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## A new kukri snake (Colubridae: *Oligodon*) from Hua Hin District, and the first record of *O. deuvei* from Thailand

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### Abstract

We describe *Oligodon huahin* sp. nov. from a bamboo forest locality on the road to Pala-U waterfall, Hua Hin District, Prachuap Khiri Khan Province, peninsular Thailand. It is characterized by a maximal known SVL of 553.7 mm; 6 maxillary teeth, the posterior two enlarged; 17-17-15 or 17-15-15 dorsal scale rows; 166–173 ventrals and 35–41 subcaudals in males; a single anal; deeply forked hemipenes lacking spines and papillae, extending *in situ* to the 14<sup>th</sup> subcaudal; faint to nearly indistinct vertebral, paravertebral and lateral stripes; no dorsal or supracaudal blotches or crossbars; and a uniformly ivory venter lacking subrectangular or squarish blotches. We also report the first finding of *Oligodon deuvei* in Thailand based on a specimen from Loei Province.

**Key words:** Thai-Malay Peninsula, Thailand, *Oligodon huahin* sp. nov., *Oligodon deuvei*, taxonomy

### Introduction

The colubrid genus *Oligodon* Boie *in* Fitzinger, 1826 currently includes about 75 species, globally widely extending through tropical Asia (Uetz *et al.* 2016). All *Oligodon* possess a large rostral scale and characteristic enlarged and compressed, blade-like posterior maxillary teeth (David *et al.* 2012), hence the common name “Kukri snakes” given to the genus. Numerous species were recently described, including from Thailand, where 11 species are currently known to occur (Chanhome & Pauwels 2007; Chan-ard *et al.* 2015; Pauwels & Grismer 2015). One of them, *Oligodon jintakunei* Pauwels, Wallach, David & Chanhome, 2002, is endemic to peninsular Thailand, and another, *O. pseudotaeniatus* David, Vogel & van Rooijen, 2008, is endemic to central Thailand (David *et al.* 2008). Some species like *Oligodon cinereus* (Günther, 1864) are believed to be actually composed of several species (David *et al.* 2012), and it is expected that further revisions will reveal more species.

Pursuing our work on the zoogeography and systematics of the reptiles of peninsular Thailand (see among our most recent contributions, Pauwels & Grismer 2016; Pauwels & Sumontha 2016; Pauwels *et al.* 2016), we examined a series of *Oligodon* collected by one of us (HL) within a few days in a single location in Prachuap Khiri Khan Province which had however been prospected multiple times by herpetologists. These *Oligodon* strikingly differ in pattern and scalation from the two other *Oligodon* recorded from this area, i.e., *O. fasciolatus* (Günther, 1864) and *O. mouhoti* (Boulenger, 1914), and our analysis shows that they are actually readily distinguishable from all currently recognized congeneric species. We thus hereafter describe this population as a new species. We take this opportunity to analyze an *Oligodon* individual found by another of us (WS) in Loei Province in northeastern Thailand, which represents a new record for Thailand.

## Material and methods

Measurements and meristic counts follow David *et al.* (2008a). All measurements were taken with a slide-caliper to the nearest 0.1 mm. Ventral scales were counted according to Dowling (1951). The terminal scute is not included in the number of subcaudals. Dorsal scale row counts are given at one head length behind head, at midbody (i.e., at the level of the ventral plate corresponding to a half of the total number of ventrals), and at one head length before vent. Paired meristic characters are given left/right. Maxillary teeth were examined after removal and cleaning of the maxillary.

Comparisons were made using original species descriptions and revisions (see References; David *et al.* 2008a-b; Orlov *et al.* 2010; van Rooijen *et al.* 2011; Zhang *et al.* 2011; Hasan *et al.* 2013; Vassilieva *et al.* 2013; Vassilieva 2015; Nguyen *et al.* 2016 and literature cited therein) and preserved museum material in the Chulalongkorn University Museum of Zoology, Reptile Collection, Bangkok (CUMZ (R)), Institut Royal des Sciences Naturelles de Belgique, Brussels (IRSNB), Muséum national d'Histoire naturelle, Paris (MNHN), Prince of Songkhla University Zoological Collection, Songkhla (PSUZC), Queen Saovabha Memorial Institute, Thai Red Cross Society, Bangkok (QSMI), Royal Forest Department of Thailand, Bangkok (RFD), Natural History Museum, National Science Museum, Technopolis, Pathum Thani (THNHM) and United States National Museum, Washington (USNM).

