



## Two new species of the genus *Cylindrophis* Wagler, 1828 (Squamata: Cylindrophidae) from Southeast Asia

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**Abstract.**—The original description of *Anguis ruffa* (now *Cylindrophis ruffus*) given by Laurenti in 1768 is not sufficiently comprehensive for the morphological identification of the species, and the type locality, given as “Surinami,” is in error. However, Schlegel in 1844 corrected the type locality as “Java in Indonesia.” There is also, currently, no proof of the existence of a type specimen of *Anguis ruffa*. Therefore, we accept Schlegel’s correction of the type locality being Java. *Anguis ruffa* is here redescribed based on museum specimens collected from Java only. Because the original description of *C. r. burmanus* is insufficiently comprehensive we here redescribe this species using the presumed type series collected from Myanmar, and we also designate a lectotype. We examined a large number of *Cylindrophis* specimens deposited in European and Indonesian museums, using morphological and meristic characters, plus coloration. We identified four groups based on the number of scale rows around the midbody (17, 19, 21, and 23). Among the *Cylindrophis* collections at Natural History Museum, London and Muséum national d’Histoire naturelle, Paris, we have discovered several specimens which do not fit any recognized species descriptions. We here describe two new species chosen from among them: *C. jodiae* sp. nov. from Vietnam and *C. mirzae* sp. nov. from Singapore. Finally, we provide color plates showing the different body colorations for all the recognized species in the genus *Cylindrophis*.

**Key words.** Biogeography, Indonesia, pipe snake, Singapore, taxonomy, Vietnam

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### Introduction

The first species of pipe snake was described by Linnaeus (1758) as *Anguis maculata* from Sri Lanka (America in error *vide* Deraniyagala 1955), followed by *Anguis ruffa* described by Laurenti (1768). The genus *Cylindrophis* was established by Wagler (1828) with a type species from Java, *Cylindrophis resplendens* Wagler 1828, a binomen later synonymized with *Cylindrophis ruffus* by Schlegel (1844). After Wagler (1828), several additional species (e.g., *Cylindrophis melanotus* Wagler 1830, *Cylindrophis lineatus* Blanford 1881, *Cylindrophis isolepis*

Boulenger 1896, *Cylindrophis opisthorhodus* Boulenger 1897, *Cylindrophis boulengeri* Roux 1911, *Cylindrophis aruensis* Boulenger 1920, *Cylindrophis celebensis* Smith 1927, *Cylindrophis heinrichi* Ahl 1933, *Cylindrophis engkariensis* Stuebing 1994, *Cylindrophis yamdena* Smith and Sidik 1998) and one subspecies, *Cylindrophis rufus burmanus*, Smith 1943) were added to the genus. Most of the taxa are endemic to one island or small island group. The Asian genus *Cylindrophis* was formerly included in the family Uropeltidae, later McDowell (1975) included the genus in the family Cylindrophidae, along with the genus *Anomochilus* Berg 1901. Furthermore,

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McDowell (1975) synonymized *C. celebensis* and *C. heinrichi* with the Sulawesi endemic *C. melanotus*. Recently, Wallach et al. (2014) synonymized the trinomen, *C. r. burmanus* with *C. ruffus*. Therefore, the genus presently consists of ten valid monotypic species (Wallach et al. 2014) of which nine are distributed in Southeast Asia (Stuebing 1994), and one (*C. maculatus*) is endemic to Sri Lanka (Somaweera 2006). There are no *Cylindrophis* in the Indian peninsular (Smith 1943). Later, Cundall et al. (1993) allocated the genus *Anomochilus* to its own family, Anomochilidae, thus rendering the family Cylindrophidae monotypic. The family Cylindrophidae can be distinguished from its sister family Anomochilidae by having a mental groove, nasals in contact, and no preocular (Das et al. 2008).

The original description of *Anguis ruffa* is limited to only a few words: “Corpore aequali, ruffo, lineis transversalibus albis interruptis; abdomine vario,” and the type locality was given as “Surinami,” in error. An English translation of the original description was given by Adler et al. (1992) as “Body uniform, red, broken white transverse bands; abdomen various. Lives in Surinam; housed in Gronovius’s Museum.” The holotype was deposited first at “Mufeo Gronoviano” / Museo Laurentii Theodori Gronovii [may be Museum Gronovianum], Lugdunum Batavorum (= Leiden) and later believed to have been transferred to the Naturalis Biodiversity Center, Nationaal Natuurhistorische Museum (Rijksmuseum), Leiden, Netherlands (RMNH.RENA). Even though Iskandar and Colijn (2002) regarded the type materials of *Anguis ruffa* as lost from Naturalis Biodiversity Center, there is no evidence to support that the type was ever deposited there in the first place. Wagler’s (1828) species *Cylindrophis resplendens*, which was described from Java, was synonymized with *Cylindrophis ruffus* by Schlegel (1844). The type locality of *Anguis ruffa* was later corrected from Suriname to Java in Indonesia (*fide* Schlegel 1844). Although Gray (1849) considered that the Javanese population is a variation (*javanica*) of *Anguis ruffa*, subsequent authors have accepted that the type locality is indeed Java (e.g., Smith 1943, Taylor 1965). Furthermore, Taylor (1965) invalidated [*id est nomen oblitum*] Laurenti’s (1768) name and choose the next available name, *Tortrix rufa* Schlegel 1844 [*id est nomen protectum*].

Although the species name was usually spelled erroneously as “*rufus*” in older publications, a justification is given for this by Adler et al. (1992) as the original spelling given by Laurenti (1768) is “*ruffa*.” Smith (1943) described a subspecies, *Cylindrophis rufus burmanus*, from Burma (now Myanmar). In the original description of *C. r. burmanus*, he failed to mention how many specimens he examined, but it is clear from the description that he had several specimens at his disposal at the time. According to Smith (1943), ventrals varied from 201–225, and subcaudals from 5–7, but he only provided the measurements for the largest specimen as “Total length: 330, tail 10 mm” [i.e., SVL 320 mm]. The dis-

tribution was given as “Range. Tenasserim and Burma as far North as Myitkyina” but a precise type locality was not given. Furthermore, Smith (1943) extended the distribution of “*Cylindrophis rufus rufus*” (*forma typica*) from Java to Siam (now Thailand), French Indo-China, Malay Peninsula and Archipelago. Although subsequent authors (e.g., Taylor 1965, Iskandar and Colijn 2002) have accepted the above trinomen from Myanmar, recently Wallach et al. (2014) included the subspecies under *Cylindrophis ruffus* because subspecies are not recognized in their catalogue. To date *Cylindrophis ruffus* has been widely recorded from Thailand, Laos, Vietnam, Myanmar, Cambodia, China, Malaysia, Singapore, and several Indonesian islands including Sumatra, Borneo, Java, and Sulawesi (Gray 1849; Boulenger 1888, 1893; Smith 1943; Deuve 1970; Dowling and Jenner 1988; Adler et al. 1992; Geissler et al. 2011; de Lang 2011, 2013). Several of these authors refer to undescribed species and it has also already been argued that *C. ruffus* being a complex of several species, is in need of a critical examination (Stuebing 1994; Smith and Sidik 1998). Our results below will be a preliminary step to the recognition of several unidentified species within this complex. An additional number of undescribed species are included in our examined material but pending larger samples, we prefer not to describe them at this time.

## Materials and Methods

We have examined more than 150 *Cylindrophis* specimens deposited in various museum collections (Appendix 1): Museum Zoologicum Bogoriense, Bogor, Indonesia (MZB); Natural History Museum [formerly British Museum (Natural History)], London, United Kingdom (UK) (BMNH); Muséum national d’Histoire naturelle, Paris, France (MNHN-RA); Senckenberg Forschungsinstitut und Naturmuseum, Frankfurt, Germany (SMF); Western Australian Museum, Perth, Western Australia, Australia (WAM); and Museum für Naturkunde, Berlin, Germany (ZMB). We compared all our examined specimens with past descriptions and other published data of all known congeners (Appendix 1). Museum acronyms follow Sabaj Pérez (2014).

We obtained distribution data from examined specimens, published literature as well as personal observations. The following characters were measured with a Mitutoyo digitmatic caliper to the nearest 0.1 mm and only along the left side of the body for symmetrical characters: snout–vent length (SVL), measured from tip of snout to anterior margin of vent; tail length (TL), measured from anterior margin of vent to tail tip. We counted supralabial and infralabial scales from the gape to the rostral and mental scales, respectively. We counted mid-body dorsal scale rows around the body, in three positions, on the neck (at the point of the 10<sup>th</sup> scale starting from the first scale after the mental groove on the ventral

side), midbody (at the point of half of the ventral count), and at one scale anterior to precloacal, always excluding the ventral scale from counts. When counting the number of ventral scales, we scored specimens according to the method described by Dowling (1951), but started from the first scale after the mental groove. We counted subcaudal scales from the first postcloacal scale to the scale before the tip of the tail.

