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A new species of the genus *Oligodon* Fitzinger, 1826 (Squamata: Colubridae) from northern Vietnam, southern China and central Laos

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Abstract

A new species of the genus *Oligodon* Fitzinger, 1826, *Oligodon nagao* **sp. nov.**, is described on the basis of five specimens originating from Lang Son and Cao Bang provinces in northern Vietnam, Guangxi Autonomous Region in southern People's Republic of China, and from Khammouane Province in central Laos PDR. This species differs from other species of the region by the combination of 15 or 17 dorsal scale rows at midbody, unforked hemipenes, not spinose but with papillae, entire cloacal plate, a high number of ventrals, a rather short tail and dorsal pattern made of numerous dark, butterfly-shaped blotches. On the basis of the morphology of its hemipenes, *Oligodon nagao* **sp. nov.** belongs to the group of *Oligodon cinereus*. This new species is compared with other species of the Indochinese Peninsula and China with 15 or 17 dorsal scale rows, especially *Oligodon joyntsoni* (Smith, 1917). An updated list of the *Oligodon* species of this region is provided.

Key words: Squamata, Colubridae, Indochinese Peninsula, China, *Oligodon nagao* **sp. nov.**, taxonomy.

Introduction

With about 75 currently recognized species (Green *et al.* 2010; David & Vogel 2012), the genus *Oligodon* Fitzinger, 1826 remains one of the largest genera of Asiatic snakes. It is widespread throughout tropical Asia but is especially speciose in the large area known as the Indochinese Peninsula. This region encompasses the territories of Vietnam, Cambodia and Laos, as well as Thailand north of Peninsular Thailand, and the southern part of China, including Hainan Island. Currently, about 30 species are recognized in this region but some species, such as *Oligodon cinereus* (Günther, 1864), obviously include more than one species (David *et al.* 2011).

Three specimens recently collected in Lang Son and Cao Bang provinces, extreme northern Vietnam, one specimen found in Khammouane Province, central Laos, and the fifth one from extreme southwest Guangxi Autonomous Region, southern China, proved to be morphologically distinct from all other species known from this region. Especially noteworthy is the fact that all these specimens were collected in karst hills. Furthermore, the

morphology of the hemipenes agrees with the definition of the informal complex of *Oligodon cinereus* as given by Smith (1943), Wagner (1975) and Green *et al.* (2010). Following David *et al.* (2011), the group of *O. cinereus* currently includes *Oligodon cinereus* (Günther, 1864), *O. albocinctus* (Cantor, 1839), *O. inornatus* (Boulenger, 1914), *O. joysoni* (Smith, 1917), *O. melanozonatus* Wall, 1922, *O. splendidus* (Günther, 1875), and *O. woodmasoni* (Sclater, 1891). This complex is mainly characterized by (1) unforked hemipenes with papillae but not spinose, (2) 15–21 dorsal scale rows (17 rows in *O. cinereus* and *O. joysoni*, 15 rows in *O. inornatus*), (3) 8–12 maxillary teeth, and (4) cloacal plate usually entire. The *O. cinereus* group is widespread from north-eastern India and Myanmar, to southern China and to southern Thailand. Hemipenial morphology of these five specimens also agrees with that of the group of *O. purpurascens*, which includes *O. maculatus* (Taylor, 1918), *O. purpurascens* (Schlegel, 1837), and *O. splendidus* (Günther, 1875). This group occurs in Myanmar (*O. splendidus*), the Indo-Malayan Region and the Philippines.

Species of the *Oligodon cinereus* group show morphological similarities with species of the *Oligodon cyclurus* group, the other large group present in the Indochinese Peninsula which contains *O. cyclurus* (Cantor, 1839), *O. kheriensis* Acharji & Ray, 1936, *O. fasciolatus* (Günther, 1864), *O. juglandifer* (Wall, 1909), *O. chinensis* (Günther, 1888), *O. formosanus* (Günther, 1872), *O. ocellatus* (Morice, 1875), *O. saintgironsi* David, Vogel & Pauwels, 2008, and *O. macrurus* (Angel, 1927). Both groups are mainly differentiated by the morphology of the hemipenes, which are long and deeply forked, neither spinose nor papillate (at the exception of *O. formosanus*, in which papillae are present) in the *O. cyclurus* group.

The five reported specimens from northern Vietnam, China and Laos do neither belong to any of the species cited above, nor to any other species of the genus. As a consequence, we here refer them to a new species which is described below. In addition, a new list to *Oligodon* species of Vietnam, China and Laos is provided.

Material and methods

The description is based on morphological characters regarded as taxonomically significant in the genus *Oligodon*, i.e. scalation and colour pattern, as well as the dentition of the maxilla and the morphology of hemipenes (see, for example, Smith 1943; Wagner 1975; Tillack & Günther 2010; David *et al.* 2008a, 2008b, 2011; David & Vogel 2012). Measurements, except body and tail lengths, were taken with a slide-calliper. The numbers of dorsal scale rows, counted according to Dowling (1951), are given at one head length behind head, at midbody, and at one head length before vent, respectively. Maxillary teeth were counted by removing the gums of the left maxilla. Values for symmetric head characters are given in left / right order. Photographs of the head of the holotype were taken with a digital microscope Keyence VHX-500F.

Abbreviations of measures and other characters used in the text. *Measures and ratios*. HL: head length (from tip of snout to angles of the jaws). SnL: snout length (from tip of snout to anterior margin of eye). SVL: snout-vent length (from tip of the snout). TaL: tail length. TL: total length. TaL/TL: ratio tail length/total length. *Meristic and other characters*. Ate: anterior temporal scale. DEN: maxillary teeth. DSR: dorsal scale rows. IL: infralabial scales. InN: internasal scale. Lor: loreal scale. SC: subcaudal scales (excluding the last one). SL: supralabial scales. VEN: ventral scales (counted according to Dowling 1951).

Museum abbreviations: AMNH: American Museum of Natural History, New York, USA. BMNH: Natural History Museum, London, UK. BNHS: Bombay Natural History Society, Mumbai, India. CAS: California Academy of Sciences, San Francisco, USA. CIB: Chengdu Institute of Biology, Chengdu, People's Republic of China. IEBR: Institute of Ecology and Biological Resources, Hanoi, Vietnam. KIZ: Kunming Institute of Zoology, Kunming, Yunnan, People's Republic of China. MHL: Muséum d'Histoire naturelle de Lyon, Lyon, France. MNHN: Muséum National d'Histoire Naturelle, Paris, France. NMW: Naturhistorisches Museum Wien, Vienna, Austria. NHMB: Naturhistorisches Museum Basel, Basel, Switzerland. PSGV: Gernot Vogel's private collection, Heidelberg, Germany. RMNH: Nationaal Natuurhistorisch Museum (Naturalis), Leyden, The Netherlands. SMF: Naturmuseum und Forschungsinstitut Senckenberg, Frankfurt am Main, Germany. USNM: National Museum of Natural History, Smithsonian Institution, Washington, USA. VNMN: Vietnam National Museum of Nature, Hanoi, Vietnam. ZFMK: Zoologisches Forschungsmuseum Alexander Koenig, Bonn, Germany. ZMA: Zoologisch Museum Amsterdam, Amsterdam, The Netherlands. ZSI: Zoological Survey of India, Kolkata, India.

Results

The enlarged and compressed, blade-like posterior maxillary teeth, the large rostral scale and the overall morphology of the five specimens are diagnostic of the genus *Oligodon*. However, they differ from all known species of this genus by a combination of characters in scalation and colour pattern. We consider differences of these specimens with other species to be significant enough to regard them as belonging to an undescribed species, which we describe herein as:

Oligodon nagao sp. nov.

(Figs. 1–5)

Oligodon joynsoni (nec *Simotes longicauda joynsoni* Smith, 1917, a valid species, now *Oligodon joynsoni*).—Anonymous 2002: 22, front cover.—Zhao 2006: 229.—Zhang 2009: 97, 99 & 100: Fig. 100.

Holotype. VNMN A.2012.1, adult male, from Huu Lien forest, Huu Lung District, Lang Son Province, Vietnam, at elevation of about 300 m a.s.l.; collected by Tao Thien Nguyen on 30 June 2009.

Paratypes. Four specimens, all adult males: MNHN 2012.0216, from Huu Lien forest, Huu Lung District, Lang Son Province, Vietnam, at elevation of about 300 m a.s.l.; collected by Tao Thien Nguyen, 2 July 2009.—IEBR A.2012.6, from Duc Quang Commune, Ha Lang District, Cao Bang Province, Vietnam; collected by Truong Quang Nguyen *et al.*, 14 October 2011 (22°42.859'N, 106°39.853'E, elevation 476 m).—KIZ 014591, from Nonggang National Nature Reserve, Longzhou County, Guangxi Autonomous Region, People's Republic of China; collected by Tianbo Chen, October, 2011.—ZFMK 93281, from Ban Nathan, Hin Boun District, Khammouane Province, Laos PDR (17°58.854'N, 104°49.517'E, elevation 172 m); collected by Alexandre Teynié *et al.*, 17 May 2012, during the mission “*Opération Canopée, Inventaire de la Biodiversité Forestière du Laos 2012-2015*”.

