper rows, many of which are distinctly notched posteriorly; scales of first dorsal row enlarged, feebly keeled; (4) a single preocular; (5) a broad, dark vertebral band, with irregularly placed dark scales producing faint and irregular, discontinuous crossbars; (6) a faint pale ochre brown dorsolateral stripe bordering the vertebral band on each side, widening to produce three or four irregular blotches on the neck; (7) two distinct postocular streaks (see the description below) and (8) ventral scales purple greyish-brown at their outer border, with a row of well defined dark brown blotches at 3/4 of their width.

This species differs from all other members of the genus by the combination of these characters. Especially diagnostic are the combination of the dorsal colour and pattern, the single preocular and the notching of the dorsal scales. These and other characters are detailed below in the discussion.

Description of the holotype. Habitus. –Body stout; head

rather short (4.8% of SVL), barely distinct from the neck, depressed in front of the eye; snout long, accounting for 26.0% of HL, or 1.6 times as long as horizontal diameter of the eye, blunt when viewed from above, rectangular when viewed from the side; nostril lateral; eye moderate, diameter 2.0 times greater than the distance between its inferior margin and edge of upper lip; pupil rounded; tail cylindrical and tapering.

Size. – SVL:358mm; TaL:158mm; TL:516mm; HL: 17.2mm; ratio TaL/TL:0.308.

Dentitional morphology. – Maxillary teeth: 18/19 + 2/2 distinctly enlarged teeth, without diastema.

Body sculation. – 140 VEN (+ 2 preventrals); 89 SC, all paired. Anal divided.

DSR: 19-19-17, distinctly keeled with a narrow, sharp keel, and notched at their posterior extremities, feebly keeled or nearly smooth on the first scale row; scales more keeled and notched in the posterior half of the body.

Head sculation. – Rostral trapezoidal, wider than high; nasals rectangular, distinctly longer than high, divided into two parts on their lower half, with a rounded, lateral nostril in its middle; internasals subtriangular, 1.2 times as long as wide and about 0.45 times wider anteriorly than posteriorly; prefrontals subrectangular, wider than long, reaching the loreal; frontal hexagonal, rather small, 1.4 times as long as wide, with apex directed posteriorly, 2.5 times longer than the suture between the prefrontals; parietals long and wide, in contact for a length 1.1 times as great as the frontal length; 1/1 small, rectangular loreal, elongate horizontally, contacting the nasal; 1/1 PrO; 3/3 PoO, the upper one much larger than the two lower ones; 1/1 undivided narrow SpO; 9/9 SL, 1st and 2nd SL in contact with the nasal, 2nd, 3th and 4th in contact with the loreal, 4th, 5th and 6th entering orbit, 7th and 8th the largest ones; temporals: at left and right: 1 ATe + 1 large upper and 1 smaller lower PTe; 11/11 IL, first pair in contact behind the mental, the four first ones are in contact with the anterior chin shields; posterior chin shields shorter than anterior ones, followed by one pair of gulars.

Coloration in alcohol. –Flanks, up to 4th row, dark reddish grey-brown, due to an intricate speckling of dark reddish-brown pigments on a pale greyish-ochre background, with lower rows 1-2 rather purple greyish-brown, slightly iridescent, with ventroposterior extremities of scales of the 1st row dark brown; widely scattered small blackish-brown spots on 2nd, 3rd and 4th rows; these dark brown spots produce faint and irregular, discontinuous crossbars, more visible on the posterior part of the body. A broad blackish-brown vertebral band on 5th-9th rows and the vertebral row, with indistinct irregular black crossbars. A dorsolateral stripe extending from the neck to the tail on top of 5th row and the whole of 6th row, well defined and greyish-pink on the neck and foremost part of the body (up to VEN 6), becoming discontinuous and broken into 4 or 5 irregular and diffuse blotches more or less connected, then changing into a diffuse, ill defined pale ochre-brown stripe.

The tail is blackish-brown above, greyish-ochre on the upper part of the side in the extension of the dorsolateral band of the body, with a blackish-brown band on its lower side and extremities of subcaudals, divided into two equal parts by a narrow greyish-purple line in the extension of the colour present on rows 1 and 2 of the body.

Head dorsal surface dark reddish grey-brown with ochre vermiculations, turning into blackish-brown on its posterior part; a fine speckling with purple greyish-brown on temporals; two small faint yellowish-white spots on the parietals and a very faint whitish-brown sagittal line just behind the parietals.