All color descriptions and other associated color characters are based on preserved specimens. The presence and absence of white bands on the nape and the back, plus the shape of the band on the nape (narrow, when the band is wider than one scale-width; or wide, when the band is wider than one scale-width), the shape of the bands at back (complete, when the band is a complete dorsal ring; or interrupted, when the bands do not meet mid-dorsally), and the arrangements of the bands at back (constant, when the bands are regularly arranged and each part of the band arranged confronting each other; or alternating, when the bands are irregularly arranged and each part of the band arranged avoiding each other) are considered as morphological characters. We have not recorded the sex of the specimens other than where the hemipenis was everted because most of the examined specimens are old, having huge historical value, we decided to keeping them intact.

The distribution of each species (in Fig. 8) does not show precise localities (due to the general lack of precise localities in historical collections). Therefore, the whole biogeographical area or country is shaded for each species.

**Results**

The original description of *Anguis ruffa* given by Laurenti (1768) is not comprehensive enough for a morpho-

logical identification of the species. Our recent attempt to locate the type material of *C. ruffus* at RMNH was unsuccessful (Marinus Hoogmoed pers. comm. to Ivan Ineich on 23 October 2014). We believe that there are several species masquerading today within the currently accepted name *Cylindrophis ruffus*. We also believe that the type of *C. ruffus* first arrived in the Netherlands from Jakarta, Indonesia because of the following: (1) the Dutch East Indies (now Indonesia) was a Dutch colony under the administration of the Dutch Government since the early 17<sup>th</sup> century; (2) most of the specimens arriving at the Netherlands natural history collections prior to 1850 originated from Java, Indonesia, especially West Java which was where the administration capital was based, Batavia (now Jakarta); (3) there was a town called “Batavia” in the former Dutch colony of Suriname which could be misidentified with Batavia in Indonesia. Therefore, we accept Schlegel’s (1844) correction for the type locality of *Anguis ruffa* as Java. Furthermore, our attempt to locate the type material of *Cylindrophis resplendens* Wagler, 1828 (type locality: Java) which was believed to be deposited at MNHN-RA was again unsuccessful.

Our species examination and comparison also shows that *Cylindrophis ruffus burmanus* has morphological and meristic character differences large enough to elevate it to species level. Although Iskandar and Colijn (2002) raised it previously to the species level, they gave no justification for this. There are six specimens (see Table 1) collected from Burma in the BMNH today, among them two specimens (BMNH 1940.3.3.1–2) are labelled “*Cylindrophis ruffus burmensis*” and all the others as “*Cylindrophis rufus*.” As these specimens were probably present at the time of Smith when his manuscript was completed in 1938 [*vide* the preface of Smith (1943)] but delayed because of the second world war, they may be considered syntypes of *C. r. burmanus*. Although, there

**Table 1.** Details of the possible syntype series of *Cylindrophis ruffus burmanus* Smith, 1943 compared to the data provided in the original description; “—” = not applicable, “?” = not given, “\*” = damaged.

Character	Smith (1943)	Catalogue Number (BMNH)					
		1940.3.3.1	1940.3.3.2	1891.11.26.28	1908.6.23.3	1925.12.22.4	1925.4.2.2
Species name on the label	—	“ <i>Cylindrophis ruffus burmensis</i> ”		“ <i>Cylindrophis rufus</i> ”			
Location	Tenasserim and Burma as far North as Myitkyina	Rangoon, Burma	Rangoon, Burma	Pyinmana, Upper Burma	Burma	Sahmaw, Myitkyina District, Burma	Thandoun, Burma
Presenter (collector unknown)	?	F.J. Meggitt		E.W. Oates	F. Wall		
Total length in mm	330	330	217.2	286	299.5	264	288
SVL in mm	[320]	320	212	280	293	256	280
Tail length in mm	10	10	5.2	6	6.5	8	8
Ventrals	201–225	213	213	209	221	~225*	201
Subcaudals	5–7	~6–7*	6	5	6	~6–7*	~5*

**Table 2.** Comparison of some morphometric, meristic, and morphological characters of *Cylindrophis* species which have 23, 19, and 17 midbody scale rows, based on examined materials; “—” = Not applicable.

Character	23 scale rows at midbody		19 scale rows at midbody				17 scale rows at midbody
	<i>C. aruensis</i> (n = 3)	<i>C. opisthorhodus</i> (n = 5)	<i>C. boulengeri</i> (n = 3)	<i>C. burmanus</i> (n = 6)	<i>C. melanotus</i> (n = 14)	<i>C. ruffus</i> (n = 14)	<i>C. engkariensis</i> (n = 1)
Location	Dammar	Flores	Wetar	Myanmar	Sulawesi	Java	Borneo
SVL (in mm)	155–305	270–470	240–310	212–320	292–575	257–715	473
Scale rows around neck	25–26	21–23	19–21	17–19	17–19	20–23	17
Scale rows around midbody	23	23	19	19	19	19	17
Scale rows around preloacal	18–20	18–21	17	16 or 17	17	17 or 18	17
Midventral scales	173–182	185–210	193–200	201–225	233–275	186–197	234
Subcaudals	6–7	6–7	5–6	5–7	6–8	5–8	5+1
Frontal > prefrontal (1) or < (0)	0	0	1	0	0	0	0
Pale band/ring on the nape present (1) or absent (0)	1	0	0	1	1	1	0
Pale band/ring wide (1) or narrow (0)	1	—	—	0	1	1	—
Pale band/ring complete (1) or dorsally interrupted (0)	0	—	—	0	0	0	—
Crossbands on the back present (1) or absent (0)	1	0	0	1	0	1	0
Crossbands complete (1) or interrupted (0)	0	—	—	0	—	0	—
Crossbands constant (1) or alternating (0)	0	—	—	0	—	1	—
Crossbands wide (1) or narrow (0)	0	—	—	0	—	1	—

is no indication of a holotype designation in the description, the specimen BMNH 1940.3.3.1 is exactly matching with the morphometric, meristic, and morphological characters given in the original description. We note also that the original description of *C. r. burmanus* was not comprehensive enough for identification. Therefore, we here designate the closely matching specimen (BMNH 1940.3.3.1), for which measurements were given in the original description, as the lectotype of *Cylindrophis ruffus burmanus* in order to stabilize the name with a recognized type specimen. Furthermore, we provide a comprehensive redescription on the basis of that lectotype, and its five paralectotypes located at the BMNH.

Among our examined sample at the BMNH and MNHN-RA, we found several specimens representing two morphospecies that do not fit the diagnoses of any known species. These specimens are morphologically distinct, geographically isolated, and well outside of the corrected distribution range of *C. ruffus*. The differences of those two morphospecies are large enough to consider them as “undescribed species.” Therefore, we formally describe them as new species in this paper. They differ from all other known species of the genus *Cylindrophis* (see Tables 2–3; Figs. 1–16) with respect to their coloration and body scalation, especially their midbody dorsal scale counts and ventrals. We assign the two new

species to the genus *Cylindrophis* based on the following character combination: a medium-sized snake with a cylindrical body, of nearly equal diameter throughout its length; a small head, not really distinct from the thick neck; a depressed snout; small eyes, with rounded pupils; the nostril pierced in the middle of a single nasal shield, slightly directed forwards; the upper head scales large and symmetrical; no internasals, loreals, or preoculars; a mental groove present; 21 rows of smooth and iridescent dorsal scales; the ventral scales barely enlarged, and the tail very short and blunt.

Furthermore, based on the number of scale rows around the midbody we have identified four morphological groups within the *Cylindrophis* genus. Note however that the phylogenetic validity of those groups has not yet been tested:

- (1) 17 midbody scale rows (one species): *C. engkariensis*—see Table 2.
- (2) 19 midbody scale rows (five species): *C. ruffus*, *C. melanotus*, *C. boulengeri*, *C. burmanus*—see Table 2.
- (3) 21 midbody scale rows (seven species): *C. maculatus*, *C. lineatus*, *C. isolepis*, *C. yamdena*, *C. jodiae* sp. nov. (see below), *C. mirzae* sp. nov. (see below)—see Table 3.
- (4) 23 midbody scale rows (two species): *C. opisthorhodus*, *C. aruensis*—see Table 2.

**Systematics:** We redescribe *Cylindrophis ruffus* and *C. burmanus* and describe two new species from Vietnam and Singapore, respectively, as follows:

***Cylindrophis ruffus* (Laurenti 1768)**

*Anguis ruffa* Laurenti 1768: 71.  
(Figs. 1, 8; Table 2)

**Synonyms:**

*Cylindrophis resplendens* Wagler 1828: pl. 5, fig. 1. Type locality, Java.

*Cylindrophis rufa javanica* Gray 1849: 112. Type locality, Java.

Proposed standard English name: **Red-Tailed Pipe-Snake**

Proposed standard Indonesian name: **Ular Pipa Ekor Merah**

**Remarks:** Here we accept the correction of the type locality made by Schlegel (1844). We have failed to find another species of *Cylindrophis* sympatric with *C. ruffus* in Java among the specimens examined. However the biogeographical range of *C. ruffus* could extend beyond Java, e.g., Borneo and Peninsular Malaysia—see Stuebing (1994: Table 1).