Diagnosis. A large species (TL up to at least 786 mm) of the genus *Oligodon* characterized by the combination of (1) 9 or 10 maxillary teeth, the last three or four strongly enlarged, (2) hemipenes not forked but divided into two lobes, thick and bulbous, reaching in situ the 16th SC, smooth, each lobe with a papilla, (3) 17–17–15 (or 17–15–15 DSR in one specimen); (4) cloacal plate entire, (5) complete complement of head scales, including 1 loreal on each side, (6) 8 supralabials (7 in one specimen), fourth and fifth (third and fourth in one specimen) entering orbit, (7) 184–193 ventrals in five males (females unknown), (8) tail relatively short in males (ratio TaL/TL: 0.135–0.146), (9) dorsal pattern made of a dark background colour with 27–37 darker, pale centered, butterfly-shaped blotches on the body and 5–8 on the tail, and (10) venter cream, heavily marked with dark pigmentation.

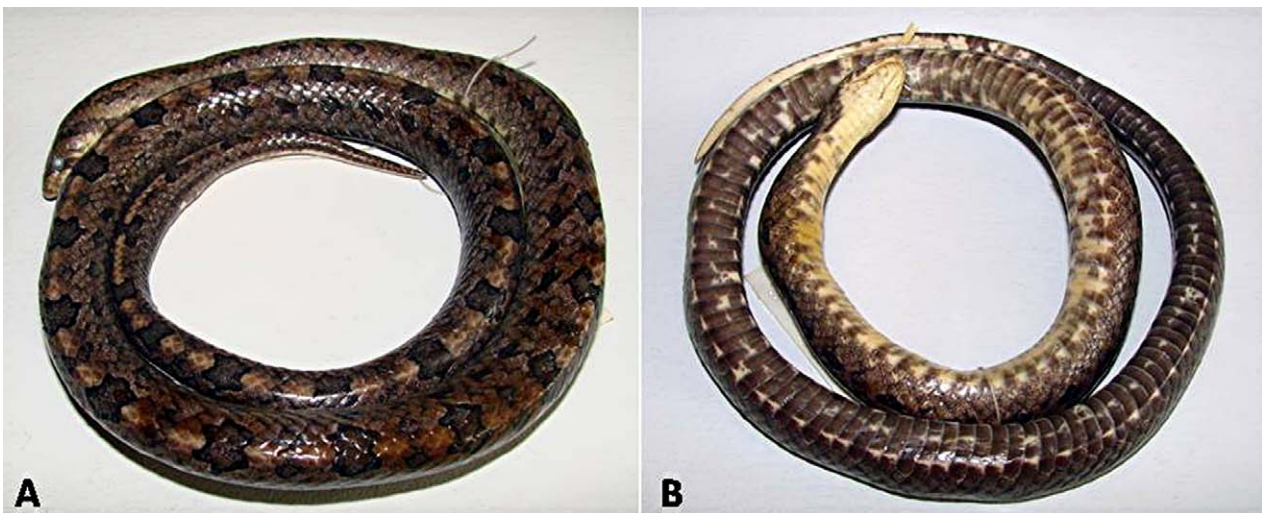


FIGURE 1. Holotype of *Oligodon nagao* sp. nov. (VNMN A.2012.1, adult male): A. Dorsal view. B. Ventral view. Photographs by Patrick David.

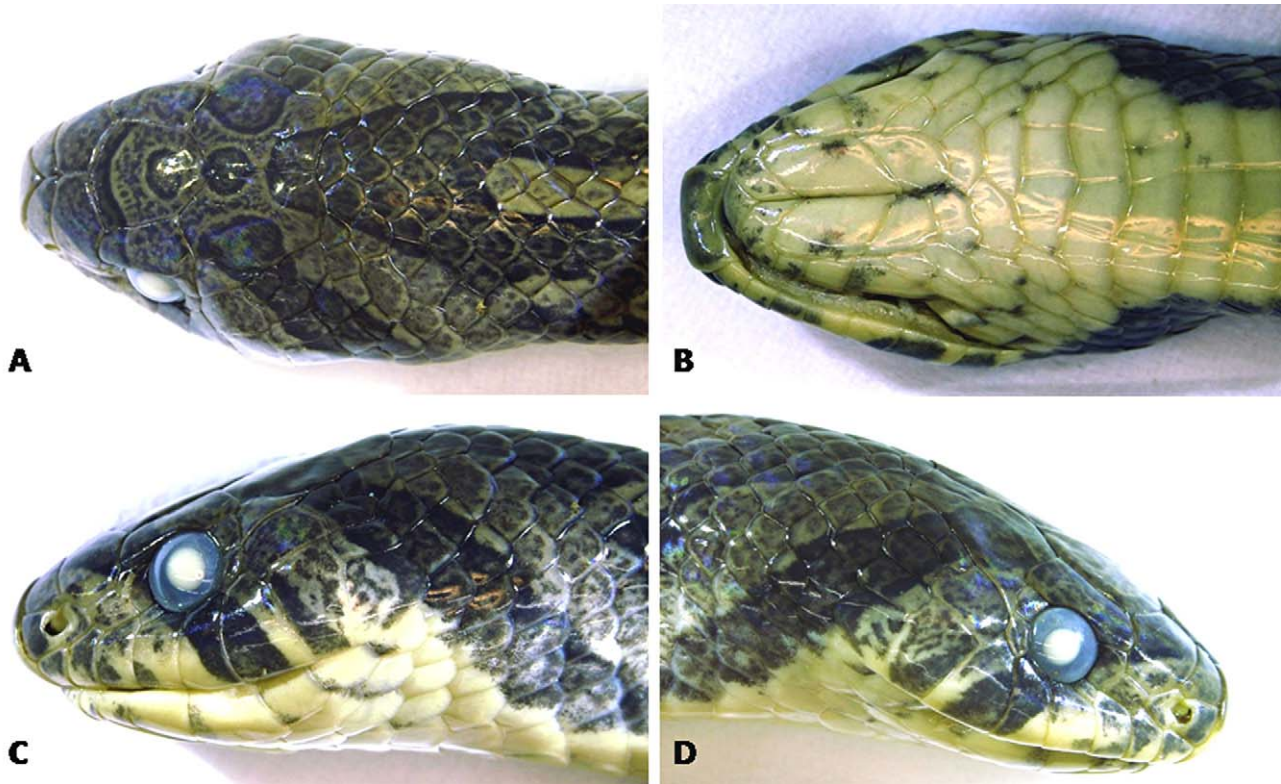


FIGURE 2. Holotype of *Oligodon nagao* sp. nov. (VNMN A.2012.1, adult male), views of the head: A. Dorsal side. B. Ventral side. C. Left side. D. Right side. Photographs by Truong Quang Nguyen.

Description of holotype. Body elongate, cylindrical and robust; head short (3.7 % of SVL), ovoid, rather broad and distinct from thick neck, thick but depressed anteriorly; snout long, narrowing anteriorly, slightly rounded, extending well beyond lower jaw, about 1.9 times as long as eye diameter; large, oval nostril piercing laterally the central part of nasal; eye rather small, its diameter about 0.9 times the distance between eye and lip, round pupil; tail average, robust at its base, tapering progressively to a point.

Measurements. SVL: 561 mm; TaL: 92 mm; TL: 653 mm; ratio TaL/TL: 0.141; HL: 20.95 mm; SnL: 6.35 mm.

Dentition. Maxillary teeth: left maxilla with 9 teeth under the formula: 6 subequal teeth + 3 strongly enlarged, blade-like teeth, without diastema.

Hemipenis. In situ, the hemipenis is massive, unforked, with simple sulcus, and reaches the 16th SC; first basal quarter of the hemipenis covered with calyces; no spines; a long papilla each, about 5 SC long, emerging from the tip.

Body scalation. DSR: 17–17–15, all smooth; scales of the outer dorsal scale row distinctly enlarged. 189 VEN (+ 1 preventral), strongly angulated; 45 SC, all paired; cloacal entire; terminal caudal scale pointing.

The dorsal scale row reductions are as follows:

5+6 → 5 (VEN 115) (left)
 17 ————— 15
 5+6 → 5 (VEN 119) (right)

Head scalation. Head scalation complement complete, including 2 internasals, 2 prefrontals, 2 supraoculars, 1 frontal, and 2 parietals. Rostral large, wider than high, well visible from above, inserting deeply and broadly between internasals on about one half of their total length; 1 / 1 large, elongate, pentagonal nasal, 1.9 times as long as high, entire, most of scale area being occupied by the nostril; internasals subrectangular, narrow, separated by a short suture, much wider than long, 0.7 times as long as the suture between prefrontals and only 0.4 times as long as prefrontal; prefrontals large, pentagonal, much wider than long, 0.5 times as long as frontal but separated by a

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suture only 0.25 times as long as frontal; supraoculars subrectangular, relatively large, about 1.6 times as long as broad, 0.4 times as wide as frontal; frontal large, hexagonal, wide, rather squat, 1.2 times longer than wide; parietals moderate, longer than wide, extending on about 30 % of HL, about 1.05 times longer than frontal, abruptly truncated posteriorly with a straight posterior margin; no nuchal scale behind parietal; 1 / 1 small loreal scale, subrectangular, 1.4 times longer than high; 8 / 8 SL, first and second in contact with nasal, second and third in contact with loreal, fourth and fifth entering orbit, sixth and seventh SL largest; 1 / 1 narrow preocular, in contact with prefrontal but not reaching the frontal; 1 / 1 minute presubocular; 2 / 2 small, narrow postoculars, lowest one slightly largest; 1 + 3 temporals on each side, anterior one large, long and high, rather squat, posterior ones rather small; 8 / 8 IL, first in contact with each other, first to fifth in contact with anterior chin shields (fifth in contact only punctually); mental small; anterior chin shields 2.2 times as long as short posterior ones.