Anterior supralabials ochre brown, with brown speckling and edged with dark brown on their posterior part. Posterior supralabials light ivory cream; posterior part of 6th SL blackish-brown; 7th SL with a curved dark brown marking in the posterior part of its centre and with its posterior upper corner dark brown; 8th SL divided into a lower anterior part ivory cream and an upper posterior part dark reddish grey-brown, these two parts being separated by an oblique blackish-brown streak connecting the upper tip of the 7th

SL to the lip edge at the junction of 8th and 9th SL; 9th SL dark reddish grey-brown, with its lower part blackish-brown and its upper part ochre brown, narrowly bordered with blackish-brown above. An ill defined and narrow postocular streak, pale ochre brown narrowly edged below with blackish-brown, extending from the upper preocular to 9th SL through the anterior temporal and the upper tip of 8th SL. Behind the 9th SL, the postocular streak, which is irregular, is bent upwards and is more or less distinctly connected with the thin greyish-pink dorsolateral stripe of the neck.

Venter uniformly ivory cream, with about 1/4th of the outer part of each scale purple greyish-brown as dorsal rows 1-2, becoming blackish-brown on the scale outer tip; a subrectangular, irregular blackish-brown spot between the purple greyish-brown and ivory parts; these spots become progressively larger backwards and are connected to the purple greyish-brown colour of the flank from about the 20th VEN onwards; before this point, the blackish-brown ventral spots are separated from the purple greyish-brown colour of the lower flank by a narrow ivory cream line, producing a thin and conspicuous but discontinuous series of dark brown



Fig. 1. *Amphiesma kerinciense*. Holotype (ZRC2.3521). Lateral view of the head (left side).

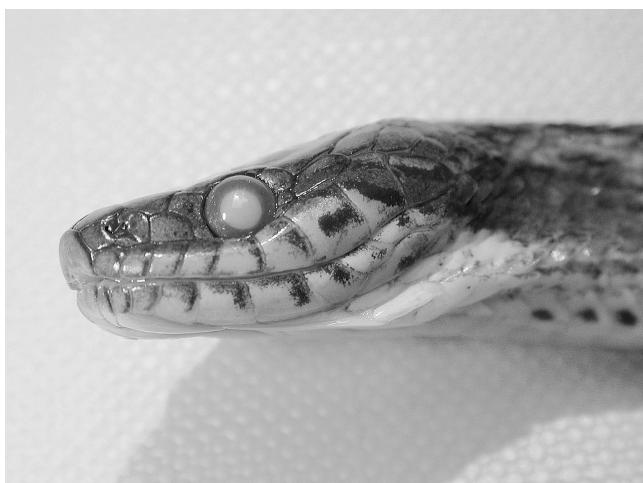


Fig. 2. *Amphiesma kerinciense*. Holotype (ZRC2.3521). Dorsal view of the head.

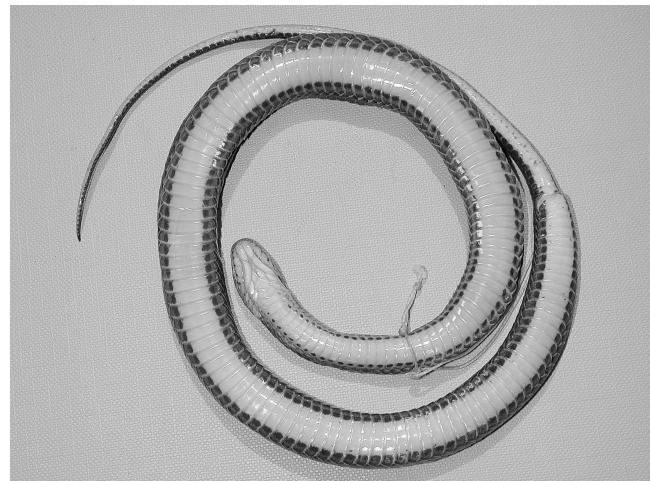


Fig. 3. *Amphiesma kerinciense*. Holotype (ZRC2.3521). General view.



Fig. 4. *Amphiesma kerinciense*. Holotype (ZRC2.3521). Ventral view.