**Examined materials (14):** MZB 1418, (SVL 715 mm), Burial, Bogor, West Java, Indonesia; MZB 3816, 1433, (SVL 325 mm, 350 mm), Banten, Indonesia; MZB 300, 301, 304, 309, 1049, 2000, (SVL 580 mm, 550

mm, 520 mm, 560 mm, 540 mm, 650 mm); MNHN-RA 1975.0073–74, 3280, 2007.2452 (formerly 3280A), 7182, (SVL 258 mm, 300 mm, 517 mm, 466 mm, 257 mm), Java, Indonesia.

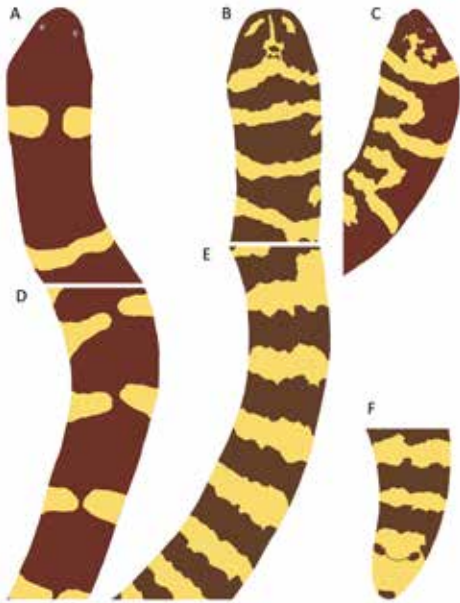
**Diagnosis:** *Cylindrophis ruffus* is distinguished from all congeners by having the following characters: 19 midbody scale rows (vs. 17 in *C. engkariensis*; 21 in *C. isolepis*, *C. lineatus*, *C. maculatus*, *C. yamdena*; 23 in *C. aruensis*, *C. opisthorhodus*), 186–197 ventrals (vs. 233–275 in *C. melanotus*; 201–225 in *C. burmanus*), wide and constant bands encircling dark body (vs. dorsum uniform black with no cross bands in *C. boulengeri*; narrow and alternating bands on paler body in *C. burmanus*), an interrupted and wide band on the nape (vs. no ring on the nape in *C. boulengeri*; a complete and narrow ring encircling the nape in *C. burmanus*).

**Description of examined materials:** SVL 257–715 mm; body elongate, rounded in cross section; head not distinct from neck, broadened and dorsoventrally flattened in the orbital and sagittal regions; snout rounded in dorsal and lateral view.

Rostral shield large, somewhat visible from a dorsal perspective with a conical apex; a single nasal, widely in contact behind the rostral, no internasals; nasals in contact with rostral anteriorly, with prefrontal dorsally, and the first and second supralabials ventrally; nostrils large; canthus rostralis weakly defined; prefrontal somewhat larger than the frontal and quadrangular; frontal large, triangular, and length same as its width; supraocular wide, triangular, posteriorly wider; parietal small, triangular,

**Table 3.** Comparison of some morphometric, meristic, and morphological characters of *Cylindrophis* species which have 21 midbody scale rows, based on examined materials; “—” = Not applicable.

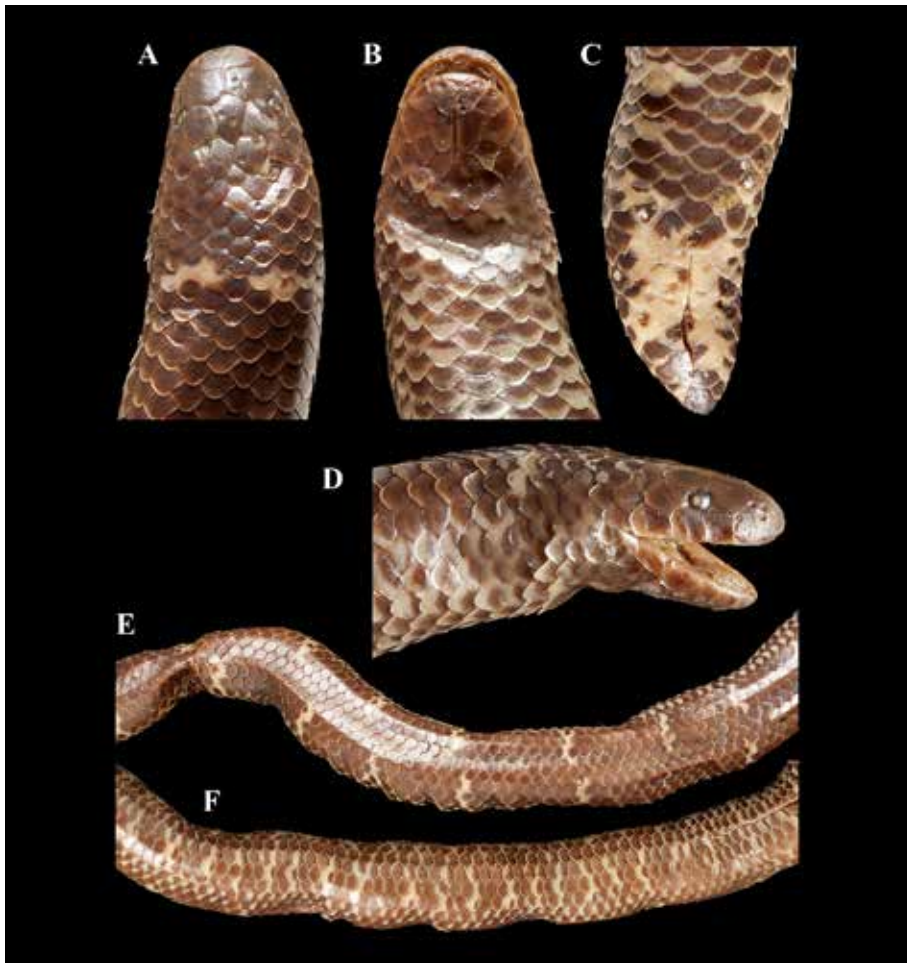
Character	21 scale rows at midbody					
	<i>C. isolepis</i> (n = 7)	<i>C. lineatus</i> (n = 2)	<i>C. maculatus</i> (n = 33)	<i>C. yamdena</i> (n = 5)	<i>C. jodiae</i> sp. nov. (n = 11)	<i>C. mirzae</i> sp. nov. (n = 4)
Location	Jampea	Borneo	Sri Lanka	Yamdena	Vietnam	Singapore
SVL (in mm)	320–500	540–713	262–378	500–610	146–656	220–693
Scale rows around neck	21–23	20–21	19 or 20	21	21	19
Scale rows around midbody	21	21	21	21	21	21
Scale rows around precloacal	19	19	16 or 17	17	15–18	17 or 18
Mid ventral scales	217–225	215–218	195–208	179–193	182–196	196–217
Subcaudals	5–6	6–8	4–6	5–7	4–7	4–7
Frontal > prefrontal (1) or < (0)	0	0	0	1	0	0
Pale band/ring on the nape present (1) or absent (0)	1	0	1	0	1	1
Pale band/ring wide (1) or narrow (0)	1	—	1	—	1	0
Pale band/ring complete (1) or dorsally interrupted (0)	0	—	0	—	0	0
Crossbands on the back present (1) or absent (0)	0	0	0	0	1	1
Crossbands complete (1) or interrupted	—	—	—	—	0	1
Crossbands constant (1) or alternating (0)	—	—	—	—	1	1
Crossbands wide (1) or narrow (0)	—	—	—	—	1	0



**Fig. 1.** Coloration of *Cylindrophis ruffus* MZB 1418 (A) head in dorsal view, (B) head in ventral view, (C) head in lateral view, (D) midbody in dorsal view, (E) midbody in ventral view, and (F) tail in ventral view.



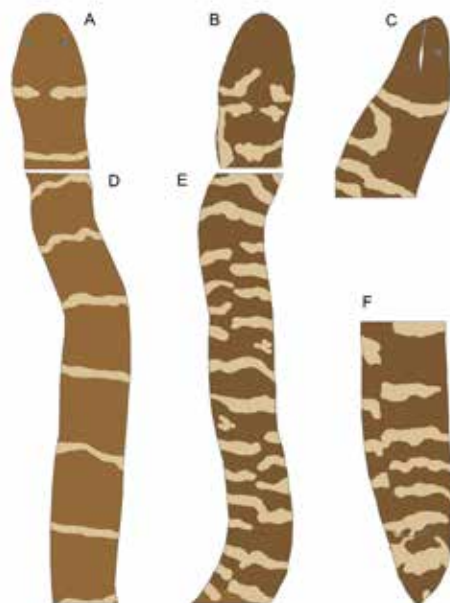
**Fig. 2.** Coloration of *Cylindrophis burmanus* lectotype, BMNH 1940.3.3.1 (A) head in dorsal view, (B) head in ventral view, (C) head in lateral view, (D) midbody in dorsal view, (E) midbody in ventral view, and (F) tail in ventral view.