FIGURE 3. *Oligodon nagao* sp. nov., in life (IEBR A.2012.6, adult male, Vietnam). Photograph by Truong Quang Nguyen.

Colour and pattern. Body is dark greyish-brown, somewhat darker or more grey on the lower sides, with all scales finely but densely dotted with blackish-brown; outer margins of scales of the vertebral row and upper margins of each adjacent row beige or pale greyish-brown, and central part of scales of the vertebral row densely dotted with brown, producing an irregular paler brown vertebral stripe more visible on the neck; a series of 27 blackish-brown dorsal blotches, somewhat paler greyish-brown in their centre, edged by darker pigmentation, about 3 DSR long and a total of 5 to 7 DSR broad, i.e. covering the vertebral scale row and the 2 or 3 adjacent DSR (DSR 6th or 7th); first blotch located at 13 scales behind parietals; first 11 blotches butterfly-shaped, bisected along the vertebral line although in narrow contact, posterior ones rather “bat-like”; on each side, a faint, irregular dark blotch on each side of the paler vertebral on 7th and 8th DSR in between each dorsal blotch; an elongate, irregularly shaped lateral, blackish-brown blotch on 3rd and 4th and sometimes also on the lower edge of 5th DSR, just below each dorsal blotch, about 1 or 1.5 DSR long. The tail is as the body, with a much better defined vertebral stripe due to the pale greyish-brown colour of the two upper tail rows; 8 blackish-brown dorsal blotches, somewhat paler in their centre, edged with darker pigmentation, progressively more bisected towards the end of the tail, no blotch on the lateral side of the tail; 1st scale row of the tail and lower half of 2nd row uniformly blackish-brown.

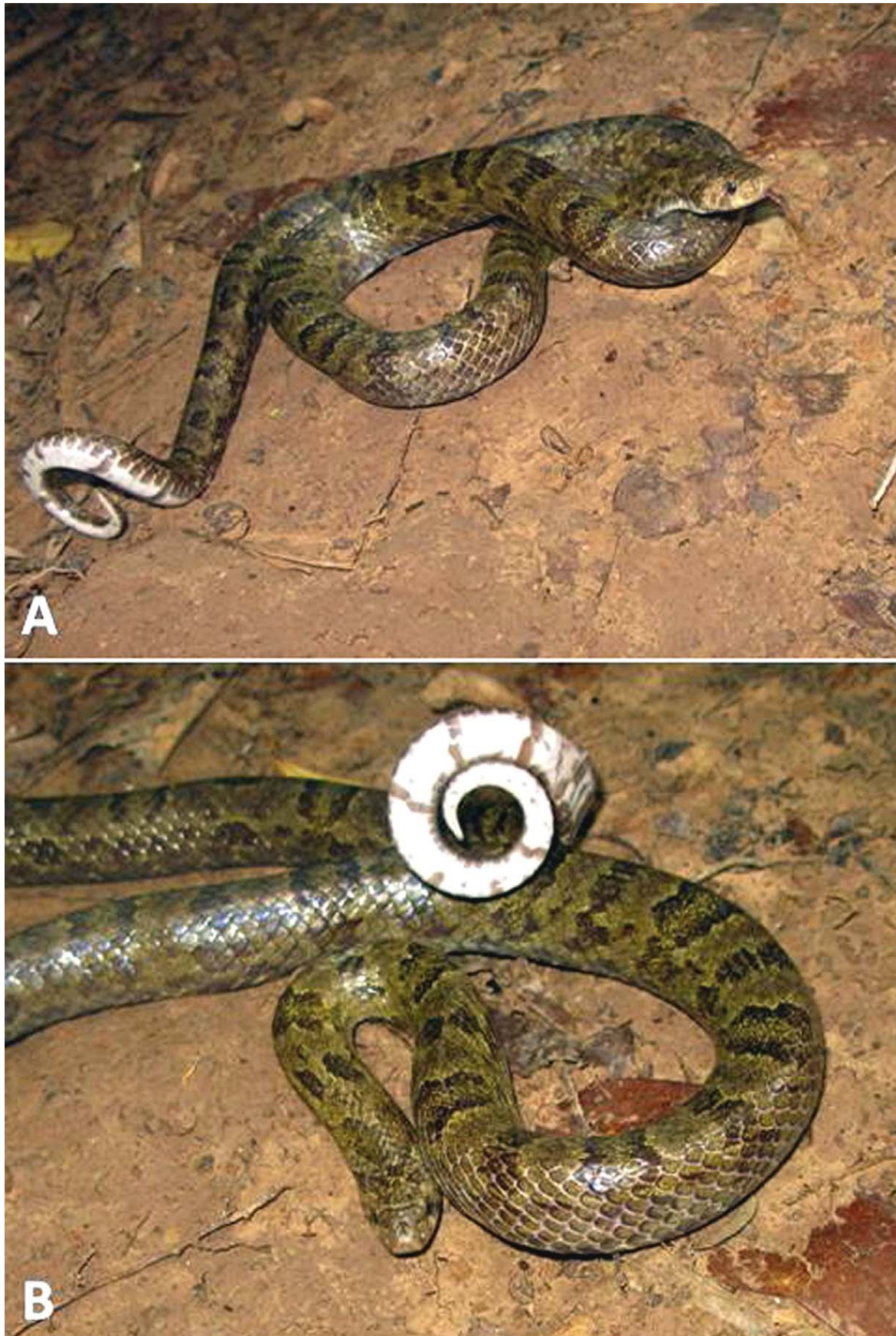


FIGURE 4. *Oligodon nagao* sp. nov., in life (ZFMK 93281, adult male, Laos). A. General view. B. Specimen showing its threatening behaviour. Photographs by Alexandre Teynié.

The head is greyish-brown as the body, much paler on the sides of the snout and rostral; a dark brown crossband across the anterior part of the head extends on internasals, prefrontals and the anterior part of the frontal, then obliquely downwards on each side through the eyes down to 5th–6th SL; a strong diagonal dark brown streak, extends obliquely downwards from the parietals across the temporal region down to the corner of the mouth, then onto the lower side of the neck, where it borders the 3rd to 5th ventral; a rounded dark brown blotch in the middle of frontal; another rounded dark brown blotch on the distal part of frontal and anterior part of parietals; a large and conspicuous dark brown chevron on the occiput, its apex reaching forward the posterior central part of parietals, and its branches extending straight posteriorly on 6th, 7th and lower half of 8th DSR of the neck, each branch contrasting sharply with the pale, brown vertebral stripe on the neck; on each side of the neck, an oblique, elongate dark brown streak in short contact with each branch of the nuchal chevron; nasal, loreal, outer margins of prefrontals and supralabials pale yellow with irregular greyish-brown spots; 5th and 6th SL, and anterior part of 7th SL with an oblique dark brown streak. The chin and throat are creamish-yellow with faint greyish-brown spots on infralabials; one such spot on each anterior chin shield.

The venter is pale yellow, uniform on the first 6 ventrals, then with rectangular dark greyish-brown blotches irregularly arranged on the outer part of each or one out of two ventrals, then on each ventral; the blotches become progressively wider and, after midbody, the dark pigmentation covers much of ventrals, in leaving only narrow streaks in the middle of each ventral; tips of ventrals dark greyish-brown but separated throughout the venter from the greyish-brown blotches by a narrow, yellow streak which produces on each side a discontinuous ventrolateral stripe. The ventral surface of the tail is pale yellow, with dark brown rectangular blotches on the outer parts of subcaudals; these blotches disappear progressively and the ventral surface of the last quarter of the tail is uniformly pale yellow.

Variation. Besides the holotype, four other males are known. The main morphological characters of all known specimens are summarized in Tables 1 and 2. The great homogeneity in variation is noteworthy, at the exception of the number of supralabials. All other external morphological characters, either in morphometry or scalation, agree with those described for the holotype, including the single cloacal, 1 loreal and 1 small presubocular on each side. Other variations are as follows:

Dorsal scale rows. Four of the five specimens have 17 DSR at midbody at the exception of MNHN 2012.0216. In this latter specimen, the first reduction (17 @ 16 DSR) occurs at the level of 91st VEN; the second reduction (16 @ 15 DSR) occurs at the level of the 93rd VEN, so just before midbody, here considered to be located at the level of the 94th VEN. We consider this value of 15 DSR exactly at midbody to be an anomaly.

Head scalation. Four of the five available specimens have 8 supralabials on each side. The specimen from Laos, ZFMK 93281 has 7 / 7 supralabials, third and fourth entering orbit. All specimens have 8 infralabials on each side at the exception of specimen KIZ 014591 which has 7 scales at left.

Hemipenis. In MNHN 2012.0216, the organ also reaches 16th SC. In KIZ 014591, in situ, hemipenes reach the 13th SC with the origin of *musculus retractor penis magnus* at 31st SC. The everted organ may be described as such: hemipenis bulbous, not forked but partly divided into two large lobes; sulcus simple; a papilla present at the tip of each lobe, the papilla of the left side of the snake longer and distinctly thicker than the papilla of the right lobe; calyces present on the first basal quarter of the copulatory organ length.

Dentition. There are 9 or 10 maxillary teeth. The formula of maxillary teeth of specimen MNHN 2012.0216 is 6 + 4 enlarged teeth, especially the last two ones; in IEBR 2012.6, the formula is 6 + 3 teeth.

