

## Description of a Second Species of the Genus *Rabdion* Duméril, Bibron & Duméril, 1854 (Colubridae: Calamariinae) from Sulawesi, Indonesia

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**ABSTRACT:** We describe a new species of the genus *Rabdion* based on morphological evidence. The new species, *Rabdion grovesi* sp. nov., is restricted to South Sulawesi, whereas *Rabdion forsteni* is widely distributed on the rest of Sulawesi (Indonesia). *Rabdion grovesi* sp. nov. differs from *R. forsteni* by having a broader, shallower, and rounded rostral (vs. narrow, deep, and pointed); nasal touched by first and second supralabials (vs. first only); temporals 1 + 2 (vs. 1 + 3); 192 ventrals (vs. 130–157 in males and 152–160 in females); elongate (vs. shorter) dorsal scales; and a bluish gray dorsum (vs. grayish brown) in preservative. Finally, we provide a complete redescription for *R. forsteni* based on the subadult female syntype, MNHN 7210.

**Key words:** Pointed Snakes; *Rabdion forsteni*; Redescription; Taxonomy

THE GENUS *Rabdion* was described by Duméril et al. (1854) to accommodate two snake species originating from Sulawesi and described in the same work: *Rabdion forsteni* Duméril, Bibron and Duméril, 1854 and *Rabdion torquatum* Duméril, Bibron and Duméril, 1854. The latter species was transferred to the genus *Pseudorabdion* by Jan (1865) and is now regarded as a subjective synonym of *Pseudorabdion longiceps* (Cantor 1847) after the work of Boulenger (1894: 329), thus leaving *Rabdion* as a monotypic genus. The type locality of *R. torquatum* is Maccassar, but the occurrence of this species on Sulawesi remains doubtful (de Lang and Vogel 2005).

The name *Rabdion* was amended to *Rhabdion* by Günther (1858) for unspecified reasons. In 1894, Boulenger replaced the name *Rhabdion* by *Rhabdophidium*, as he regarded the name *Rhabdion* as preoccupied by *Rhabdium* Wallroth, 1833 (erected for a group of Protozoa). This replacement was unjustified according to the International Code of Zoological Nomenclature (Leviton 1958), which indicates that even the difference in few letters (*on* vs. *um*) is enough to authenticate a scientific name. So the name *Rabdion* was again reinstated by Leviton (1958) and has been used ever since (Bosch 1985; de Lang and Vogel 2005; Koch 2012).

*Rabdion* is one of only two snake genera regarded as endemic to Sulawesi (Koch 2012), the other being the typhlopoid, *Cyclotyphlops* in den Bosch and Ineich, 1994. In the collections of the Museum Zoologicum Bogoriense, we found one specimen of the genus *Rabdion* (MZB 2679) that was misidentified as *Calamaria virgulata* and that differs from *Rabdion forsteni* in several aspects. It is here described as a new species, the second in the genus. Furthermore, we provide a brief redescription of *Rabdion forsteni* as the original description given by Duméril et al. (1854) was published only in French.

### MATERIALS AND METHODS

One of us (JAM) collected the type specimen by hand, euthanized it with sodium pentobarbital, and fixed it in 10% buffered formalin prior to storage in 70% ethanol. We compared the new type specimen, which is deposited at Museum Zoologicum Bogoriense, Bogor, Indonesia (MZB), to specimens and the description of the other known congener (Appendix). We examined specimens from the following collections: Muséum National d'Histoire Naturelle, Paris, France (MNHN-RA) and MZB, and we obtained additional data from the registers of Naturalis Biodiversity Center, Nationaal Natuurhistorisch Museum, Leiden, Netherlands (RMNH). Museum acronyms follow Sabaj Pérez (2014).

We obtained distribution data from examined specimens as well as published literature. With a Mitutoyo digital caliper ( $\pm 0.1$  mm) and a Leica Wild M3Z dissecting microscope, we measured the following characters on the left side of the body: eye diameter (the greatest horizontal diameter of the orbit), snout length (from anterior border of eye to tip of snout), internarial length (shortest distance between dorsal margins of nostrils), eye–mandible length (from posterior border of eye to posterior tip of mandible), interorbital width (shortest distance between dorso-medial margins of eyes), head length (from posterior edge of mandible to tip of snout), head width (maximum width of head at the angle of the jaws), snout–vent length (SVL; from tip of snout to anterior margin of vent), and tail length (TL; from posterior margin of vent to tail tip).