**Fig. 3.** Sculation of *Cylindrophis burmanus* lectotype, BMNH 1940.3.3.1 (A) head in dorsal view, (B) head in ventral view, (C) head in lateral view, (D) tail in ventral view, (E) midbody in dorsal view, (F) midbody in ventral view.



**Fig. 4.** Coloration of *Cylindrophis jodiae* sp. nov. holotype, MNHN-RA 1911.0196 (A) head in dorsal view, (B) head in ventral view, (C) head in lateral view, (D) midbody in dorsal view, (E) midbody in ventral view, and (F) tail in ventral view.



**Fig. 6.** Coloration of *Cylindrophis mirzae* sp. nov. holotype, MNHN-RA 3279 (A) head in dorsal view, (B) head in ventral view, (C) head in lateral view, (D) midbody in dorsal view, (E) midbody in ventral view, and (F) tail in ventral view.



**Fig. 5.** Scapulation of *Cylindrophis jodiae* sp. nov. holotype, MNHN-RA 1911.0196 (A) head in dorsal view, (B) head in ventral view, (C) tail in ventral view, (D) head in lateral view, (E) tail in lateral view, (F) body in dorsal and ventrolateral view.

its rear border pointed, bordered by supraocular, frontal shield, upper posterior temporal shield, occipital shield, and two dorso-nuchal shields posteriorly on each side, the occipital shield is of equal size as other dorso-nuchal scales; loreal and preocular absent; eye small, pupil rounded; eye in broad contact with supraocular dorsally, prefrontal and third supralabial anteriorly, fourth supralabial ventrally, and postocular posteriorly; a single small postocular, quadrangular, posteriorly wider, in broad contact with supraocular, anterior temporal, and fourth supralabial; temporals 1+2, triangular; anterior temporal larger than posteriors; anterior temporal in contact with supraocular and both posterior temporal with parietal dorsally, 4<sup>th</sup>–6<sup>th</sup> supralabials ventrally; anterior temporal does not meet parietals.

Six supralabials, 3<sup>rd</sup>–5<sup>th</sup> larger in size; first supralabial in contact with rostral anteriorly and nasal dorsally; second supralabial in contact with nasal and prefrontal dorsally, third supralabial in contact with prefrontal and eye dorsally, fourth supralabial in contact with the eye, postocular, and anterior temporal dorsally; fifth supralabial in contact with anterior and posterior temporals; sixth supralabial in contact with lower posterior temporal dorsally and body scales posteriorly.

Mental small, triangular; first infralabial pair larger than mental plate and in broad contact with each other, in contact with anterior chin shield posteriorly; six infralabials in total, 1<sup>st</sup>–3<sup>rd</sup> in contact with first chin shield, 4<sup>th</sup>–6<sup>th</sup> in contact with gular scales, and not touching the chin shields; anterior chin shields larger than posterior ones; a mental groove continues from the posterior tip of the mental until the posterior chin shields.

Body slender; transverse dorsal scale rows (20–23)–19–(17–18), all smooth, subcycloid, and weakly imbricate; vertebrals and midventrals undifferentiated from adjacent scales; 186–197 ventrals; cloacal plate divided, precloacal undivided and triangular, tail extremely short, relative TL (TL/total length) 2.1–2.9%, with a conical robust and thick tip; 5–8 entire subcaudals.

**Coloration:** All the examined specimens have a reddish brown back with wide and incomplete lighter bands encircling the body along dorsal surface from behind nape to tail, each band covering about two scales; head entirely darker, an incomplete, wide ring encircling the nape; the venter is dark brown with regular, cream colored stripes, divided at midline. See Fig. 1 for details of coloration in preservative.

**Distribution:** *Cylindrophis ruffus* is recorded from Java, Indonesia (Fig. 8). Possible type locality is Batavia (now Jakarta) in Indonesia (not Batavia in Suriname).

### ***Cylindrophis burmanus* Smith 1943**

*Cylindrophis rufus burmanus* Smith 1943: 97 (Figs. 2, 3, 8; Tables 1, 2)

Proposed standard English name: **Burmese Pipe-Snake**

**Lectotype (designated herein):** BMNH 1940.3.3.1, (SVL 320 mm), collected from Rangoon, Burma (now Myanmar) by an unknown collector, collection date unknown. This specimen was presented to BMNH by Professor F.J. Meggitt, University College Rangoon (according to the museum registry). Although Smith (1943) had several specimens at his disposal at the time, he provided the measurement for only the largest specimen in the series. Because the original description is not comprehensive enough, and because of the fact that the *Cylindrophis* population in Myanmar may represent more than one species, in order to stabilize the name with a recognized type specimen, we here designate BMNH 1940.3.3.1 as the lectotype.

**Paralectotypes (6):** BMNH 1940.3.3.2, (SVL 212 mm), collected from Rangoon, Burma by an unknown collector, presented by F.J. Meggitt; BMNH 1908.6.23.3, (SVL 293 mm), Burma, collector and date unknown, presented by Major F. Wall; BMNH 1891.11.26.28, (SVL 280 mm), Pyinmana, Upper Burma, collector and date unknown, presented by E.W. Oates; BMNH 1925.4.2.2, (SVL 280 mm), Thandoung, Burma, collector and date unknown, presented by F. Wall; BMNH 1925.12.22.4, (SVL 256 mm), Sahmaw, Myitkyina District, Burma, collector and date unknown, presented by F. Wall; and probably ZMB 3094 (*vide* Iskandar and Colijn 2002; indicated no justification). All these paralectotypes share the same characters as the lectotype and belong to the same species.

**Diagnosis:** *Cylindrophis burmanus* is distinguished from all congeners by having the following characters: 19 midbody scale rows (vs. 17 in *C. engkariensis*; 23 in *C. aruensis*, *C. opisthorhodus*; 21 in *C. isolepis*, *C. lineatus*, *C. maculatus*, and *C. yamdena*), 201–225 ventrals (vs. 233–275 in *C. melanotus*; 193–200 in *C. boulengeri*; 186–197 in *C. ruffus*), narrow and alternating bands on paler body (vs. dorsum uniform black with no crossbands in *C. boulengeri*; wide, constant, dorsally interrupted bands encircling the dark body in *C. ruffus*), a complete and narrow ring encircling the nape (vs. no ring on the nape in *C. boulengeri*; a wide, dorsally interrupted band encircling the nape in *C. ruffus*).

**Description of lectotype:** SVL 320 mm, tail length 10 mm; body elongate, rounded in cross-section; head not distinct from neck, broadened and dorsoventrally flattened in the orbital and sagittal regions; snout rounded in dorsal and lateral view.

Rostral shield large, visible from above with a conical apex; a single nasal, widely in contact behind the rostral, no internasals; nasals in contact with rostral anteriorly, with prefrontal dorsally, and the first and second supralabials ventrally; nostrils large; canthus rostralis weakly



defined; prefrontal hexagonal, larger than frontal; frontal large, triangular, and longer than width; supraocular wide, triangular, wider posteriorly; parietal small, triangular, its rear border rounded, bordered by supraocular, frontal shield, upper posterior temporal shield, occipital shield, and two dorso-nuchal shields posteriorly on each side, the occipital shield smaller than other dorso-nuchal scales; loreal and preocular absent; eye small, pupil rounded; eye in broad contact with supraocular dorsally, prefrontal and third supralabial anteriorly, fourth supralabial ventrally, and postocular posteriorly; a single large postocular, subtriangular, posteriorly narrow, in broad contact with supraocular, anterior temporal, upper posterior temporal, and fourth supralabial; temporals 1+2, all triangular; anterior temporal smaller than upper posterior; anterior temporal in contact with both posterior temporals, 4<sup>th</sup> and 5<sup>th</sup> supralabials ventrally; anterior temporal does not meet parietals.

Five supralabials, 3<sup>rd</sup> and 4<sup>th</sup> largest in size; first supralabial in contact with rostral anteriorly and nasal dorsally; second supralabial in contact with nasal and prefrontal dorsally; third supralabial in contact with prefrontal and eye dorsally; fourth supralabial in contact with eye, postocular, and anterior temporal dorsally; fifth supralabial in contact with anterior and posterior temporals.

Mental small, triangular; first infralabial pair larger than mental plate and in broad contact with each other, in contact with anterior chin shield posteriorly; five infralabials in total, 1<sup>st</sup>–3<sup>rd</sup> in contact with first chin shield, 4<sup>th</sup> and 5<sup>th</sup> in contact with gular scales, and not touching the chin shields; anterior chin shields larger than posterior ones; a mental groove continues from the posterior tip of the mental until the posterior chin shields.

Body slender; transverse dorsal scale rows 19–19–17, all smooth, subcycloid, and weakly imbricate; vertebral and midventral scales undifferentiated from adjacent scales; 213 ventrals; cloacal plate divided, precloacal undivided and triangular, tail extremely short, relative TL (TL/total length) 3.0%, with a conical thick and robust tip; 6 or 7 (damaged) entire subcaudals.

**Coloration:** The lectotype (the largest specimen of the original syntypes) has a brown back with narrow and alternating white stripes along dorsal surface from behind nape to tail, each stripe covering about half of one scale; head entirely dark, a complete, narrow ring encircling the nape; the venter is brown with regular, mottled cream colored bars. See Fig. 2 for details of coloration in preservative.