Dorsal pattern. It is quite similar in all these specimens. The number of dorsal blotches varies from 27 to 37 on the body and 5 to 8 on the tail for a total ranging from 35 to 42. Specimen MNHN 2012.0216 is more distinctly brown than the holotype and lateral blotches are smaller and more irregular. Other elements of the dorsal pattern are similar. In life (Fig. 5), upper dorsal surfaces of specimens IEBR A.2012.6 and ZFMK 93281 were greenish-brown, with dark dorsal blotches, golden in their centre and edged with blackish-brown. In alcohol, the paler center is not as visible and turns to pale greyish-brown.

Comparisons. Our comparisons of *Oligodon nagao* **sp. nov.** with other species of the genus is based on data available in Smith (1943), Wagner (1975), Pauwels *et al.* (2002), Zhao (2006), David *et al.* (2008a-b, 2011), Das (2010), Tillack & Günther (2010), Zhang *et al.* (2011), David & Vogel (2012), and Geissler *et al.* (2012), and as well as on examined specimens (see Appendix).

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TABLE 1. Main variation in the type series of *Oligodon nagao* **sp. nov.** Part 1: body and tail scalation. See Materials and Methods for abbreviations. All specimens are males.

Number	Body + tail blotches	SVL (mm)	TaL (mm)	TL (mm)	Ratio TaL/TL	DSR	VEN	SC
VNMN A.2012.1	27 + 8	561	92	653	0.141	17–17–15	189	45
MNHN 2012.0216	30 + 6	628	107	735	0.146	17–15–15	188	47
IEBR A.2012.6	32 + 6	680	106	786	0.135	17–17–15	191	44
KIZ 014591	37+5	623	104	727	0.143	17–17–15	193	46
ZFMK 93281	31+6	609	98	707	0.139	17–17–15	184	43

TABLE 2. Main variation in the type series of *Oligodon nagao* **sp. nov.** Part 2: head scalation. See Materials and Methods for abbreviations.

Number	SL	SL / orbit	PreOc	PosOc	Temporals	IL	IL / chin shields
VNMN A.2012.1	8 / 8	4–5 / 4–5	1 / 1	2 / 2	1+3 / 1+3	8 / 8	1–5
MNHN 2012.0216	8 / 8	4–5 / 4–5	1 / 1	2 / 2	1+2 / 1+2	8 / 8	1–4
IEBR A.2012.6	8 / 8	4–5 / 4–5	1 / 1	2 / 2	1+2 / 1+2	8 / 8	1–4
KIZ 014591	8 / 8	4–5 / 4–5	1 / 1	2 / 2	1+2 / 1+2	7 / 8	1–4
ZFMK 93281	7 / 7	3–4 / 3–4	1 / 1	2 / 2	1+2 / 1+2	8 / 8	1–4

**FIGURE 5.** Biotope of *Oligodon nagao* **sp. nov.** in Khammouane Province, Laos. Photographs by Alexandre Teynié.

Smith (1943) defined informal groups in the genus *Oligodon* on the basis of the hemipenial morphology. The distinctiveness of these groups was confirmed by Green *et al.* (2010). Among the 50 species or so of the genus for which the hemipenial morphology is known according to Green *et al.* (2010), only the groups of *Oligodon taeniatus* and *Oligodon cyclurus* have deeply forked hemipenes. Species of all other groups have non-forked copulatory organs. Among these groups, only the groups of *O. cruentatus*, *O. cinereus*, *O. octolineatus*, *O. purpurascens* and *O. modestus* have organs with long papillae but spines are absent only in species of the groups of *O. cinereus*, *O. octolineatus*, *O. modestus*, and *O. purpurascens*. We consider that *Oligodon nagao* **sp. nov.** has affinities with only one of these groups. As members of the groups of *O. purpurascens*, *O. octolineatus* and *O. modestus* include species inhabiting the Malay Peninsula, Indo-Malayan Archipelago and the Philippine Islands, affinities are rather with the group of *O. cinereus* for both zoogeographical and morphological reasons.

Oligodon nagao **sp. nov.** differs from members of the groups of *O. cinereus* and *O. purpurascens* as follows. *Oligodon nagao* **sp. nov.** has a dorsal pattern made of 27–37 dark, butterfly-shaped blotches vs. a pattern uniform in *O. c. cinereus* and *O. inornatus*, or reticulate in *O. c. cinereus* and *O. joysoni*, or made of solid black crossbars in *O. cinereus tamdaoensis* (Bourret, 1935), or of black-edged pale crossbars in *O. cinereus pallidocinctus* (Bourret, 1934), one morph of *O. albocinctus* (Cantor, 1839) and *O. melanozonatus*, or, lastly, striped in *O. woodmasoni*. Additional differences are given in Tables 3 and 4 below. In contrast, one morph of *O. albocinctus*, *O. purpurascens*, and *O. splendidus* has a blotched dorsal pattern. *Oligodon nagao* **sp. nov.** differs from the blotched morph (Form II of Smith 1943) of *O. albocinctus* by (1) 17 vs. 19 or 21 DSR, (2) a much shorter tail, ratio TaL/TL 0.135–0.146 vs. 0.171–0.200 in males of *O. albocinctus*, and (3) a largely dark venter vs. pale with rectangular blotches. *Oligodon nagao* **sp. nov.** differs from *O. purpurascens* by (1) 17 vs. 19 or 21 DSR, (2) a shorter tail, ratio TaL / TL 0.135–0.146 vs. 0.152–0.188 in males of *O. purpurascens*, and a higher number of dorsal blotches, 27–37 vs. 10–18 in *O. purpurascens*. *Oligodon nagao* **sp. nov.** differs from *O. splendidus* (Günther, 1875) by 17 vs. 21 DSR, (2) 2 prefrontals vs. 4, and (3) 27–37 vs. 14–17 dorsal blotches. Lastly, *O. maculatus*, endemic to the Philippines has also 17 DSR and a blotched dorsal pattern but this latter species has no more than 164 ventrals (Alcala 1986), 7 supralabials and only 20–24 dorsal blotches.

When it was discovered in China in 1998 (Anonymous 2002), *Oligodon nagao* **sp. nov.** was confused with *Oligodon joysoni*. This rare species is currently known from three provinces of northern Thailand (Chiang Mai, Lampang and Loei) and from an unknown locality in Laos (David *et al.* 2011). On the basis of the five specimens examined by us, of four specimens cited by Taylor (1965; see David *et al.* 2011), and of Wagner (1975), *Oligodon nagao* **sp. nov.** differs from *O. joysoni* by (1) a different pattern, *O. joysoni* having no dorsal blotches but only more or less visible reticulations on a very dark background, (2) 9–10 maxillary teeth vs. 11–12 in *O. joysoni*, and (3) 1 versus usually 2 anterior temporals in *O. joysoni*.

Currently, the *Oligodon cyclurus* group is composed of nine species (see above) which have both forked, non spinose and non papillate hemipenes (although short papillae are present in *O. formosanus*). With 17 (or 15) DSR at midbody, *Oligodon nagao* **sp. nov.** differs from *O. cyclurus* (19), *O. formosanus* (19), *O. kheriensis* (19), *O. fasciolatus* (21 or 23), *O. juglandifer* (19), and *O. ocellatus* (19). Furthermore, *Oligodon nagao* **sp. nov.** differs from *O. cyclurus* by (1) 17 vs. 19 DSR, (2) 9–10 vs. 12–13 maxillary teeth, (3) 184–193 VEN vs. 161–172 in males, (4) 1 anterior temporal vs. always 2, and (5) a blotched pattern vs. dorsal reticulations.

The three remaining species of the *O. cyclurus*-group have 17 DSR at midbody. Besides the morphology of hemipenes, *Oligodon nagao* **sp. nov.** differs from males of *O. saintgironsi* by (1) a shorter tail (0.135–0.146 vs. 0.191–0.203), (2) a higher number of ventrals, 184–193 vs. 166–170, and (3) a distinct pattern; both species have dorsal blotches but they differ in shape (see David *et al.* 2008b). *Oligodon nagao* **sp. nov.** differs from *O. macrurus* by (1) a shorter tail in males, 0.135–0.146 vs. 0.329–0.373, (2) a lower number of SC in males, 43–47 vs. 73–94, (3) 7–8 vs. 9–10 IL, (4) a lower number of maxillary teeth, 9–10 vs. 14–15, and (5) a totally different dorsal pattern, *O. macrurus* being uniform or showing only faint reticulations on a rather pale background. Lastly, *Oligodon nagao* **sp. nov.** differs from males of *O. chinensis*, which occurs in the same region, by (1) a shorter tail, 0.135–0.146 vs. 0.187–0.195, (2) a higher number of ventrals, 184–193 vs. 175–184, (3) a lower number of SC, 43–47 vs. 60–64, (4) 1 anterior temporal vs. usually 2 (in 19 out of 28 occurrences) in *O. chinensis*, and (5) a distinct dorsal pattern, with more dorsal blotches, 27–37 vs. 11–14 blotches of different shape. Additional data on members of the *O. cyclurus* group can be found in David *et al.* (2008b, 2011).