We counted supralabial and infralabial scales from gape to the rostral and mental scales, respectively. We counted midbody scale rows around the body, from one side of ventrals to the other side, in three locations: on the neck, at midbody, and at one head length anterior to the cloaca. When counting the number of ventral scales, we scored specimens according to method described by Dowling (1951). We counted subcaudal scales from first postloacal scale to the scale before the tip of the tail. We sexed specimens by the presence of everted hemipenes or by ventral tail dissection.

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TABLE 1.—Morphometric, meristic, and morphological traits of *Rabdion forsteni* and *Rabdion grovesi* sp. nov. based on examined materials (Appendix). Measurements are in millimeters. \* = includes syntypes.

Character	<i>Rabdion grovesi</i>		<i>Rabdion forsteni</i>		
	MZB 2679	MNHN 7211	MNHN 7210	Range	
	Holotype, male	Syntype, male	Syntype, female	(n = 6)*	
Snout-vent length (SVL)	490	325	123	123–390	
Tail length (TL)	30	67	14	14–67	
(TL/SVL + TL)%	5.8	17.1	10.0	10.0–17.0	
(Head length/SVL)%	2.7	–	5.7	4.3–5.7	
(Head width/head length)%	40.1	–	48.6	40.8–48.6	
(Eye diameter/head length)%	12.9	–	14.3	9.5–14.3	
(Snout length/head length)%	31.8	–	41.4	24.3–41.4	
(Internarial length/head width)%	56.6	–	44.1	33.3–44.1	
(Interorbital width/head width)%	77.3	–	64.7	64.7–68.1	
(Eye-mandible length/head length)%	65.9	–	60.0	60.0–63.3	
Ventrals	192	137	151	130–160	
Subcaudals	19	32	26	21–34	
Temporals	1 + 2	1 + 3	1 + 3	1 + 3	
Nasal in contact with supralabials	1 and 2	1	1	1	
Rostral width	Broad	Narrow	Narrow	Narrow	
Rostral depth	Shallow	Deep	Deep	Deep	
Rostral shape	Rounded	Pointed	Pointed	Pointed	
Shape of dorsals	Elongate	Shortened	Shortened	Shortened	

## RESULTS

As the original description of *R. forsteni* given by Duméril et al. (1854) was published only in French, we briefly redescribe the species here, based on the syntype MNHN 7210. We present diagnostic morphological, morphometric, and meristic data taken for the type specimens (Table 1).

## SYSTEMATICS

We assigned the new species to the genus *Rabdion* based on the following combination of characters: head not distinct from neck, eye small, pupil round, nostril within a single small nasal that is in contact with the preocular, no loreal, one large preocular, internasals present, ventrals rounded, tail short, 15 smooth dorsal scale rows throughout the body without apical pits, a single anal shield, and subcaudal plates divided. The new species differs from the other known species in that genus with respect to body scalation, however, especially ventral and subcaudal counts. The differences are distinct enough to consider this specimen as an undescribed species, which we describe as follows.

*Rabdion grovesi* sp. nov.  
(Figs. 1, 3, 4; Table 1)

**Holotype.**—Adult male (MZB 2679; field number JAM 2885), Awan Village, Rindingalo, Tana Torja, Province of South Sulawesi, Indonesia, (2°51'20.53"S, 119°48'30.04"E; datum = WGS84; 2150 m above sea level), collected on 10 August 2000 by J. McGuire, R.M. Brown, and M. Williams.

**Diagnosis.**—*Rabdion grovesi* sp. nov. can be distinguished from *R. forsteni* (the other member of the genus; characters in parentheses) by having a broader, shallower, and rounded rostral (narrow, deep, and pointed), nasal in contact with the first and second supralabials (first only), temporals 1 + 2 (1 + 3), 192 ventrals (130–160), 19 subcaudals (21–34), elongate dorsal scales (shortened), and a yellow ventrolateral wavy band and bluish-gray dorsum in preservative (cream ventrolateral and grayish-brown

dorsum). Other distinguishing characters of the new species are the larger body size, SVL 490 mm (SVL 123–390 mm); and shorter tail, relative TL 5.8% (TL 10.0–17.0%).