Abbreviations of morphological characters are as follows: Morphometry: ED, eye diameter (horizontal); HD, maximum head depth; HL, head length (from the tip of rostral to the posterior end of the jaw); HW, maximum head width; SnL, snout length (from the tip of rostral to the anterior eye margins); SVL, snout-vent length; TaL, tail length; TL, total length. Scallation & others: ASR, number of dorsal scale rows at neck (at one HL behind head); DSR, dorsal scale rows; IL, infralabial scale(s); LOR, loreal scale; MSR, number of dorsal scale rows at midbody (at number of VEN/2); MT: maxillary teeth; PosOc, postocular scale(s); PreOc, preocular scale(s); PreSubOc, presubocular scale (below the preocular and not in contact with the loreal); PV, preventral(s) (directly preceding the ventrals, unpaired, wider than long but not in contact with the 1<sup>st</sup> dorsal scale row); SC, subcaudal scale(s); SL, supralabial scale(s); SnL, snout length (from the tip of rostral to anterior eye margin); Tem, temporal formula; VEN, ventral scale(s).

## Results

### Description of *Oligodon huahin* sp. nov.

(Figs 1–9)

**Holotype.** QSMI 1501 (field number MS 602); adult male from the road 3218 to Pala-U waterfall (12.528768 N, 99.527812 E), about 2 km east of the entrance gate to Kaeng Krachan National Park, Hua Hin District, Prachuap Khiri Khan Province, peninsular Thailand; collected by H. Larsen on 20 December 2016.

**Paratypes.** QSMI 1502 and PSUZC 720, adult males, same locality and collector as holotype, collected on 12 and 20 December 2016, respectively.

**Diagnosis.** *Oligodon huahin* sp. nov. can be distinguished from all other congeneric species by its maximal known SVL of 553.7 mm, 7 or 8 supralabials, 17-17-15 or 17-15-15 dorsal scale rows, 166–173 ventrals, single anal, 35–41 subcaudals, deeply forked hemipenes without spines, 6 maxillary teeth, faint to very faint striped dorsal pattern without blotches on head, nape, dorsum or belly, and ivory ventral surface.

**Description of holotype.** Adult male. Body robust but elongate. Head short, barely distinct from the poorly marked neck. Pupil round. SVL 454.8 mm. TaL 70.8 mm. Tail robust, tapering, accounting for 13.5 % of the TL (525.6 mm). HL 13.5 mm; HW 8.7 mm; HD 7.0 mm. SnL 5.0 mm. Snout long (37 % of HL, 2.4 times as long as ED). ED 2.1 mm.

Body scalation. DSR 17-15-15, all smooth. DSR reduction from 17 to 16 occurs on the right side above the 73<sup>rd</sup> VEN by fusion of DSR 3 and 4; from 16 to 15 on the left side above the 82<sup>nd</sup> VEN by fusion of DSR 4 and 5. One PV + 173 VEN, laterally angulated. Anal plate single. SC 41, all divided.

Head scalation. Rostral thick, curved onto upper snout surface, well visible from above, separating internasals by about one half of their length. Rostral width 3.3 mm, rostral height 2.9 mm. Nasals vertically divided, with the

posterior part smaller. Nostril large, piercing top of middle of nasal. Internasals in broad contact, shorter than prefrontals. Prefrontals subrectangular, distinctly wider than long. Length of suture between internasals subequal to length of suture between prefrontals. Frontal pentagonal, 1.3 times as long as wide; 1/1 supraoculars, distinctly longer than wide; SL 8/8, 2<sup>nd</sup> and 3<sup>rd</sup> in contact with LOR, 4<sup>th</sup> and 5<sup>th</sup> in contact with orbit, 6<sup>th</sup> largest. LOR 1/1, distinctly longer than high. PreOc 1/1, tall and narrow; no PreSubOc. PosOc 2/2, the upper one larger. Tem 1+2 on each side. Mental width 2.3 mm, mental length 1.5 mm. IL 8/8, 1<sup>st</sup> pair in contact behind mental, IL 1 to 4 in contact with anterior chin shields. First pair of chin shields much longer than 2<sup>nd</sup> pair.



**FIGURE 1.** Live holotype of *Oligodon huahin* sp. nov. in dorsal view. Photograph by H. Larsen.

**Dentition.** Six MT, the first four progressively increasing in size posteriorly, curved backwards, sharp, the two posterior ones much enlarged, kukri-like.

**Hemipenes.** The hemipenes are deeply forked and lack spines (Fig. 5).

**Coloration in life.** Dorsum surface light grayish brown, with a poorly defined brownish broad mediodorsal stripe on vertebral and adjacent rows. Some vertebral or paravertebral scales, irregularly distributed, have partly black posterior margins. No dorsolateral stripes. Upper head surface grayish brown, with faint, irregular lighter and darker markings. No interorbital dark band, no dark chevron on nape or neck, no large dark markings on head. Ventral surfaces of head, belly and tail uniformly ivory, gradually transitioning dorsally to grayish brown on the lowest dorsal scale row on body and tail, and on supralabials on head. Iris greenish golden, speckled with black. The tongue, including its forked tip, is uniformly bright red.