Nevertheless, because dissected hemipenes are not always available, we further compare our new species with species of *Oligodon* inhabiting the Asian mainland and Taiwan with either 17 or 15 DSR at midbody, regardless of

their current group; species from Sri Lanka, the Indo-Malayan Archipelago and the Philippines, not present in the region of *Oligodon nagao* **sp. nov.**, are excluded. The number of DSR at midbody is a major diagnostic character in the genus *Oligodon* (see David *et al.* 2008a-b). This number is usually constant within a given species but may sometimes vary due to an anomalous position of the dorsal scale row reductions, as it is likely the case with *Oligodon nagao* **sp. nov.** Data are summarized in Tables 3 and 4.

TABLE 3. Main characters of mainland *Oligodon* species with 15 dorsal scale rows at midbody. Exceptional values are placed in brackets. See Materials and Methods for abbreviations, with the addition of: Cloacal plate: D—divided; E—entire; ?—data unavailable.

Species	Hemipenes	Hemipenes length (SC)	DEN	Cloacal plate	VEN	SC
<i>Oligodon nagao</i> sp. nov.	Not forked	16	9–10	E	184–193	43–47
<i>O. breviceauda</i>	?	?	7–8	D	158–176	25–29
<i>O. dorsalis</i>	Forked	11	6–7	D	162–188	27–51
<i>O. erythrorachis</i>	?	?	7–8	D	154	46
<i>O. hamptoni</i>	Not forked	11	7–8	D	160–175	30–32
<i>O. inornatus</i>	Not forked	10–12?	11–12	E	169–174	31–42
<i>O. jintakunei</i>	?	?	6	D	189	46
<i>O. lacroixi</i>	Not forked	6–8	8–12	D	162–178	29–?
<i>O. lungshenensis</i>	Not forked	10	?	D	166–180	31–38
<i>O. melaneus</i>	Not forked	15	7	D	152–160	39–40
<i>O. nikhili</i>	?	?	?	D	144	33
<i>O. ornatus</i>	Not forked	9	6–8	D	156–182	27–44
<i>O. taeniolatus</i>	Forked	9–11	6–7	D	158–218	29–59
<i>O. torquatus</i>	Not forked	8	15–16	D	114–169	25–34

continued.

Species	SL	InN	Lor	Ate	Ratio TaL/TL (males)	Dorsal pattern
<i>Oligodon nagao</i> sp. nov.	7 or 8	1	1	1	0.135–0.146	Dark blotches
<i>O. breviceauda</i>	7	0	0	1	?	Stripes + spots
<i>O. dorsalis</i>	7	2	1	1	?	Stripes
<i>O. erythrorachis</i>	7	2	0	1	?	Vertebral stripe + black crossbars
<i>O. hamptoni</i>	5	0	0 or 1	1	?	Stripes
<i>O. inornatus</i>	8	2	1	1	0.141–0.144	Uniform or reticulations
<i>O. jintakunei</i>	7	0	1	1	----	Pale rings
<i>O. lacroixi</i>	5	2	0	1	?	Spots + stripes
<i>O. lungshenensis</i>	6	2	0	2	?	Crossbars
<i>O. melaneus</i>	7	2	1	1	?	Dark with speckling
<i>O. nikhili</i>	7	2	0	1	0.173	Stripes
<i>O. ornatus</i>	6–7	2	0	1	0.146–0.182	Widely separated blotches
<i>O. taeniolatus</i>	7	2	1	1	?	Blotched or spotted
<i>O. torquatus</i>	7	2	1	1	?	Stripes + reticulations

Oligodon nagao **sp. nov.** might be confused only with *O. joysoni*, of which we examined five specimens to which we add the four specimens identified by Taylor (1965) as *O. cinereus swinhonis* and *O. cinereus multifasciatus* (see David *et al.* 2011). However none of these specimens has a blotched pattern as *Oligodon nagao* **sp. nov.** On the basis of this constant character, together with differences in dentition and head scalation, we consider *Oligodon nagao* **sp. nov.** to be a species distinct from *O. joysoni*.

TABLE 4. Main characters of mainland *Oligodon* species with 17 dorsal scale rows at midbody. Exceptional values are placed in brackets. See Materials and Methods for abbreviations, with the addition of: Cloacal plate: D – divided; E – entire; ? – data unavailable.

Species	Hemipenes	Hemipenes length (SC)	DEN	Cloacal plate	VEN	SC	SL	InN	Lor	Ate	Ratio TaL/TL (males)	Dorsal pattern
<i>Oligodon negao</i> sp. nov.	Not forked	16	9–10	E	184–193	43–47	7 or 8	1	1	1	0.135–0.146	Dark blotches
<i>O. affinis</i>	Not forked	12	7	D	129–142	23–36	7	1	0	1	?	Reticulations
<i>O. arnensis</i>	Not forked	8	8–11	D	164–202	41–59	7	1	0 (1)	1	?	Dark crossbars
<i>O. barroni</i>	Forked	10–12	10–13	E	136–160	28–48	7 (8)	1	1	1	0.170–0.189	Dark blotches
<i>O. chinensis</i>	Forked	12–13	9–10	E	175–206	47–64	8	1	1	1 or 2	0.187–0.195	Dark blotches
<i>O. cinereus</i>	Not forked	7–14	11–14	E	156–184	31–43	7 or 8	1	1	1	-----	----
<i>O. c. cinereus</i>	Not forked	7–14	12–14	E	156–178	33–43	7 or 8	1	1	1	0.126–0.149	Uniform or reticulations
<i>O. c. tamdaensis</i>	Not forked	7–11	11–12	E	168–184	30–42	7 or 8	1	1	1	0.104–0.140	Solid, dark crossbars
<i>O. c. pallidocinctus</i>	Not forked	11–12	11–12	E	164–176	31–41	7 or 8	1	1	1	0.122–0.150	Pale crossbars
<i>O. cruentatus</i>	Not forked	18	14–16	D	148–173	27–40	8		1 (0)	1	?	Stripes + reticulations
<i>O. deuvei</i>	Forked	12	12–15	E	142–163	31–47	7 (8)	1	1	1 (2)	0.158–0.172	Stripes
<i>O. erythrogaster</i>	Not forked	29	7–8	D	169–186	42–59	7	1	0	1	?	Stripes
<i>O. joynsoni</i>	Not forked	14	11–12	E	186–198	32–50	7 or 8	1	1	2 (1)	0.124–0.156	Reticulations or faint crossbars
<i>O. macrurus</i>	Forked	28	14–15	E	139–162	45–94	7 or 8	1	1 (0)	1	0.329–0.373	Reticulations
<i>O. melanozonatus</i>	?	?	8	D	171–173	42–45	6	0	0	1	?	Blotches
<i>O. moricei</i>	?	?	12	E	175	41	8	1	1	1	?	Stripes
<i>O. mouhohi</i>	Forked	18–19	14–16	E	145–163	29–43	8	1	1	1 (2)	0.172–0.185	Stripes
<i>O. octolineatus</i>	Not forked	25–27	8–10	E	155–197	40–62	6 (7)	1	1	1 or 2	0.181–0.224	Stripes
<i>O. pseudotaeniatus</i>	Forked	14	15	E	137–156	34–46	8	1	1	1	0.201–0.205	Stripes
<i>O. saintgironsi</i>	Forked	27–28	10–12	E	166–184	53–59	8	1	1	2	0.191–0.203	Blotches
<i>O. theobaldi</i>	Not forked	18	15–16	D	164–180	30–42	8	1	1	1	?	Stripes
<i>O. travancoricus</i>	Not forked	9	7	D	154–155	34–37	7	1	0	1	?	Crossbars
<i>O. venustus</i>	Not forked	9	7–8	D	136–165	27–36	(6) 7	1	0	1	?	Blotches
<i>O. woodmasoni</i>	Not forked	16	8–10	E	180–190	46–57	6	1	0 or 1	?	?	Stripes

Etymology. This new species is named in honour of the Nagao Natural Environment Foundation, Japan, for the support of natural sciences research and conservation in developing countries in Asia.

As common names, we suggest Nagao Kukri Snake (English name), *Rắn khiếm na-gao* (Vietnamese name), and *Fang Ban Xiao Tou She* (Chinese name, meaning the “Kukri Snake with rectangular blotches on the back”).

Distribution (Fig. 6). *Oligodon nagao* sp. nov. is currently known from a small area straddling over Vietnam and China, and from central Laos, as follows:

Vietnam. Known from the provinces of Lang Son (Huu Lung District) and Cao Bang (Ha Lang District).

People’s Republic of China. Known from Guangxi Autonomous Region (Longzhou County). Laos. Known from Khammouane Province (Hin Boun District).

Natural history. This species has been found only in karst environment. The Vietnamese and Chinese specimens were all collected at night in karst forests. The specimen from Cao Bang was found at night (21:00) near the limestone cliff surrounded by secondary forest made of short hardwood, shrubs and vines. No water was observed in the vicinity. The Laotian specimen was collected in a large cave of a karst massif located in the corridor connecting Phou Hin Boun National Park to Nakai Nam Theu National Park. In this totally mineral biotope, this adult male was active around noon in nearly complete darkness on the ground beneath a large boulder. A few amphibian species were found there, such as *Hylarana nigrovittata* and *Micryletta inornata*, as well as some other reptile species: *Cyrtodactylus* sp. and *Triceratolepidophis sieversorum*. The *Oligodon* specimen did not attempt to bite when it was collected but it showed the usual behaviour of many species of the genus *Oligodon* when they feel threatened, i.e. showing the bright colour of the ventral side of its tail curled in a spiral.