**Description of holotype.**—Adult male, SVL 490 mm; TL 31.5 mm; head elongate, head length 2.7% of SVL, twice as long as wide, head width 40.1% of head length, slightly flattened, indistinct from neck; snout elongate, snout length 29.5% of head length, moderate, round in dorsal and lateral profiles, forming a rather quadrangular shape.

Rostral shield large, hemispherical, distinctly visible from above, pointed posteriorly; interorbital width broader, 73.6% of head width; internasals quadrangular; nostrils rather large, placed anteriorly; nasals undivided, in contact with rostral anteriorly, internasal and prefrontal dorsally, first and second supralabials ventrally, and preocular posteriorly; loreal absent; prefrontal rather large, broader, and subhexagonal; frontal large, subhexagonal, elongate posteriorly and twice as long as wide; supraoculars narrow, elongated, subrectangular, posteriorly wider; parietals large, elongate, butterfly-like in shape, bordered anteriorly by supraoculars, frontal, and postocular, ventrally by fifth supralabial and anterior temporal, and posteriorly by posterior-most temporal and occipital; one preocular, elongate, subrectangular, anteriorly pointed, in contact anteriorly with nasal, dorsally with prefrontal and supraocular, and ventrally with second and third supralabials; eye moderate, diameter 11.4% of head length, rounded, nearly a half of the snout length, diameter 38.5% of snout length, pupil rounded; one postocular, quadrangular but rounded posteriorly, in broad contact with supraocular, parietal, fourth and fifth supralabials; anterior temporal larger and longer than posterior temporals, in contact dorsally with parietal and ventrally with sixth supralabial; posterior temporals smaller, lower one in contact ventrally with sixth supralabial.

Supralabials six, fifth the largest in size; first supralabial in contact anteriorly with rostral, dorsally with nasal; second supralabial in contact dorsally with nasal and preocular; third supralabial in contact dorsally with preocular and ocular;



FIG. 1.—Dorsal (A) and ventral (B) views of the adult male holotype of *Rabdion grovesi* sp. nov. (MZB 2679) photographed in life at the collection locality.

fourth supralabial in contact dorsally with ocular and postocular; fifth supralabial in contact dorsally with postocular, parietal, and anterior temporal; sixth supralabial in contact dorsally with anterior temporal and lower posterior temporal, and with a body scale posteriorly.

Mental small in size, triangular; first infralabial pair larger than mental plate and in narrow contact with one another, in contact with anterior chin shield posteriorly; six infralabials, first–fourth in contact with first chin shield, fourth infralabial largest in size, in narrow contact with the anterior chin shield and broader contact with the posterior chin shield; fifth and sixth infralabial in contact with gular scales; two larger anterior chin shields, and two slightly smaller posterior chin shields all in broad contact; posterior chin shield bordered posteriorly by six gular scales.

Body robust, elongate and subcylindrical; dorsal scale rows 15–15–15, all smooth and bluntly pointed without

apical pits; 192 ventral scales, no preventrals; an approximately 50-mm-long incision present on the ventral side of the midbody; cloacal plate entire, hemipenes not everted. Tail short, relative TL  $(TL/[SVL + TL])$  0.058, robust and thick; subcaudals divided, 19/18.

**Coloration.**—Dorsum bluish-black, venter bright yellow, the yellow ventral coloration irregularly encroaches upon scale rows I–II (about every other scale row) to produce a zig-zag or triangular ventrolateral yellow pattern. Also, the outer edges of each ventral have a black spot or dot posteriorly and the middle of most ventrals have irregular black pigmentation marks. After 14 yr in preservative, the bluish-black dorsum has faded to bluish-gray and the bright yellow venter faded to pale cream.

**Etymology.**—The specific epithet is a noun in the genitive singular case, honoring professor Colin Peter Groves (Australian National University) for his generous



FIG. 2.—An adult *Rabdion forsteni* (RMB 2532) photographed in life in the Province of South Sulawesi, Indonesia.

friendship and support of the first author. The dedication that Professor Groves has exhibited to the fields of primatology, biological anthropology, and biogeography, and his regular participation in debates with antievolutionists are highly commendable.