Table 1. Comparison of *Amphiesma kerinciense* with other Sundaic species

Species	MSR	VEN	SC	Anal	Dorsal scales
<i>Amphiesma kerinciense</i>	19	140	89	divided	notched
<i>Amphiesma sanguineum</i>	19	140-155	98-104	divided	normal
<i>Amphiesma flavifrons</i>	19	146-157	87-102	entire	normal
<i>Amphiesma frenatum</i>	17	164-166	112-116	divided	—
<i>Amphiesma groundwateri</i>	17	147-154	120-134	entire	normal
<i>Amphiesma inas</i>	19	143-151	73-109	divided	notched
<i>Amphiesma petersii</i>	19	134-150	65-93	divided	notched
<i>Amphiesma sarawacense</i>	17	134-154	52-112	divided	notched
<i>Amphiesma viperinum</i>	19	101	59	divided	—
<i>Rhabdophis conspicillatus</i>	19	138-152	40-54	divided	normal
<i>Xenochrophis maculatus</i>	19	138-156	95-117	divided	normal
Species	PrOc	SL	ATe	Dorsal pattern	Belly
<i>Amphiesma kerinciense</i>	1	9	1	vertebral band and crossbars	lateral blotches
<i>Amphiesma sanguineum</i>	2	9	1	vertebral band and crossbars	lateral blotches
<i>Amphiesma flavifrons</i>	1	8-9	2	dorsolateral spots & crossbars	large dark spots
<i>Amphiesma frenatum</i>	1	8	2	dorsolateral spots & crossbars	large dark spots
<i>Amphiesma groundwateri</i>	2	9	1	undulating dorsolateral stripe	lateral blotches
<i>Amphiesma inas</i>	1	9	1	alignment of dorsolateral spots	lateral blotches
<i>Amphiesma petersii</i>	1	9	2	black and pale rounded spots	dark-edged scales
<i>Amphiesma sarawacense</i>	1	8-9	2	dark and light square blotches	chequered
<i>Amphiesma viperinum</i>	1	7	2	dorsolateral stripe & crossbars	black with dots
<i>Rhabdophis conspicillatus</i>	1	7-8	1	chequered squarish blotches	dark edged scales
<i>Xenochrophis maculatus</i>	1	8-9	2	irregular dark blotches	black spots

See "Materials and methods" for the explanation of abbreviations.

spots at the bottom of the flanks; the ivory line is progressively replaced by the purple greyish-brown hue. Ventral part of tail as the venter, bordered on each side by a blackish-brown stripe described above, with a middle line made of irregular and faint dark brown speckling. Throat, chin and ventral part of the neck ivory cream, uniform in their middle, with some dark brown speckling on the outer parts of the throat and lower side of the neck; posterior margins of infralabials dark brown.

The coloration in life has not been recorded. The colour of the belly suggests, by analogy with other species of the genus such as *Amphiesma optatum* after some time in preservative, a pink or red coloration in life (see David et al., 1998).

Etymology. —The specific epithet derives, in modern Latin, from the name of the type locality, Gunung Kerinci, the highest peak in Sumatra (3805m asl). The grammar of the gender of *Amphiesma* being neuter (Toriba, 1994; David et al., 1999), the specific epithet is treated in concordance to the sex of the generic name. We suggest the following western common names: Mt. Kerinci Keelback (English), *Amphiesma* du Mont Kerinci (French), Mt. Kerinci Gebirgswassernatter (German).

Distribution and biology. —*Amphiesma kerinciense* is currently known only from its type locality. It might be expected from other forested parts of Banjaran Barisan. The holotype was caught from a shallow (less than 30 cm deep) hill stream (elevation unfortunately not recorded), fast flowing in parts through an open, grassy area. The clear water flowed over a substratum of stone and gravel. The snake was collected while it was feeding on tadpoles, possibly of the genus *Huia*, which it later regurgitated.

DISCUSSION

Morphological comparisons with other species. —According to Tweedie (1983), Cox (1991), David & Vogel (1996), Manthey & Grossmann (1997) and Stuebing & Inger (1999), the following seven species of the genus *Amphiesma* have been currently recorded in the Sunda Region, as defined above: *Amphiesma flavifrons* (Boulenger), *Amphiesma frenatum* (Dunn, 1923), *Amphiesma groundwateri* (Smith), *Amphiesma inas* (Laidlaw), *Amphiesma petersii* (Boulenger, 1893), *Amphiesma sanguineum* (Smedley, 1932), *Amphiesma sarawacense* (Günther), and *Amphiesma viperinum* (Schenkel). *Amphiesma groundwateri* is known

from Ranong Province in Thailand, at the limit of the Sunda Region.