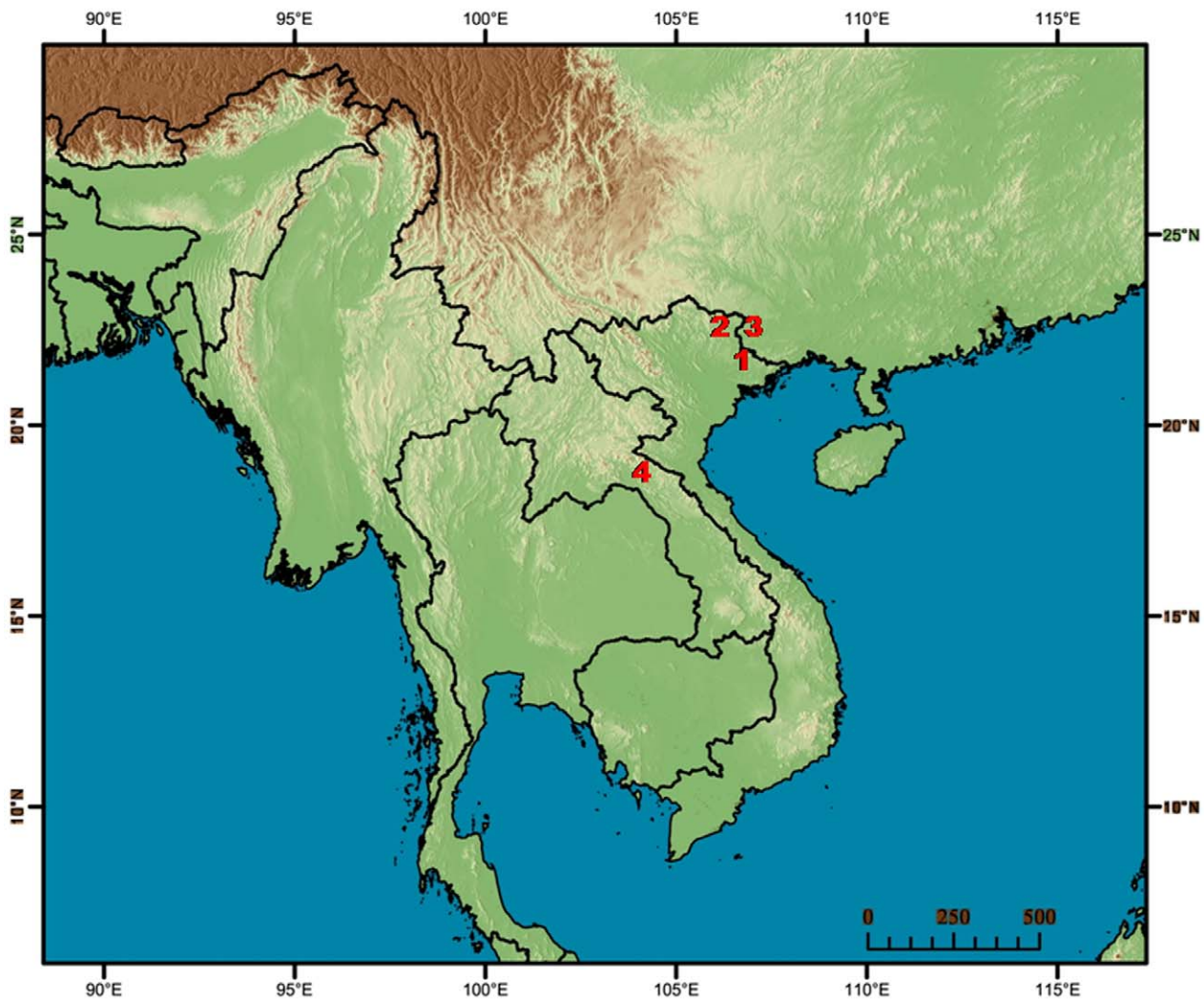


FIGURE 6. Distribution of *Oligodon nagao* sp. nov.: (1) Huu Lien Nature Reserve in Lang Son Province and (2) Ha Lang forest in Cao Bang Province, Vietnam; (3) Nonggang National Nature Reserve in Guangxi Autonomous Region, China; and (4) Ban Nathan in Khammouane Province, Laos.

TABLE 5. Main external morphological characters of *Oligodon* species known from Vietnam, Laos and China (including the islands of Hainan and Taiwan). See Materials and Methods for abbreviations, with the addition of: Cloacal plate: D – divided; E – entire; CN – China, LA – Laos, VN – Vietnam

Species	Cloacal plate	DSR	Head scalation	Main dorsal pattern	Occurrence		
					CN	VN	LA
<i>O. albocinctus</i>	E	19–21	Complete	Blotches or pale crossbars	X	-	-
<i>O. annamensis</i>	E	13	No loreal	Pale crossbars	-	X	-
<i>O. barroni</i>	E	17	Complete	Dark blotches	-	X	X
<i>O. catenatus</i>	D	13	No internasal, no loreal	Stripes	X	X	X
<i>O. chinensis</i>	E	17	Complete	Dark blotches	X	X	-
<i>O. cinereus</i>	E	17	Complete	----	X	X	X
<i>O. c. cinereus</i>	E	17	Complete	Uniform or ashy	X	X	?
<i>O. c. tamdaoensis</i>	E	17	Complete	Solid, dark crossbars	X	X	X
<i>O. c. pallidocinctus</i>	E	17	Complete	Pale crossbars	-	X	X
<i>O. cyclurus</i>	E	19	Complete	Reticulations	X	-	-
<i>O. deuvei</i>	E	17	Complete	Vertebral stripe	-	X	X
<i>O. eberhardti</i>	D	13	No internasal or loreal	Vertebral chain of blotches	-	X	X
<i>O. fasciolatus</i>	E	21	Complete	Reticulations or blotches	X	X	X
<i>O. formosanus</i>	E	19	Complete	Reticulations and vertebral stripe	X	X	-
<i>O. inornatus</i>	E	15	Complete	Uniform or reticulations	-	-	X
<i>O. joysoni</i>	E	17	Complete	Reticulations or faint crossbars	-	-	X
<i>O. laeotoxi</i>	D	15	No internasal, no loreal	Vertebral spots	X	X	-
<i>O. lungshenensis</i>	D	15	No internasal, no loreal	Crossbars	X	-	-
<i>O. macrurus</i>	E	17	Complete	Nearly uniform	-	X	-
<i>O. melanozonatus</i>	D	17	No loreal	Pale crossbars	X	X	-
<i>O. moricei</i>	E	17	Complete	Stripes	-	X	-
<i>Oligodon nagao</i> sp. nov.	E	17 (15)	Complete	Dark blotches	X	X	X
<i>O. ocellatus</i>	E	17	Complete	Blotches	-	X	X
<i>O. ornatus</i>	E	15	Complete	Blotches	X	-	-
<i>O. saintgironi</i>	E	17–18	Complete	Blotches	-	X	-
<i>O. taeniatus</i>	E	19	Complete	Striped	-	X	X

Discussion

The description of *Oligodon nagao* **sp. nov.** adds a new species to the rich snake fauna of Indochina and southern China. However, this new species seems to be restricted to karst environment and related caves. All five known specimens were found in the same habitat, i.e. near the entrance of karst limestone caves or even well inside these caves. Karst formations have unique characters, such as extreme roughness of their surface, steep slopes and deep, more or less dark caves. Karst massifs of Vietnam were described by Sterling *et al.* (2006). In China and Vietnam, both *O. chinensis* and *O. cinereus* have been recorded from karst forests (our data), as well as from forests covering granite massifs. In contrast, *O. nagao* **sp. nov.** has been found only in lowland karst areas covered with tropical evergreen forests and, furthermore, inside karst caves. Although *O. nagao* **sp. nov.** is morphologically similar to species like *O. chinensis* and, especially, *O. joynsoni*, it is biologically separated from these latter species by its unique habitat. To our best knowledge, no species of *Oligodon* has ever been reported from caves of karst formations. Sterling *et al.* (2006) provided a description of karst vegetation, pointing out that forests over karst or limestone are markedly different from other forest formations.

This peculiar habitat has biogeographical bearings. *O. nagao* **sp. nov.** should be searched for in other karst features of Indochinese Peninsula and adjacent areas, such as karst hills in Guangdong and Guizhou provinces in China, and in limestone caves of Thailand. The wide gap between the specimen from Laos, on the one hand, and the other specimens from the small area of northern Vietnam and Guangxi on the second hand, suggests a rather wide distribution in the Indochinese Region.

Quite interestingly, *O. nagao* **sp. nov.** shows a greenish-brown coloration in life with wide, brown dorsal blotches. This scheme of coloration has also been found in several pitvipers endemic to limestone, such as *Trimeresurus kanburiensis* Smith, 1943, *Trimeresurus truongsoneensis* Orlov, Ryabov, Bui & Ho, 2004 and *Protobothrops trungkhanhensis* Orlov, Ryabov & Nguyen, 2009 (Anonymous 2012). Our observations show that *Trimeresurus truongsoneensis* is barely visible on a background of stones covered with lichens. However, we could not find any other peculiar morphological difference between *O. nagao* **sp. nov.** and other species of the *Oligodon* genus which might be considered an adaptation to life in karst.