**Variation of paralectotypes:** SVL range from 256–293 mm; body scale rows at neck ranges from 17–19; ventrals 201–225; relative TL 2.1–2.9%.

**Distribution:** *Cylindrophis burmanus* is only reported from Myanmar (Fig. 8).

***Cylindrophis jodiae* sp. nov. Amarasinghe, Ineich, Campbell & Hallermann**

(Figs. 4, 5, 8; Table 3)

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Proposed standard English name: **Jodi's Pipe-Snake**

**Holotype:** MNHN-RA 1911.0196, SVL 415 mm, collected from Annam, Central Vietnam, by the French botanist Philippe Eberhardt, without precise date, but before 1911.

**Paratypes (10):** MNHN-RA 1974.1251, (SVL 391 mm), collected in the area of Saigon, southern Vietnam, by Sergeant Poilane before 1974; MNHN-RA 1885.0100–103, (SVL 265, 264, 146, 177 mm), collected in Cochinchina, southern Vietnam, by Girard before 1885; MNHN-RA 1885.0098–99, (SVL 375, 656 mm), collected in Cochinchina, southern Vietnam, by Girard before 1885; MNHN-RA 1935.0001, (SVL 271 mm), collected in Cochinchina, southern Vietnam, by René Bourret before 1935; MNHN-RA 1974.1253, (SVL 192 mm), collected in the area of Saigon, southern Vietnam, by Sergeant Poilane before 1974; BMNH 1920.1.20.2649, (SVL 345 mm), collected from Long-Xuyen, Vietnam by F. Lataste, collection date unknown.

**Diagnosis:** *Cylindrophis jodiae* sp. nov. is distinguished from all congeners by having the following characters: 21 midbody scale rows (vs. 17 in *C. engkariensis*; 19 in *C. boulengeri*, *C. burmanus*, *C. melanotus*, *C. ruffus*; 23 in *C. aruensis*, *C. opisthorhodus*), 182–196 ventrals (vs. 217–225 in *C. isolepis*), wide and interrupted bands on the back (vs. lateral and middorsal stripes along the body in *C. lineatus*; two series of large reddish-brown spots along the back, which are enclosed by a black network in *C. maculatus*; no bands and paler back in *C. yamdena*).

**Description of holotype:** An adult, SVL 420 mm, tail length 10.1 mm; body elongate (largest body diameter at midbody is 23.8 mm), flattened laterally in cross section; head not distinct from neck, broadened and dorsoventrally flattened in the orbital and sagittal regions; snout rounded in dorsal and lateral view.

Rostral shield large, visible from above with a conical apex; a single nasal, widely in contact behind the rostral, no internasals; nasals in contact with rostral anteriorly and prefrontal posteriorly, and the first and second supralabials ventrally; the holotype has its right nasal in contact with the left prefrontal by a point, which is an anomaly; nostrils large; canthus rostralis weakly defined; prefrontals slightly larger than the frontal, and pentagonal; frontal small, triangular, and same length as its width (length 3.8 mm, width 3.7 mm), equal or somewhat smaller than supraocular; supraocular wide, subtriangular, wider posteriorly; parietals smaller than frontal



**Fig. 7.** Scapulation of *Cyliodrophis mirzae* sp. nov. holotype, MNHN-RA 3279 (A) head in dorsal view, (B) head in ventral view, (C) tail in ventral view, (D) head in lateral view, (E) tail in lateral view, (F) body in dorsal view, (G) body in ventral view.

which are in large median oblique contact oriented from right to left antero-posteriorly, subtriangular, their rear border bluntly pointed, bordered by supraoculars, frontal shield, upper posterior temporal shields, occipital shield, and two dorso-nuchal shields posteriorly on each side, the occipital shield of the same size as other dorso-nuchal scales; left parietal in larger contact than the right (just a point) with the frontal; loreal and preocular absent; eye small (diameter 1.8 mm), pupil rounded; eye in broad contact with supraocular dorsally, prefrontal and third supralabial antero-ventrally, fourth supralabial ventrally, and postocular posteriorly; a single postocular, quadrangular, posteriorly roundish and wider, in broad contact with supraocular, anterior temporal, and narrow contact with fourth supralabial; temporals 1+2, triangular; anterior temporal larger than posteriors; anterior temporal in contact with supraocular and posterior temporal dorsally, 4<sup>th</sup> and 5<sup>th</sup> supralabials ventrally, anterior temporal does not meet parietal on both sides; upper posterior temporal slightly larger than lower posterior temporal.

Five supralabials, 3<sup>rd</sup>–5<sup>th</sup> larger in size; first supralabial in contact with rostral anteriorly and nasal dorsally; second supralabial in contact with nasal and prefrontal

dorsally; third supralabial in contact with prefrontal and eye dorsally; fourth supralabial in contact with the eye, postocular, and anterior temporal dorsally; fifth supralabial in contact with anterior and posterior temporals dorsally and body scales posteriorly.

Mental small, triangular; first infralabial pair larger than mental plate and in broad contact with each other; 1<sup>st</sup> infralabials in contact with anterior chin shield posteriorly; five infralabials in total, 1<sup>st</sup>–3<sup>rd</sup> in contact with first chin shield, 4<sup>th</sup> and 5<sup>th</sup> in contact with gular scales and not touching the chin shields; anterior chin shields larger than posterior ones; a mental groove continues from the posterior tip of the mental until the posterior chin shields.

Body slender; transverse body scale rows 21–21–17, all smooth, subcycloid, and weakly imbricate; vertebral and midventral scales undifferentiated from adjacent scales; 188 ventrals; cloacal plate divided, precloacal undivided and triangular; tail extremely short, relative TL (TL/total length) 2.5%, with a conical robust and thick tip, and six paired subcaudals.

**Coloration:** The holotype has a dark brown back with wide and interrupted white bands along dorsal surface

from behind nape to tail, each band covering about two scales; head entirely dark, an incomplete, wide band encircling the nape; the venter is dark brown with regular, cream colored bars, divided at midline. See Fig. 4 for details of coloration in preservative.

**Variation of paratypes:** SVL range from 146–656 mm, but MNHN-RA 1885.0102–3, 1974.1253 are juveniles; body scale rows at one scale prior to precloacal ranges from 16–18; ventrals 182–196; subcaudals 4–6; all the subcaudals entire except MNHN-RA 1885.0100 (2<sup>nd</sup> divided), MNHN-RA 1885.0103 (3<sup>rd</sup> divided); relative TL 2.0–3.3%.

**Etymology:** The species epithet is an eponym latinized as a noun in the genitive singular, honoring Dr. Jodi Rowley for her generous friendship, and remarkable contributions and expeditions assessing amphibian decline due to various diseases, conservation status, and in documenting amphibian biodiversity. Jodi Rowley is an Australian herpetologist. She has conducted amphibian research in Southeast Asia, mainly in Vietnam. Currently she is a co-ordinator of Australian Museum Research Institute, a member of the IUCN Amphibian Red List Authority and the co-chair for Mainland Southeast Asia of the IUCN Species Survival Commission Amphibian Specialist Group.

**Distribution:** The new species is only reported from Vietnam (Fig. 8). The specimens from Cambodia and

Thailand are much closely related to this new species, however for the moment we exclude these specimens as it seems now, after having examined these specimens, that there may be many more species in existence in Cambodia and Thailand.

***Cylindrophis mirzae* sp. nov. Amarasinghe, Ineich, Campbell & Hallermann**

(Figs. 6, 7, 8; Table 3)

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Proposed standard English name: **Mirza’s Pipe-Snake**

Proposed standard Indonesian name: **Ular Pipa Mirza**

**Holotype:** MNHN-RA 3279, (SVL 419 mm), collected at Singapore, by Joseph Fortuné Théodore Eydoux (1802–1841), certainly during the expedition on the vessel La Favorite (1829–1832).

**Paratypes (3):** BMNH 1847.2.9.23, (SVL 693 mm), collected from Singapore, by A.F. Gardiner, collection date unknown; BMNH 1938.9.8.1, (SVL 580 mm), collected from Singapore, by Dr. A.G.H. Smart (Assistant Medical Advisor, Colonial Office S.W.1.), presented by Dr. H.B. Newham (London School of Hygiene and Tropical Medicine), collection date unknown; BMNH 1880.9.10.23, (SVL 298 mm), collected from Singapore, collector and the date unknown, presented by Dr. Dennis.