Among these species, three are currently known from Sumatra: *Amphiesma petersii* (known from two localities in the lowlands of the east coast), *Amphiesma viperinum* (known only from the region of the Indragiri River [Riau Province], also in the lowlands of the east coast) and *Amphiesma inas*, known from one specimen recently collected at Kubu Perahu, Bukit Barisan Selatan National Park (near Lake Ranau), Lampung Province, in the highlands of the extreme south-west coast of the island (Mumpuni, 2001). The description provided by this author rules out any confusion with *Amphiesma kerinciense*. This latter species and *Amphiesma inas* are the sole representatives of the genus *Amphiesma* known from Banjaran Barisan.

Amphiesma kerinciense differs from the Sundaic species by characters given in Table 1. We also consider in this table two taxa previously treated as members of the genus *Amphiesma* before the revision of Malnate & Underwood (1988), *Rhabdophis conspicillatus* (Günther) and *Xenochrophis maculatus* (Edeling), both occurring in Sumatra. Among other characters, *Amphiesma kerinciense* can be separated from *A. flavifrons*, *A. petersii*, *A. viperinum* and *Xenochrophis maculatus* by distinct head and dorsal patterns. *Rhabdophis conspicillatus* is distinguished from *A. kerinciense* by its greatly enlarged posterior maxillary teeth and its dorsal pattern (see Stuebing & Inger, 1999).

Amphiesma inas and *A. sanguineum* share most scalation characters with *Amphiesma kerinciense*. Besides characters listed in Table 1, *Amphiesma inas* can be separated from the new species by distinctly white-centered posterior upper labials, a more slender habitus and proportionally larger eyes. *Amphiesma kerinciense* most resembles *Amphiesma sanguineum* (*Natrix sanguinea* Smedley, 1932: 116. Type locality: not given in the description; Cameron Highlands, by inference from the title of the paper). Both species share a similar dorsal pattern made of a broad, dark vertebral band extending on rows 7-10 ornated with black markings, and most characters of the body and head scalation; differences appear in Table 1. Other characters include (1) a higher number of maxillary teeth in *A. kerinciense*, 18 or 19 + 2 enlarged teeth without diastema, vs. 15 + 2 with a small diastema in *A. sanguineum*; (2) 11 infralabials in the new species, vs. nine or ten in *A. sanguineum*; (3) a stouter body in *A. kerinciense*; (4) a greater horizontal eye diameter/snout length ratio in *A. kerinciense* than in *A. sanguineum* (0.65 vs. 0.50-0.55); (5) a different dorsal colour, greyish-brown in *A. kerinciense*, reddish-brown (in alcohol) in *A. sanguineum*; (6) paler supralabials in *A. kerinciense*, ivory vs. ochre yellow in *A. sanguineum*; (7) a different pattern on posterior supralabials, with a broader oblique dark brown streak in *A. sanguineum*; and (8) centre of throat and chin more or less speckled with dark brown spots in *A. sanguineum*.

An artificial key to *Amphiesma* species and two other naticines of the Sunda Region

This key is based on Boulenger (1893), Dunn (1923), Taylor (1965), Tweedie (1983), Malnate & Underwood (1988), Cox (1991), Manthey & Grossmann (1997), and Stuebing & Inger (1999), supplemented by the examination of specimens listed in the Appendix.

1	17 scale rows at midbody	2
-	19 scale rows at midbody	4
2	Anal single; 1 anterior temporal; 2 preoculars	<i>Amphiesma groundwateri</i>
-	Anal divided; 2 anterior temporals; 1 preocular	3
3	More than 160 ventral scales	<i>Amphiesma frenatum</i>
-	Less than 155 ventral scales	<i>Amphiesma sarawacense</i>
4	Last maxillary teeth greatly enlarged; less than 60 subcaudals	<i>Rhabdophis conspicillatus</i>
-	Last maxillary teeth not greatly enlarged; at least 60 subcaudals	5
5	1 anterior temporal	6
-	2 anterior temporals	8
6	Dorsal pattern made of a broad dark brown vertebral band with dark brown fleckings; lips paler than upper head surface with irregular brown markings	7
-	Dorsal pattern made of regularly arranged small pale yellowish-brown dorsal spots producing a dorsolateral stripe on each side; lips as dark as upper head surface, with distinct white spots in their centre	<i>Amphiesma inas</i>
7	1 preocular; stout body; less than 90 subcaudals possible in females; 11 infralabials; maxillary teeth 18 or 19 + 2, without diastema	<i>Amphiesma kerinciense</i>
-	2 preoculars; moderately slender body; at least 98 subcaudals in females; 8-10 infralabials; maxillary teeth 15 + 2, with a small diastema	<i>Amphiesma sanguineum</i>
8	Anal single	<i>Amphiesma flavifrons</i>
-	Anal divided	9
9	1 preocular; 8 or 9 supralabials; more than 130 ventrals	10
-	2 preoculars; 7 supralabials; less than 110 ventrals	<i>Amphiesma viperinum</i>
10	Eye very large; 90 or more subcaudals; body checkered with pale and dark squarish blotches ... <i>Xenochrophis maculatus</i>	
-	Eye moderate; 65-93 subcaudals; body speckled with black and pale rounded spots, large white triangular ventrolateral blotches forward	<i>Amphiesma petersii</i>