With its peculiar dorsal pattern, *O. nagao* **sp. nov.** cannot be confused with any other known species. However, the status of *Simotes trinotatus* Duméril, Bibron & Duméril, 1854 (p. 631. Type locality: “Chine”, China), remains to be ascertained. Since Jan (1863: 25) this taxon has been considered a junior synonym of *Xenodon purpurascens* Schlegel, 1837, now *Oligodon purpurascens*, a valid species from the Indo-Malayan Region unknown north of southern Peninsular Thailand. We examined the holotype, MNHN 7452. This large female (SVL 635 mm, Tal 107 mm; ratio TaL/TL 0.145) has a complex dorsal scale formula, as 19–21(midbody)–19–17, with 21 DSR between the 31st and 96th VEN, then 19 DSR between 99th and 112th VEN; its other main characters are 189 VEN (+ 1 preventral), 48 SC, 8 / 8 SL (4-5 enter orbit), 2+3 / 2+2 temporals, and 9 / 9 IL. If the scalation of this specimen agrees well with characters of *O. purpurascens* as summarized by Tillack & Günther (2010), the dorsal pattern of the type of *Simotes trinotatus* is quite different. On a yellowish-brown background, 13 on the body (+ 3 on the tail) large, dark rhombic or hexagonal dorsal blotches reaching downwards the middle of the side, all bordered below by an equivalent pentagonal or subtriangular, large lateral blotch with its long base on the ventral side, extending from the middle height of the side to the level of ventrals or subcaudals. The upper and lower blotches are vertically connected with each other in their middle. The venter is similar to that of *Oligodon nagao* **sp. nov.** In contrast, in *O. purpurascens*, dorsal blotches are broad, irregular and do not reach ventrals, or narrower and may reach ventrals on only a very short length; the venter is usually marked with subrectangular blotch.

Pending the availability of a male specimen with the same characters than the holotype of *Simotes trinotatus* Duméril, Bibron & Duméril, 1854, it is impossible to conclude on its status although it is clearly distinct from *O. purpurascens* and may well represent another Chinese species of *Oligodon*. As the holotype was deposited in the Muséum national d'Histoire naturelle (Paris) by Mr. Benoît Gernaert (1797–1843), consul of France in China between 1832 and 1839 who resided in Canton (now Guangzhou), an erroneous locality is very unlikely. Chinese specimens with 19 and 21 DSR and three series of large dorsal blotches should be searched for in collections. A specimen possibly conspecific with *Simotes trinotatus* may have been cited by Liang (2003) as *Oligodon cyclurus*. Lastly, there are minor differences between the sole specimen of *O. nagao* **sp. nov.** from Laos and those from Vietnam and China. Additional studies are required to investigate the genetic divergence of these populations.

Conclusion

On the basis of Nguyen *et al.* (2009) and Zhang *et al.* (2011), the description of *Oligodon nagao* **sp. nov.** adds a 20th and a 14th species of the genus *Oligodon* to the snake fauna of Vietnam and China respectively. According to Teynié & David (2010), *Oligodon nagao* **sp. nov.** is the 13th known species of the genus in Laos. Lastly, in the Chinese fauna, we here do not include two species, *O. multizonatus* Zhao & Jiang, 1981 and *O. ningshaanensis* Yuan, 1983, the generic allocations of which were considered controversial by Zhang *et al.* (2011) and which will eventually be referred to other genera (unpublished). In contrast, we still consider the occurrence of *Oligodon albocinctus* unconfirmed in Vietnam, and we exclude *O. mouhoti* (Boulenger, 1914) from the fauna of this latter country (see David *et al.* 2008a). In the large region covering Vietnam, Laos and China (including Hainan and Taiwan), 23 species of the genus *Oligodon* are now recognized, the list and main external morphological characters of which are given in Table 5. This list should be considered preliminary. Zhang *et al.* (2011) mentioned, as *Oligodon* sp., an undescribed species from Xizang Province.

Hemipenial morphology has long been considered to be an important diagnostic character in the taxonomy of the genus *Oligodon* (Smith 1943; David *et al.* 2008b; Green *et al.* 2010; David *et al.* 2011). A new example is given with *Oligodon nagao* **sp. nov.**, which can be separated from most other species with 17 DSR by this major character. Although the scalation of *Oligodon nagao* **sp. nov.**, and to a lesser extent, its dorsal pattern are much similar to that of *O. chinensis*, both species are easily set apart by the morphology of hemipenes. This character is even more diagnostic than the dorsal pattern. Although this latter character is usually constant within a given species, there are exceptions, such as in *O. albocinctus* (see Smith 1943), and in *O. octolineatus* and *O. purpurascens* (both according to Tillack & Günther 2010). However, it seems that species with large variation in their dorsal pattern, such as *Oligodon cinereus*, may in fact include more than one species. A third diagnostic character in the genus *Oligodon* is the number of dorsal scale rows at midbody. It is usually constant within a given species, although anomalous variation may occur. Lastly, the maxillary tooth formula is also diagnostic. A new examination of preserved blotched specimens of *Oligodon* originating from China, Vietnam, Laos and northern Thailand seems necessary for re-evaluating the definitions and ranges of several species of the groups of *O. cyclurus* and *O. cinereus*.

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APPENDIX. Examined specimens.

Oligodon cinereus ($n = 87$; all morphs altogether). **Cambodia**. BMNH RR 1946.1.1.25 (BM 61.8.12.8), “Camboja” (holotype of *Simotes cinereus* Günther, 1864). MNHN 1970.0437–0440, Trapeang–Chan, Kompong Chhnang Province.—**India**. State of Assam: BMNH 1908.6.23.45, “Timsukia, Assam”, now Timsukia District. NHMB 13622, “Assam”; Sengupta’s private collection SS057, Tezpur, Sonitpur District; S. Sengupta’s private collection SS067, Jaipur, Tinsukia District. State of Bihar: ZSI 12356, “Cargola, Purnea”, Kargola, District of Purnia. State of Nagaland: NHMB 13540, “Naga Hills, Assam”.—**Laos**. MNHN 1897.0425, “Laos”; MNHN 1928.0070, MNHN 1999.8150–8151, “Xieng-Khouang”, Xiengkhuang, Xiengkhuang Province; ZMA 19170, Dakchun, Xekong Province.—**Myanmar**. Kachin State: BMNH 1940.6.5.2, “Sinan Hka, Triangle, Upper Burma”, a locality near Watamkawng. Kayah State: MNHN 1893.0387–0388, “Monts Carin, alt. 1200–1300 m”, now Mts. Karen; NHMB 1564–1565, “Kharim Mts.” Mandalay Region: BMNH 1900.9.20.14, Mogok. Sagaing Division: BNHS 848, Mansi. Shan State: BMNH 91.11.26.32–33, “Toungyi, S. Shan States, 5,000 ft”, now Taunggyi; BMNH 1908.6.23.44, “Toungyi, Shan States”, now Taunggyi; BNHS 845, Taunggyi. Tanintharyi Region: BMNH 84.5.8.11, “Tenasserim”. Yangon Region: BMNH 1908.6.23.43, “Rangoon”, now Yangon. No locality: BNHS 846–847, “Burma”.—**People’s Republic of China**. Fujian Province: BMNH 62.12.6.88 (syntype of

Simotes swinhonis Günther, 1864), “Amoy”, now Xiamen; CIB 9928, Fuzhou; USNM 65396, “Fukien”. Guangdong Province: CIB 9927, Guangzhou; NHMB 1567, “Guangdong”. Guizhou Province: CIB 72378, “Guizhou”. Hainan Island: BMNH 1969.1843–44, “Kachek”, now Jiaji, Qionghai County; NMW 24537:1, “Ting-An”, now Dingan County. Hong Kong SAR: BMNH 82.11.25.2, Hong Kong; BMNH 1931.8.4.9, “Lo Wa”. No locality: NMW 39275, NMW 24537:2; BMNH 1946.1.4.14, BMNH 1946.1.4.35 (both syntypes of *Simotes swinhonis* Günther, 1864), locality unknown. Unidentified locality: NHMB 1566, “Lilong, China”.—**Thailand**. Chiang Mai Province: USNM 101651, Chiang Mai. Chiang Rai Province: USNM 084754, “Doi Lang Ka”, now Doi Langka. Lampang Province: BMNH 1921.4.1.19, “Me Wang, Siam”, now Mae Wang. Kanchanaburi Province: BMNH 1921.4.1.20, Sai Yok. Nakhon Ratchasima Province: USNM 72161, Khorat. Prachuap Khiri Khan Province: USNM 94932, “Roi Yot, Siam”, now Khao Sam Roi Yot National Park. Surat Thani Province: USNM 72309, no locality. No locality: USNM 164802.—**Vietnam**. Bac Giang Province: IEBR 94, Tay Yen Tu Nature Reserve, Luc Son Commune. Bac Kan Province: MNHN 1897.0407–0408, “Bac Kan (Tonkin)”, now Bac Kan. Dong Nai Province: MNHN 1937.0022, Bien Hoa. Cao Bang Province: MNHN 1900.0330, “Région de Cao Bang (Tonkin)”, now Cao Bang; NMW 24533, “Cao Bang, Tonkin”. Dong Nai Province: USNM 90009–90011, Bien Hoa. Ha Giang Province: MNHN 1997.4359–4360, Tat Ke Sector, Na Hang Nature Reserve, Na Hang. Hanoi: MNHN 1911.0040, Hanoi. Ha Tinh Province: ZFMK 81475–476, Ky Anh - Ke Go, Ky Thuong Commune. Ho Chi Minh City: BMNH 1938.8.7.33–34, “Saigon”, now Ho-Chi-Minh City; USNM 73850, Gia Dinh. Lai Chau Province: MNHN 1892.0264, Ban Nam. Lang Son Province: NMW 24533:1, Mt. Mau Son. Lao Cai Province: MNHN 1901.0373, “Bao-Ha, Tonkin”, now Bao Hà; MNHN 1948.0087, “Coc-xan, région de Lao Kay”. Quang Tri Province: MNHN 1948.0086 (holotype of *Holarchus violaceus poilani* Bourret, 1939), “Dong Tam Ve (Annam)”, a mountain near Lang Cop Village, Huong Hoa District; MNHN 1948.0088 (holotype of *Holarchus violaceus plurimaculatus* Bourret, 1941), “Indochine, Quang Tri (Annam)”, now Quang Tri. Tuyen Quang Province: MNHN 1901.0507, “Minh Luong (Tonkin)”, now Minh Luong. Vinh Phuc Province: MNHN 1938.0136, Tam Dao (syntype of *Holarchus violaceus tamdaoensis* Bourret, 1935); MNHN 1996.7436, Tam Dao; PSGV 487-1, Tam Dao. North Vietnam: MNHN 1908.0203, “Haut Tonkin”, Upper Tonkin; MNHN 1958.0465–0466, “Bavi et Nghan Son (Tonkin), now Bavi (Hanoi) and Ngan Son (Bac Kan Province)”. South Vietnam: MHL 42000348, no locality; MNHN 1938.0135 (holotype of *Simotes violaceus pallidocinctus* Bourret, 1934), “Cochinchine”.