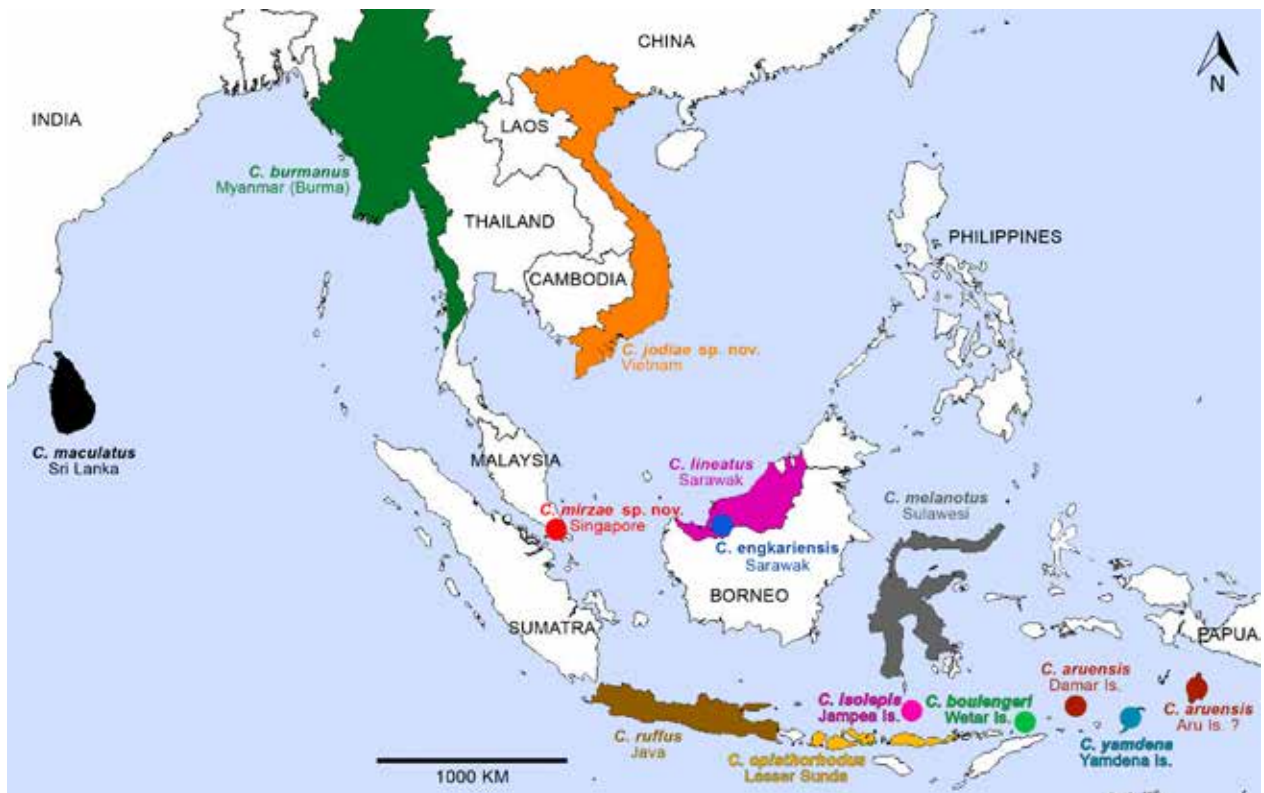


Fig. 8. Current distribution pattern of the genus *Cylindrophis*.

**Diagnosis:** *Cylindrophis mirzae* sp. nov. is distinguished from all congeners by having the following characters: 21 midbody scale rows (vs. 17 in *C. engkariensis*; 19 in *C. boulengeri*, *C. burmanus*, *C. melanotus*, *C. ruffus*; 23 in *C. aruensis*, *C. opisthorhodus*), narrow and completed lighter rings encircling the dark body at anterior and posterior parts of the body (vs. no bands on the paler back in *C. isolepis* and *C. yamdena*; lateral and middorsal stripes along the body in *C. lineatus*; wide and interrupted bands on the back in *C. jodiae* sp. nov.; two series of large reddish-brown spots along the back, which are enclosed by a black network in *C. maculatus*).

**Description of holotype:** An adult, SVL 419 mm, tail length 10.0 mm; body elongate (largest body diameter at midbody is 14.6 mm), rounded in cross section; head not distinct from neck, broadened and dorsoventrally flattened in the orbital and sagittal regions; snout blunt in dorsal and lateral view.

Rostral shield small, slightly visible from above with a conical apex; a single nasal, widely in contact behind the rostral, no internasals; nasals in contact with rostral anteriorly, with prefrontal posteriorly, and the first and second supralabials ventrally; nostrils large; canthus rostralis weakly defined; prefrontals larger than the frontal, and quadrangular; frontal large (length 2.7 mm and width 3.1 mm), triangular, and with the same length as width, equal or somewhat larger than supraocular; supraocular wide (length 2.6 mm and width 2.3 mm), triangular, posteriorly wider; parietals equal in size to frontal, subtriangular, their rear border rounded, bordered by supraocular, frontal shield, upper posterior temporal shield, occipital shield, and two dorso-nuchal shields posteriorly on each side, the occipital shield is of same size as other dorso-nuchal scales; loreal absent; no preocular; eye small (diameter 1.0 mm), pupil rounded; eye in broad contact with supraocular dorsally, prefrontal and third supralabial anteriorly, fourth supralabial ventrally, and postocular posteriorly; a single postocular, trapezoidal, posteriorly wider, in broad contact with supraocular, anterior temporal, and wide contact with fourth supralabial ventrally; temporals 1+2, subtriangular; anterior temporal much larger than posteriors; anterior temporal in contact with supraocular and upper posterior temporal dorsally, lower posterior temporal posteriorly, 4<sup>th</sup> and 5<sup>th</sup> supralabials ventrally; anterior temporal well separated from the parietal by the supraoculars and the upper posterior temporal.

Six supralabials, 3<sup>rd</sup> and 4<sup>th</sup> larger in size and touching the eye; first supralabial in contact with rostral anteriorly and nasal dorsally; second supralabial in contact with nasal and prefrontal dorsally, third supralabial in contact with prefrontal and eye postero-dorsally, fourth supralabial in contact with the eye, postocular, and anterior temporal dorsally; fifth supralabial in contact with anterior and lower posterior temporal dorsally; sixth supralabial in contact with posterior temporals dorsally and body scales posteriorly.

Mental large, triangular; first infralabial pair slightly smaller than mental plate and in narrow contact with each other, and with anterior chin shield posteriorly; six infralabials in total, 1<sup>st</sup>–3<sup>rd</sup> in contact with first chin shield, 4<sup>th</sup>–6<sup>th</sup> in contact with gular scales but not touching the chin shields; anterior chin shields larger than posterior ones; a mental groove continues from the posterior tip of the mental until the posterior chin shields.

Body slender; transverse body scale rows 19–21–18, all smooth, subcycloid, and weakly imbricate; vertebrals and midventrals undifferentiated from adjacent scales; 213 ventrals; cloacal plate divided, preloacal undivided and triangular; tail extremely short, relative TL (TL/total length) 2.3%, with a conical robust and thick tip; five subcaudals, the first three entire, the following divided and the last one entire again.

**Coloration:** The holotype has a brown back with narrow and completed lighter rings encircling the body along dorsal surface from behind nape to tail, each band covering about one scale; head lighter, an incomplete, narrow ring encircling the nape; the venter is dark brown with regular, cream colored stripes, some divided at midline. See Fig. 6 for details of coloration in preservative.

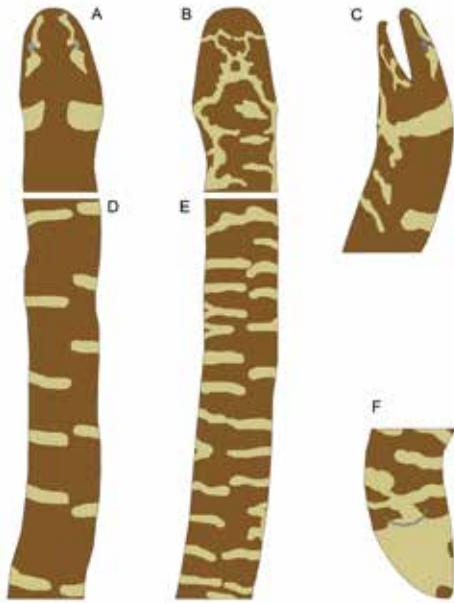
**Variation of paratypes:** SVL range from 298–693 mm; ventrals 196–217; six subcaudals in all paratypes; relative TL 2.0–3.3%.

**Etymology:** The species epithet is an eponym latinized as a noun in the genitive singular, honouring Dr. Mirza Kusri for her generous friendship and support, for her dedication and important contributions to herpetological conservation and ecology in Indonesia. Mirza Kusri is an Indonesian herpetologist and currently she is a lecturer at Bogor Agricultural University, Indonesia and a steering committee member of IUCN Species Survival Commission Amphibian Specialist Group.

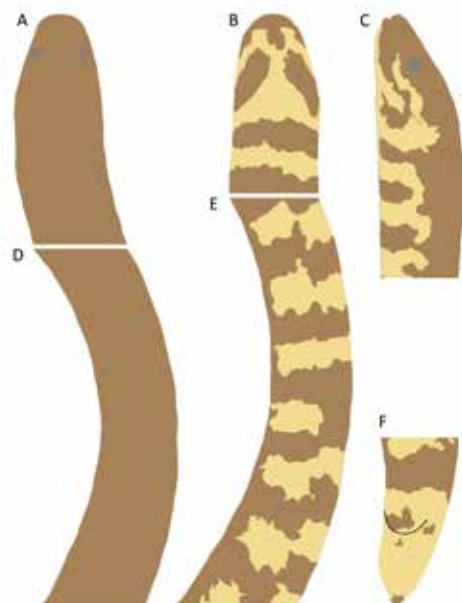
**Distribution:** The new species is evidently recorded from Singapore (Fig. 8).