CONCLUSION

Although *Amphiesma kerinciense* is known from a single specimen, we regard it as sufficiently distinct from other species of the genus, including *A. sanguineum*, to represent a distinct species. Species of the genus *Amphiesma* are often separated by subtle differences in pattern and coloration, for example in the cases of *A. parallelum* / *A. bitaeniatum* / *A. octolineatum*, or *A. boulengeri* / *A. khasiense* (Wall, 1925; David, unpublished data).

The description of *Amphiesma kerinciense* raises to 39 the number of species currently recognized within this genus. The list of species presented in David et al. (1999) requires some emendation. Firstly, *Amphiesma frenatum*

was overlooked, and, secondly, the specific epithet of *Amphiesma metusia* Inger, Zhao, Shaffer & Wu was incorrectly written as *metusium*. This nomen is derived directly from the Greek noun *metousia*, meaning “partnership”. As this is a noun used in apposition, it should not be accorded with the neuter generic epithet. Lastly, we refer to Ota & Iwanaga (1997) for the status of *Amphiesma ishigakiense* (Malnate & Munsterman), a species which should be added to the list provided by David et al. (1999).

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APPENDIX

SPECIMENS EXAMINED

Amphiesma flavifrons-Indonesia. MNHN1891.68, “Sebroeang (Bornéo)”, now Seberuang, Kalimantan Barat Province, Borneo Island.-Malaysia. MNHN1889.211-213, MNHN1889.215,

“Kina-Baloo (N. de Bornéo)”, now Gunung Kinabalu, State of Sabah.

Amphiesma inas-Malaysia. West Malaysia: ZRC2.4055-56, Cameron Highlands, State of Pahang, 4500 ft.-ZRC2.4057-4058, Cameron Highlands, State of Pahang, 4-5000 ft.

Amphiesma petersii-Malaysia: ZRC2.3954, Sungai Buloh, Subang Forest Reserve, State of Selangor, West Malaysia-Singapore: ZRC2.4041, Singapore.

Amphiesma sanguineum-Malaysia, West Malaysia: ZRC2.4034, Cameron Highlands, State of Pahang, 5500 ft.-ZRC2.4035, Renglet, Cameron Highlands, 3000 ft.-ZRC2.4036, ZRC2.4039, Cameron Highlands, State of Pahang.-ZRC2.4037, Gombak Valley, State of Selangor.-ZRC2.4038, Telon Valley, Cameron Highlands, State of Pahang, 5000 ft.-ZRC2.4040, Dusun Wan, State of Selangor, 2000 ft.

Amphiesma sarawacense.-Malaysia: ZRC2.4045, Tenompok, Gunung Kinabalu, State of Sabah, Borneo Island.-ZRC2.4048-49, Cameron Highlands, State of Pahang, West Malaysia.-ZRC2.4050, Telon Valley, Cameron Highlands, State of Pahang, West Malaysia, 5000 ft.-ZRC2.4051, Lobong, Gunung Kinabalu, State of Sabah, Borneo Island.

Rhabdophis conspicillatus-Malaysia: ZRC2.3953, Kemaman, State of Trengganu, West Malaysia.-ZRC2.4042, Chikus Forest Reserve, Tapah Road, State of Perak, West Malaysia.-ZRC2.4043, Lio Matoh, State of Sarawak, Borneo.-ZRC2.4044, Tampassuk (left bank), Gunung Kaung, State of Sabah, Borneo Island.

Xenochrophis maculatus-Indonesia: RMNH1079, Borneo Island.-RMNH3953, no locality.-RMNH4953, Sumatra Island.-RMNH4954, Indragiri, Sumatra Island.-RMNH5702, “Biliton”, now Belitung Island.