Oligodon chinensis ($n = 13$). **Vietnam**. Cao Bang Province: MNHN 1896.0042, Cao Bang. Bac Kan Province: MNHN 1935.0420, MNHN 1938.0139, “Ngan-Son, Tonkin”, now Ngan Son; IEBR A0707a-A0707b, Ba Bê National Park, Ba Be; MNHN 1928.0014, “Bac Kan (Tonkin)”, now Bac Kan. Lang Son Province: MNHN 1896.0041, Lang Son. Quang Ninh Province: MNHN 1911.0043, “Pointe-Pagode, Tonkin”, a small cape south of Tien Yen. Vinh Phuc Province: MNHN 1935.0008, “Tam Dao, Tonkin”, now Tam Dao Hill Station.—**People’s Republic of China**. MNHN 7453, MNHN 1999.7952-53, “Kiangsi Oriental”, now Jiangxi Province; PSGV 491, Fujian Province.

Oligodon cyclurus ($n = 23$). **Bangladesh**. ZSI 7087, “Kaligunz, Rangpore”, now Subdistrict of Kaligunj, Lalmonirhat District, near Rangpur.—**India**. State of Meghalaya: BNHS 804, “Khassia Hills, Assam”, now Khasi Hills; BNHS 806, Tura, Garo Hills. State of West Bengal: BMNH 1936.7.2.6–7, “Mal District, Dooars, 400’, N. Bengal”, now Mal, Jalpaiguri District; ZSI 8611–12, Darjeeling; BNHS 812–813, Tinelhari (= Tindharia?), Darjeeling District; BMNH 1969.1802, BNHS 808–811; ZSI 12878, Jalpaiguri, Jalpaiguri District; ZSI 18674, Sevoke, Darjeeling District.—**Myanmar**. Ayeyarwady Division: BNHS 802, “Bassein”, now Patheingyi. Bago Division: ZSI 7091, ZSI 12390, “Pegu”, now Bago. Kachin State: MNHN 1893.0389, Bhamo. Yangon Division: BNHS 799, ZSI 11571, “Rangoon”, now Yangon. No locality: MNHN 4241, “Birmanie”, Burma, now Myanmar.

Oligodon formosanus ($n = 17$). **People’s Republic of China**. Guangdong Province: MNHN 5235, “Canton (Chine)”, now Guangzhou. Guangxi Autonomous Region: MNHN 1902.0068, “Lungchow, Kouang-Si (Chine méridionale)”, now Longzhou County. Zhejiang Province: PSGV S0020. No locality: MNHN 7454, MNHN 1874.0046, “Chine”.—**Vietnam**. Ha Giang Province: AMNH 15290, Khau Ria, Du Gia, Yen Minh. Cao Bang Province: MNHN 1900.0329, Cao Bang; MNHN 1904.0397, “Bao Lac, Haut Tonkin”, now Bao Lac. Vinh Phuc Province: MNHN 1908.0204, “Environs de La-Pho: alt. 150 à 200 m”, now La Phu. Thanh Hoa Province: MNHN 1911.0044, “Trieu-Yen, Tonkin”, now Thieu Yen. No precise locality: MNHN 1890.0407, MNHN 1890.0407A, MNHN 1890.0408, MNHN 1890.0408A-0408B, MNHN 1950.0431-0432, “Tonkin”, now North Vietnam.

Oligodon inornatus ($n = 5$). **Thailand**. BMNH 1915.8.14.22, Ko Kut Island, Trat Province; BMNH 1969.1842, “Chai Tenk”; BMNH 1969.1858, “Chiengmai”, now Chiang Mai, Chiang Mai Province; USNM 84823, USNM 94653, “Sriracha, Huey Yang”, now Ban Huai Yang, Siracha, Chon Buri Province.

Oligodon joysoni ($n = 5$). **Thailand**. Lampang Province: BMNH 1946.1.4.23 (holotype), BMNH 1969.1809, Muang Ngao or Muang Ngau, 18°45'27N, 99°58'42E. Chiang Mai Province: BMNH 1938.8.7.40, BMNH 1969.1808, “Me Wang, N. Siam”, now Mae Wang.—**Laos**. MNHN 1896.0633, “Laos”, without locality.

- Oligodon lacroixi* ($n = 5$). **Vietnam.** MNHN 1933.0001, MNHN 1938.0137–0138, MNHN 1958.0464–0464A, “Chapa, Lao Kai”, now Sa Pa, Lao Cai Province.
- Oligodon macrurus* ($n = 4$). **Vietnam.** BMNH 1938.8.7.39, “Nha-Trang, S. Annam”, now Nha Trang, Khanh Hoa Province; BMNH 1969.1854, “Saigon”, now Ho Chi Minh City; BMNH 1969.1855–1856, “near Na Thrang”, now Nha Trang, Khanh Hoa Province.
- Oligodon ocellatus* ($n = 24$). **Vietnam.** Binh Dinh Province: USNM 164373, Landing Zone Sandra, 35 miles NE Bông Son, 1 mile E of An Lao Valley, 2300 ft. Dong Nai Province: USNM 90409, USNM 95080, “station agricole de Blao, Prov. Haut Donai, 800 m. alt, Annam”, now Blao exploitation, near Phuong Lam. Lam Dong Province: USNM 146178-79, “Fyan, Vietnam”, now Fyan or Ngoc Son. Quang Nam Province: MNHN 1897.0423, Nui Quieu; NMW 19167-1, NMW 19167-2, Phuc Son; USNM 163859, near Chu Lai. Tay Ninh Province: MHL 42000347 (formerly MHL 1571; syntype), MHL 42000354/1-2 (formerly MHL 1569a-b; 2 syntypes), MHL 42000359 (formerly MHL 1572; syntype), “Tay Ninh, Cochinchine”, now Tay Ninh Province. No precise locality: MHL 42006419, MNHN 1910.0016, MNHN 1999.8095 (ex MNHN 1910.16A), “Cochinchine”, now Southern Vietnam; MNHN 1910.0017, MNHN 1939.0002, “Indochine”, no locality; NMW 16530 (holotype of *Simotes brevicauda* Steindachner, 1867), “Cochinchina”, now southern Vietnam; NMW 19166-1–NMW 19166-4, “Annam”, now central Vietnam.—**Laos.** MNHN 2003.3343, Xepian National Biodiversity Conservation Area, Champasak Province.
- Oligodon purpurascens* ($n = 19$). **Indonesia.** Java: RMNH 242A–C (3 syntypes of *Xenodon purpurascens* Schlegel, 1837), “Au pied du mont Parang à l’île de Java”, at the foot of Gunung Parang, Purwakarta District, Province of Jawa Barat (West Java Province).—Sumatra: MNHN 3539, “Indes orientales; NMW 25816:1–2, “Deli, Sumatra”; RMNH 18153, “Padangse Bovenlanden, Muara Labu, Balun”, now Balun, near Muaralabuh, Province of Sumatera Barat; SMF 22423, “Takengon, Tawar See, Atjeh”, now Takengon, Laut Tawar, Aceh Province; USNM 103580, Siantar, Sumatera Utara Province; ZMA 17463, “Djambi, Sumatra”, now region of Jambi, Jambi Province; ZFMK 33551, “Sumatra”; ZMB 8460, “Lahat”, now Langkat Regency, Aceh Province; ZMB 15881, “Indragiri”, region of Indragiri River, Riau Province; ZMB 15999, ZMB 24047, ZMB 32198, “Sumatra”.—Bangka Island. ZMA 17464, “Banka”.—**Malaysia.** CAS 16820, West Malaysia; PSGV 750, West Malaysia.
- Oligodon saintgironsi* ($n = 3$). **Vietnam.** MNHN 1974.1264, “Arboretum de Trang Bôm”, now Arboretum of Bien Hoa, Dong Nai Province; MNHN 1974.1272, “Institut de Recherches agronomiques, Saïgon”, now in Ho Chi Minh City.—**Cambodia.** MNHN 1877.0050, “Cambodge”.