**Variation.** Table 1 presents the main meristic and morphometric characters for the type series and for four other specimens released after they were photographed and examined: “specimen 4” caught on 18 Dec. 2016 (12.528397 N, 99.528897 E), “specimen 5” caught on 21 Dec. 2016 (12.528533 N, 99.527408 E), “spec. 6” on 22 Dec. 2016 (12.528727 N, 99.529424 E), and “spec. 7” on 1<sup>st</sup> Jan. 2017 (12.528759 N, 99.527993 E). The largest known specimen has a TL of 553.7 mm. The relative tail length (TaL/TL) for the type series and other examined specimens (see Table 1) varies between 12.3 and 13.9 %. In QSMI 1502, the DSR reduction from 17 to 16 occurs on the right side above the 93<sup>rd</sup> VEN by fusion of rows 4 and 5; from 16 to 15 on the left side above the 96<sup>th</sup> VEN by fusion of rows 4 and 5. In PSUZC 720, the DSR reduction from 17 to 16 occurs on the left side above the 73<sup>rd</sup> VEN; from 16 to 15 on the right side above the 75<sup>th</sup> VEN; from 15 to 14 on the left side above the 160<sup>th</sup> VEN; all

three reductions involve a fusion of the 4<sup>th</sup> and 5<sup>th</sup> DSR. The extension *in situ* of the hemipenis till the 14<sup>th</sup> SC has been verified in PSUZC 720 and QSMI 1502. The MT of PSUZC 720 and QSMI 1502 have been examined and are exactly similar in number and relative sizes to those of the holotype. Some of the examined specimens show a dorsal coloration identical to that of the holotype, or with faint dark brown paravertebral and lateral (DSR 3 and 4) stripes on dorsum and tail and a rusty brown vertebral stripe (see Figs. 6–7). PSUZC 720 and specimens 5 and 6 show dusky spots on the posterior part of the belly, but no dark subrectangular or other well defined blotches.

**TABLE 1.** Meristic and morphometric (in mm) data for the type series and other specimens (“specimens 4–7”) of *Oligodon huahin* sp. nov. Paired meristic characters are given left/right. Paired measurements are given for the right side. NA = not available (individual released). Supralabial numbers are followed in brackets by the ones contacting the orbit. Infralabial numbers are followed in brackets by how many contact the anterior chin shields. A = anal plate; D = divided; S = single. For the other abbreviations, see Material and methods.

Specimen number	Sex	SVL	TaL	HL	HW	HD	ED	DSR	PV + VEN	A
QSMI 1501, holotype	M	454.8	70.8	13.5	8.7	7.0	2.1	17-15-15	1 + 173	S
QSMI 1502, paratype	M	357.1	50.5	11.7	8.0	5.4	1.9	17-17-15	2 + 170	S
PSUZC 720, paratype	M	485.8	67.9	13.5	8.8	6.0	2.3	17-15-14	2 + 173	S
Spec. 4	M	447.5	69.0	10.7	9.0	6.3	2.4	17-17-15	1 + 170	S
Spec. 5	M	NA	NA	NA	NA	NA	NA	17-17-15	2 + 170	S
Spec. 6	M	363.5	58.5	9.9	7.0	5.2	2.0	17-17-15	2 + 166	S
Spec. 7	M	NA	NA	NA	NA	NA	NA	17-17-15	1 + 172	S

continued.

Specimen number	Sex	SC	SL	IL	LOR	PreOc	PreSubOc	PosOc	Tem
QSMI 1501, holotype	M	41, D	8 (4-5) / 8 (4-5)	8 (4) / 8 (4)	1 / 1	1 / 1	0 / 0	2 / 2	1+2 (L) / 1+2 (R)
QSMI 1502, paratype	M	35, D	7 (3-4)* / 8 (4-5)	8 (4) / 8 (4)	1 / 1	1 / 1	0 / 0	2 / 2	1 + (1/(1+1)) (L) / 1 + 2 (R)
PSUZC 720, paratype	M	38, D	7 (4)** / 7 (4)**	7 (4) / 8 (4)	1 / 1	1 / 1	1 / 1	2 / 2	1+2 (L) / 1+2 (R)
Spec. 4	M	39, D	8 (4-5) / 7 (4)**	8 (4) / 8 (4)	1 / 1	1 / 1	0 / 1	2 / 2	1 + ((1+1)/1/1) (L) / 1 + 2 (R)
Spec. 5	M	39, D	8 (4-5) / 8 (4-5)	8 (4) / 8 (4)	1 / 1	1 / 1	1 / 1	2 / 2	1+2 (L) / 1+2 (R)
Spec. 6	M	39, D	7 (4) / 7 (4)	8 (4) / 8 (4)	1 / 1	1 / 1	0 / 0	2 / 2	1+2 (L) / 1+2 (R)
Spec. 7	M	39, D	8 (4-5) / 8 (4-5)	8 (4) / 8 (4)	1 / 1	1 / 2***	1 / 0	2 / 2	1+2 (L) / 1+2 (R)