*Rabdion forsteni* Duméril, Bibron and Duméril, 1854  
(Figs. 2 and 4; Table 1)

**Syntypes.**—MNHN 7210, 7211, and possibly one of RMNH specimens (RMNH 66 or 66a, examined by E. Dondorp; we assume that all three syntypes were originally housed at RMNH and then sent to MNHN, see discussion below), all collected from Celebes (now Sulawesi), Indonesia, by E.A. Forsten.

**Redescription of syntype MNHN 7210.**—Subadult female, SVL 123 mm; tail length 14 mm; head elongate, twice as long as wide, slightly flattened, indistinct from neck; snout elongate, moderate, bluntly pointed in dorsal and lateral profiles.

Rostral shield large, bluntly pointed, distinctly visible from above, pointed posteriorly; interorbital width broader; internasals quadrilateral, narrow medially; nostrils rather large, placed anteriorly; nasals undivided, in contact with rostral anteriorly, internasal and prefrontal dorsally, first supralabial ventrally, and preocular posteriorly; loreal absent; prefrontal rather large, broader, and subpentagonal; frontal large, subhexagonal, elongate posteriorly and slightly longer than wide; supraoculars narrow, elongated, subrectangular; parietals large, elongate, butterfly-like in shape, bordered anteriorly by supraoculars, frontal, and postocular, ventrally by fifth supralabial and anterior temporal, and posteriorly by posterior-most temporal and occipital; one preocular, elongate, subrectangular, anteriorly pointed, in contact anteriorly with nasal, dorsally with prefrontal and supraocular, and ventrally with first, second, and third supralabials; eye moderate, rounded, nearly a half of the snout length, pupil rounded; one postocular, quadrangular but rounded posteriorly, in broad contact with supraocular, parietal, fourth and

fifth supralabials; anterior temporal larger and longer than posterior temporals, in contact dorsally with parietal and ventrally with sixth supralabial; posterior temporals smaller, lower one in contact ventrally with sixth supralabial.

Supralabials six, fifth the largest in size; first supralabial in contact anteriorly with rostral, dorsally with nasal and preocular; second supralabial in contact dorsally with preocular; third supralabial in contact dorsally with preocular and ocular; fourth supralabial in contact dorsally with ocular and postocular; fifth supralabial in contact dorsally with postocular, parietal, and anterior temporal; sixth supralabial in contact dorsally with anterior temporal and lower posterior temporal, and with a body scale posteriorly.

Mental small in size, triangular; first infralabial pair larger than mental plate and in broad contact with one another, in contact with anterior chin shield posteriorly; six infralabials, first–fourth in contact with first chin shield, fourth infralabial largest in size, in narrow contact with the anterior chin shield and broader contact with the posterior chin shield; fifth and sixth infralabial in contact with gular scales; two larger anterior chin shields, and two slightly smaller posterior chin shields all in broad contact; posterior chin shield bordered posteriorly by seven gular scales.

Body robust, elongate and subcylindrical; dorsal scale rows 15–15–15, all smooth and bluntly pointed without apical pits; 151 ventral scales, two preventrals; cloacal plate entire. Tail short, relative TL ( $TL/[SVL + TL]$ ) 0.100, robust and thin; subcaudals divided, 26.

**Coloration.**—Dorsum uniformly dark purplish-black, venter cream including the labials.

#### DISCUSSION

Until now, the genus *Rabdion* was only represented by one species, *R. forsteni*. In their original description, Duméril et al. (1854) mentioned three type specimens (in two places in the original description) that therefore should be regarded as syntypes. Among the three syntypes, two syntypes are available in the collection of the Paris Museum