## Discussion

Although, it has been confirmed that the types of *Anguis ruffa* and *Cylindrophis resplendens* are lost, it is now clear that the type locality of *Cylindrophis ruffus* is Java (*vide* Schlegel 1844). The International Code of Zoological Nomenclature (ICZN) supports the designation of a neotype in order to stabilize the taxonomic status. However, we have decided not to undertake such action due to the following reasons: (1) our available samples from Java were too small ( $n = 14$ ), (2) we have not yet compared the *C. cf. ruffus* populations (which also have 19 midbody scale rows) from other Sundaic Islands and Peninsular Malaysia (including specimens mentioned by



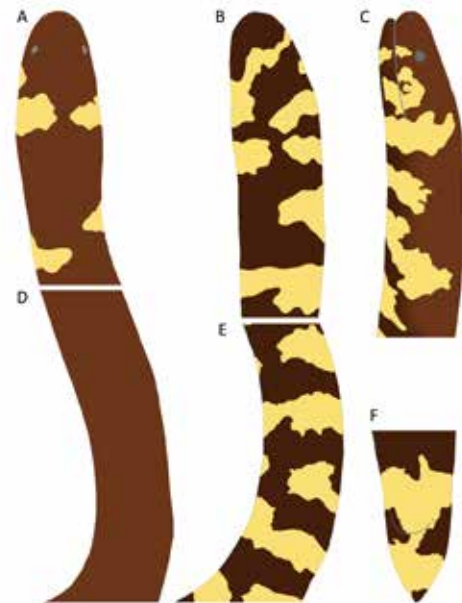
**Fig. 9.** Coloration of *Cylindrophis aruensis* syntype BMNH 1946.1.16.72 (A) head in dorsal view, (B) head in ventral view, (C) head in lateral view, (D) midbody in dorsal view, (E) midbody in ventral view, and (F) tail in ventral view.



**Fig. 10.** Coloration of *Cylindrophis boulengeri* MZB 5284 (A) head in dorsal view, (B) head in ventral view, (C) head in lateral view, (D) midbody in dorsal view, (E) midbody in ventral view, and (F) tail in ventral view.



**Fig. 11.** Coloration of *Cylindrophis engkariensis* holotype ZRC 8821 (A) head in dorsal view, (B) head in ventral view, (C) head in lateral view, (D) midbody in dorsal view, (E) midbody in ventral view, and (F) tail in ventral view.

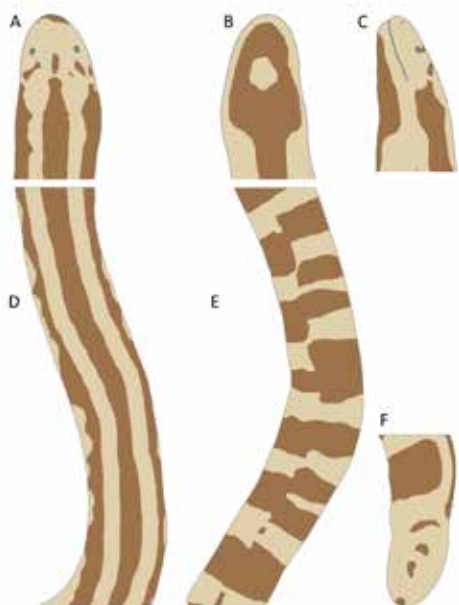


**Fig. 12.** Coloration of *Cylindrophis isolepis* MZB 1926 (A) head in dorsal view, (B) head in ventral view, (C) head in lateral view, (D) midbody in dorsal view, (E) midbody in ventral view, and (F) tail in ventral view.

Stuebing 1994), and (3) we have not found a preserved adult specimen from Jakarta with associated DNA samples to support its designation as a neotype. We believe it would be better to designate a specimen of which DNA samples are available to solve the taxonomic issues mentioned in number (2) above.

Based on morphological and meristic characters, particularly the number of dorsal scale rows at midbody,

number of ventrals, and coloration, we include *C. rufus* and *C. burmanus* in the morphological group which has 19 middorsal scale rows. However Taylor's (1965) specimen of "*Cylindrophis rufus rufus*" from Thailand and the populations from Thailand and Cambodia might either represent an undescribed species or represent *C. jodiae* sp. nov. which is distributed in Vietnam. However, we defer from attempting to answer such questions



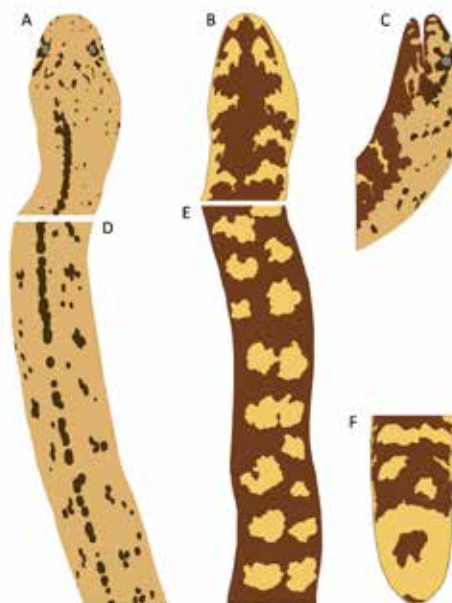
**Fig. 13.** Coloration of *Cylindrophis lineatus* holotype BMNH 1946.1.16.5 (A) head in dorsal view, (B) head in ventral view, (C) head in lateral view, (D) midbody in dorsal view, (E) midbody in ventral view, and (F) tail in ventral view.



**Fig. 14.** Coloration of *Cylindrophis maculatus* BMNH 1962.861 (A) head in dorsal view, (B) head in ventral view, (C) head in lateral view, (D) midbody in dorsal view, (E) midbody in ventral view, and (F) tail in ventral view.



**Fig. 15.** Coloration of *Cylindrophis melanotus* MZB 2999 (A) head in dorsal view, (B) head in ventral view, (C) head in lateral view, (D) midbody in dorsal view, (E) midbody in ventral view, and (F) tail in ventral view.

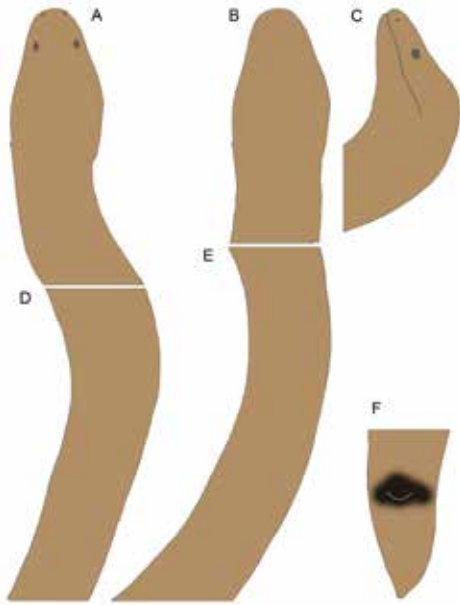


**Fig. 16.** Coloration of *Cylindrophis opisthorhodus* MZB 1515 (A) head in dorsal view, (B) head in ventral view, (C) head in lateral view, (D) midbody in dorsal view, (E) midbody in ventral view, and (F) tail in ventral view.

because we believe such questions should be addressed with the support of molecular evidence and with the comparison involving large samples from each of the representative countries. We did not compare *C. mirzae* sp. nov. from Singapore with the populations in Sumatra, Peninsular Malaysia, and Borneo because the available samples from those locations were too small, thus we have voluntarily excluded those areas from our study. It

is probable that *C. mirzae* sp. nov. may be distributed in some parts of Sumatra (e.g., *C. cf. mirzae* specimen listed in Appendix 1 below).

It seems also that *Cylindrophis melanotus* might be a species complex or at least consisting of two cryptic species (note the wide range of ventrals: 233–275). Although, the taxonomy of the genus *Cylindrophis* should be examined critically with larger samples and with the



**Fig. 17.** Coloration of *Cylindrophis yamdena* holotype WAM R112252 (A) head in dorsal view, (B) head in ventral view, (C) head in lateral view, (D) midbody in dorsal view, (E) midbody in ventral view, and (F) tail in ventral view.

support of molecular analyses (especially for the species which have 19 and 21 midbody scale rows), we have described the above two new species due to their clear morphological differences and because of their biogeographically isolation from all other known taxa.