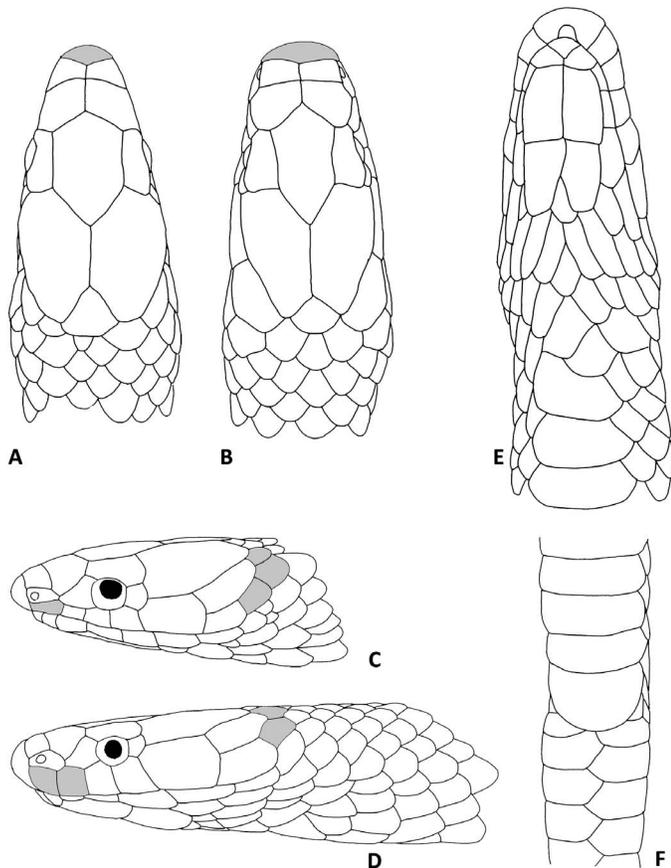


FIG. 3.—Comparative sketches of the two species of *Rabdion* (shaded scales indicate morphological differences between species). Dorsal (A) and lateral (C) views of the head of *Rabdion forsteni* (syntype, MNHN 7210; note the narrow rostral, three posterior temporals, and nasal in contact with first supralabial). Dorsal (B), lateral (D), and ventral (E) views of the head, and ventral view of the tail base (F) of *Rabdion grovesi* sp. nov. (holotype, MZB 2679; note the wide rostral, two posterior temporals, and nasal in contact with first and second supralabials).

(MNHN-RA) and one in the collection of the Leiden Museum (RMNH). According to Duméril et al. (1854), all three syntypes were collected from Celebes (now Sulawesi), Indonesia, by E.A. Forsten, but no indication of date can be found in the catalogues of the MNHN. Duméril et al. (1854) counted 137–154 ventral scales and 29–31 subcaudals in their three type specimens. They also indicated that the largest of the three specimens was 39.9 cm in total length, which corresponds with MNHN 7211 (see Table 1). The other MNHN syntype (MNHN 7210) represents a subadult.

The third syntype is currently deposited in the RMNH at Leiden (Netherlands). All three syntypes were originally deposited at RMNH, with some additional specimens of the species also having the same origin and the same collector (E.A. Forsten). According to M. Hoogmoed (personal communication, 21 October 2014), there are currently six specimens of *R. forsteni* deposited at RMNH under the collection numbers RMNH 46 (one specimen), RMNH 66 (four specimens: two adults and two juveniles), and RMNH 66a (one specimen), all of which are attributed to Forsten. Five specimens (RMNH 66 and 66a) are accompanied by labels listing E.A. Forsten as the collector and a collection date of 24 April 1860. Because Forsten died in 1843, the accuracy of the label must be considered dubious. Esther

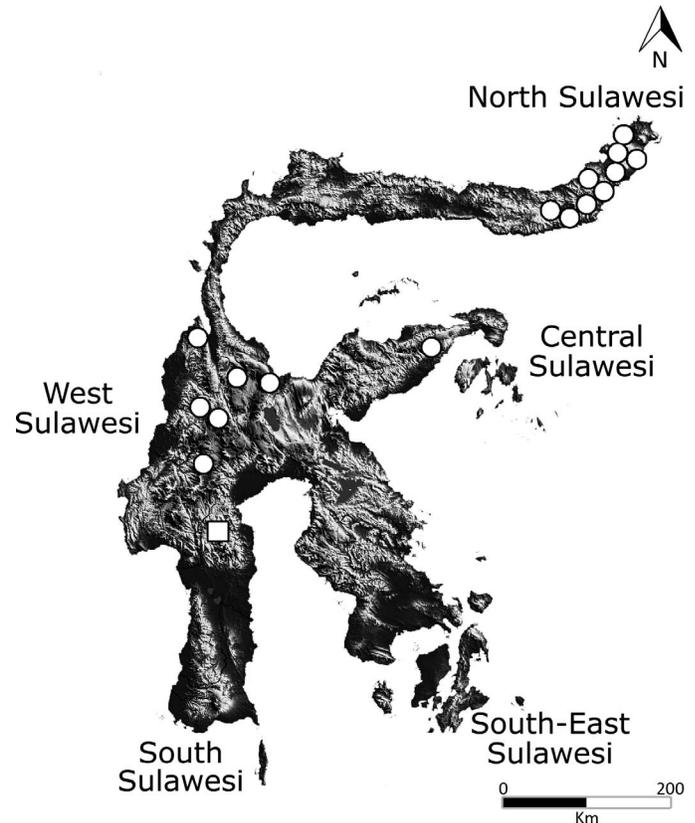


FIG. 4.—Collection localities for specimens of *Rabdion forsteni* (circles) and *Rabdion grovesi* sp. nov. (square) on Sulawesi, Indonesia.

Dondorp (RMNH) allowed us to examine the museum catalog pages dealing with those specimens. The catalog indicates that the date 24 April 1860 was added later (probably after 1939) to specimens RMNH 66 and 66a, and that RMNH 46 was labeled as a cotype (indicated by R.F. Inger) in the genus *Calamaria*.

The MNHN collection currently includes only two specimens of *R. forsteni*, despite there being three syntypes mentioned in the original description. We suspect that one of the specimens of RMNH 66 or 66a represents the third syntype, as it could have been returned to Leiden from Paris around April 1860, several years after the species' description was published (possibly producing the erroneous 1860 collection date on the specimen's current tag). It is not possible to identify with certainty the RMNH specimen (out of the six housed there) that corresponds to the third syntype examined by Duméril et al. (1854).

MNHN 7211 is the largest specimen of *R. forsteni*, but its skull has been removed. Fortunately, this does not affect its identification because the skin is still attached to the specimen and all head plates are visible. The skull is not in any of collections at MNHN, reptile or otherwise. One possibility is that the skull could have been removed at RMNH before the specimen was sent to MNHN. However, there is no skull of *R. forsteni* in RMNH collections either (E. Dondorp, personal communication, 30 September 2014). We conclude that the skull of MNHN 7211 should be considered lost or destroyed. The tail base of MNHN 7211 was dissected and one hemipenis was detached, but the

remaining hemipenis is still clearly visible, confirming it to be an adult male. The detached hemipenis was removed by Hussam Zaher (Museu de Zoologia, Universidade de São Paulo, Brazil) for his doctoral research on the MNHN snake collections. That hemipenis will be returned to the MNHN.

De Lang and Vogel (2005) restricted *R. forsteni* to North and West Sulawesi based on the examined material and literature records. In fact, *R. grovesi* sp. nov. was misidentified by the collectors and illustrated by de Lang and Vogel (2005) as *Calamaria virgulata* Boie, 1827, where the illustrated specimen is the holotype of *R. grovesi*. Koch (2012) noted several specimens from various parts of Sulawesi, including Central and East Sulawesi and Sangihe Island (see Fig. 2 for current distribution records).

We examined one specimen of *R. forsteni* (MZB 3622) collected from the Northern Peninsula of Sulawesi, and three specimens (MZB 1776, 2680–2681) from the interior portion of central Sulawesi. These geographically separated localities imply that *R. forsteni* is widely distributed on the island, whereas *R. grovesi* sp. nov. appears to be restricted to the interior portion of central Sulawesi, where it might be sympatric with *R. forsteni*. *Rabdion grovesi* sp. nov. is a fossorial or semifossorial species, and might be restricted to high elevations. Thus, it is not surprising that the new species is difficult to detect in the field, and is currently represented by a single specimen.

The reptile fauna of Sulawesi is one of the least known in Southeast Asia. According to Koch (2012), about 60% of the known snake fauna from Sulawesi is endemic, although this is likely an underestimate. Sulawesi is a composite island formed via the geological aggregation of several separate paleo-islands. Partially because of this tectonic history, at least seven areas of endemism have been identified on Sulawesi proper (Evans et al. 2003; Setiadi et al. 2011; Bacon et al. 2013). Correspondingly, many species might be restricted to individual areas of endemism, or exhibit substantial geographic variation across the island. Given the biogeographical complexity of Sulawesi and the presence of large tracts of poorly known upland rainforest in the island's interior portion, the discovery of many new species can be expected in the future.

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#### APPENDIX

##### Specimens Examined

*Rabdion forsteni* Duméril, Bibron and Duméril, 1854: Sulawesi: MNHN 7210–11 (syntypes); Central Sulawesi: MZB 1776; North Sulawesi: MZB 3622; South Sulawesi: MZB 2680–81.