**Acknowledgments.**—We thank the Ministry of Research and Technology of the Republic of Indonesia (RISTEK), S. Wahyono and L. Shalahuddin for coordinating and granting research permissions to AATA; the staff members of LIPI-MZB including A. Hamidy, Syaripudin, and W. Trilaksana for facilitating in-house study of specimens; Robert Stuebing and Kelvin Lim (Lee Kong Chian Natural History Museum) for kindly sending the photos of *Cylindrophis engkariensis* type; Ruchira Somaweera and Paul Doughty (Western Australian Museum) for kindly examining and sending photos of *Cylindrophis yamdena*; and Gernot Vogel for kind support, valuable comments, and data issued from his specimen examination. We wish to thank M. Hoogmoed and E. Dondorp (RMNH, Leiden) for data about the collections under their care. We also thank N.K. Amarasinghe and the staff of RCCC-UI for their kind support, and Howard O. Clark, Jr. for excellent graphic design of the manuscript. Finally, we thank Van Wallach, Olivier Pauwels, and Gernot Vogel for reviewing the manuscript and their valuable comments.

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## Appendix 1

### Comparative materials examined

*Cylindrophis aruensis* Boulenger, 1920 (Fig. 9) – Aru Island, Indonesia: BMNH 1946.1.16.72–73 (syntypes); Dammer Island, Indonesia: MZB 305.

*Cylindrophis boulengeri* Roux, 1911 (Fig. 10) – Ilwaki, Wetar Island, Barat Daya, Maluku, Indonesia: SMF 16996 (holotype), MZB 5243, 5284; Madura Island, East Java, Indonesia (doubtful location): MZB 314.

*Cylindrophis engkariensis* Stuebing, 1994 (Fig. 11) – Nanga Segerak, Sarawak, Malaysia: ZRC 8821 (holotype).

*Cylindrophis isolepis* Boulenger, 1896 (Fig. 12) – Jampea Island, Selayar, South Sulawesi, Indonesia: BMNH 1946.1.1.47 (holotype); MZB 299A–B, 1926, 3149, 3365–66.



**Appendix 1 (continued)**

*Cylindrophis* cf. *jodiae* – Trapeang-Chan, Cambodia: MNHN-RA 1970.0411–13; Snoc Trou, Cambodia: MNHN-RA 1963.0713; Trabeang Thum lake, Choam Khsant, Cambodia: MNHN-RA 2010.0909; Ban Chao Samran, Muang District, Thailand: MNHN-RA 1998.0576; Ban Pong, Thailand: MNHN-RA 1999.7634; Ban Bang Ba, Muang District, Phang Nga Province, Thailand: MNHN-RA 1997.6582; Bangkok, Thailand: MNHN-RA 3281; Thailand: BMNH 1865.4.28.17, 1897.10.8.18, 1947.1.1.8, 1969.324, 1969.819, 1969.1693, 1987.1723–24.

*Cylindrophis lineatus* Blanford, 1881 (Fig. 13) – Singapore: BMNH 1946.1.16.5 (holotype); Borneo: BMNH 1901.5.17.1.

*Cylindrophis maculatus* Linnaeus, 1758 (Fig. 14) – Sri Lanka: BMNH 1962.861, 1892.11.3.3, 1969.2755, 1968.77, 1905.3.25.76–81, 1894.9.11.5–7, 1845.8.7.5, 1897.10.20.18, 1931.5.13.1–5, 1915.5.3.1, 1930.5.8.48, 1930.5.8.51, 1930.5.8.50, 1930.5.8.49, 1930.5.8.52, 1962.254, 1964.1632–1633, 1964.1687; MNHN-RA 3282–83.

*Cylindrophis melanotus* Wagler, 1830 (Fig. 15) – Dumoga West, North Sulawesi, Indonesia: MZB 3246; Manado, North Sulawesi, Indonesia: MNHN-RA 5779, 1999.8281; Rantepao, North Toraja, South Sulawesi, Indonesia: MZB 3826; Majene, West Sulawesi, Indonesia: MZB 310; Lindu Lake, Tomado, Central Sulawesi, Indonesia: MZB 1553, 3621; Butung Island, South-East Sulawesi, Indonesia: MZB 2834, 2999; Tinanggea, South Konawe, South East Sulawesi, Indonesia: MZB 4567; Tinukari, Wawo, North Kolaka, South East Sulawesi, Indonesia: MZB 4568; Halmaheira (=Halmahera), Indonesia: ZMB 34313 (holotype of *Cylindrophis heinrichi*); Sulawesi, Indonesia: MNHN-RA 3278, 7180, 7180A.

*Cylindrophis* cf. *mirzae* – Sumatra: MNHN-RA 1884.0115.

*Cylindrophis opisthorhodus* Boulenger, 1897 (Fig. 16) – Lombok, Indonesia: BMNH 1946.1.16.148–149 (syntypes); Ruteng, Watu, Manggarai, East Nusa Tenggara, Indonesia: MZB 1286; Flores, East Nusa Tenggara, Indonesia: MZB 1515; Ndao Nuse, West Rote, Rote Ndao, East Nusa Tenggara, Indonesia: MZB 1532.

*Cylindrophis yamdena* Smith & Sidik, 1998 (Fig. 17) – Yamdena Island, Indonesia: WAM R112252 (holotype), 109947, 109971–72, 109980.



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**Patrick D. Campbell** is a British citizen and Senior Curator of Reptiles, managing over an estimated 174,000 herpetology specimens in the Natural History Museum (London) at which he has been employed for almost 30 years. He is interested in collection management, reptile taxonomy, and the processes of speciation. He has carried out herpetological fieldwork recently in Kenya and the French Guiana and is also interested in the reptilian fauna of South and Southeast Asia, mainly focussing on the countries of Sri Lanka, India, Andaman/Nicobar, and Indonesia. As a BSAC (British Sub Aqua Club) advanced trained professional diver and dive instructor, he has dived on various expeditions including the RAF lead Benthic Orchid III examining the effect of the 2004 Tsunami in the Similan Islands Thailand, conducting underwater surveys for the burrowing starfish *Astropecten* in Spain, conducting marine biological surveys in the Cliffe Lagoons/Portland Harbour UK sifting and identifying macro invertebrate samples, and investigating shallow subtitle hydrothermal vents off the Greek island of Milos. He has lead various collection improvement projects at the museum including the recent CSIP (Collection Storage Improvement Project) Wildebeest project involving over 20,000 specimens.



**Jakob Hallermann** studied biology at the Universities of Tübingen and Hamburg, and then completed his Ph.D. in 1994 at the University of Tübingen focussing on the morphology of the Iguanian nose including a phylogenetic analysis. After two years as a volunteer at the Museum of Natural History Stuttgart, he became the curator of the herpetological collection of the Zoological Museum Hamburg (now Centre of Natural History, Cenak). His scientific interests are systematics, biogeography, speciation, and the comparative anatomy of herpetofauna. Since 1997 his research focus has shifted to the South and Southeast Asian herpetofauna. He has described many new species of the agamid lizard genera *Calotes*, *Pseudocalotes*, and *Bronchocela*. Currently, he is conducting research on the phylogeny of the African house snake genus *Boaedon*.



**Irvan Sidik** was born in Bandung, West Java Province, Indonesia. Irvan obtained an M.Sc. in the field of phylogenetics at the Institute Technology of Bandung. Since 1992 Irvan has been working as a staff researcher in the laboratory of herpetology at the Museum Zoologicum Bogoriense, Indonesian Institute of Sciences (LIPI) in the Cibinong Science Center. Beginning as an auxiliary field survey researcher, and then as a local CITES officer, Irvan became interested and developed a great interest in the snakes of the region of Sundaland. Irvan has continued with more scholarly work on the mountainous areas of the western part of Indonesia. Irvan's research is based on museum collections of specimens and field research in Indonesia's regions mentioned above. Irvan has been involved in several international research collaborations, and is currently working with the University of Texas at Arlington, USA on research of amphibians and reptiles in the mountains of Java and Sumatra. Irvan has published on the herpetofauna of Kalimantan and his first book was about snakes that are traded in Indonesia (CITES appendices I, II, and III) written in Indonesian. Currently, Irvan is studying the phylogeography of the reed snake genera *Calamaria* for his Ph.D. at the University of Brawijaya, Malang.



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**Ivan Ineich** is a French herpetologist especially interested in systematics, biogeography, and processes of speciation. He has mostly been carrying out reptile taxonomy work in Africa and on the Pacific Islands, but also South and Southeast Asia. He was curator of lizards and snakes at Paris Natural History Museum (NNHN) from 1988 to 2014. He was editor-in-chief of the French *Bulletin de la Société Herpétologique de France* for many years. He is currently researcher at the Institute for Systematic, Evolution and Biodiversity at the Museum national d'Histoire naturelle of Paris, a position that he occupied since 1988.

In accordance with the International Code of Zoological Nomenclature new rules and regulations (ICZN 2012), we have deposited this paper in publicly accessible institutional libraries. The new species described herein has been registered in ZooBank (Polaszek 2005a, b), the official online registration system for the ICZN. The ZooBank publication LSID (Life Science Identifier) for the new species described here can be viewed through any standard web browser by appending the LSID to the prefix "http://zoobank.org/." The LSID for this publication is: urn:lsid:zoobank.org:pub:A4C569A0-36DB-4E6D-B3CE-35331FE535F2.

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