\* On the left side the 6<sup>th</sup> SL is prevented from contacting the lip by a slight contact between the 5<sup>th</sup> and the 7<sup>th</sup> SL along the lip. \*\* The PreSubOc prevents the 3<sup>rd</sup> SL to contact the orbit. \*\*\* On the right side there is a contact by a point between the PreOc and the LOR, so it cannot be accounted as a PreSubOc.

**Distribution and natural history.** *Oligodon huahin* sp. nov. is currently known only from its type locality in Hua Hin District (Figs. 10–11). The species has never been found in Kaeng Krachan National Park and neighboring areas in spite of nearly two decades of field research (Pauwels *et al.* 2000, 2003, 2009, 2016; Pauwels & Kheowyo 2004, Pauwels & Chan-ard 2006; Sumontha *et al.* 2012), but it most probably occurs within the park, at least along the road leading to Pala-U waterfall. It is also expected to occur in similar habitats in the southern parts of Phetchaburi Province, especially in southern Cha-Am, Kaeng Krachan and Tha Yang districts.

All specimens were found crossing the road in a bamboo forest between 6.15 and 7.15 PM, which indicates an activity peak at dusk. All were males, suggesting that late December corresponds to a time when males are actively looking for females. A short yearly activity peak could explain why the species had not been found so far. None of the individuals tried to bite when handled, and they only rarely stroke from a distance when disturbed, for example

when photographed. Their defensive behavior included raising the tail rolled into a spiral and showing its underside (Fig. 7), as is commonly observed in other members of the genus, but without everting the hemipenes (Wüster & Cox 1992). When handled they pushed their snout hard towards the skin of the hand but without biting. Most of the individuals are infested by multiple ticks (Acari, see Figs. 4, 8). In addition to the seven specimens listed in Table 1, which were all caught alive, an 8<sup>th</sup> individual was found dead-on-road on 2 January 2017.

Other reptiles we found in syntopy at the type locality include *Calotes versicolor* (Daudin) (Agamidae), *Cyrtodactylus phetchaburiensis* Pauwels, Sumontha & Bauer, 2016, *Dixonius siamensis* (Boulenger), *Hemidactylus platyurus* (Schneider) (Gekkonidae), *Eutropis macularia* (Blyth) (Scincidae), *Ahaetulla prasina* (Boie), *Boiga siamensis* Nootpand and *B. cyanea* (Bibron in Duméril, Bibron & Duméril), *Chrysopelea ornata* (Shaw), *Coelognathus radiatus* (Boie), *Dryocalamus davisoni* (Blanford), *Lycodon capucinus* Boie in Boie, *Oligodon fasciolatus* (locally very common) (Colubridae), *Naja kaouthia* Lesson, *Ophiophagus hannah* (Cantor) (Elapidae), *Hypsiscopus plumbea* (Boie) (Homalopsidae), *Psammodynastes pulverulentus* (Boie) (Lamprophiidae), *Xenochrophis piscator* (Schneider) (Natricidae), *Pareas carinatus* Wagler and *P. margaritophorus* (Jan in Bocourt) (Pareatidae), *Python reticulatus* (Schneider) (Pythonidae) and *Trimeresurus albolabris* (Gray) (Viperidae). Syntopic amphibians we observed include *Ichthyophis kohtaoensis* Taylor (Ichthyophiidae), *Duttaphrynus melanostictus* (Schneider) (Bufonidae), *Fejervarya limnocharis* (Gravenhorst), *Limnonectes blythii* (Boulenger) and *L. jarujini* Matsui, Panha, Khonsue & Kuraishi (Dicroglossidae), *Glyphoglossus guttulatus* (Blyth) and *G. molossus* Günther, *Microhyla fissipes* Boulenger and *M. heymonsi* Vogt, *Micryletta inornata* (Boulenger) (Microhylidae), *Hylarana erythraea* (Schlegel) (Ranidae) and *Polypedates megacephalus* Hallowell (Rhacophoridae).

**Etymology.** The specific epithet is an invariable noun in honor of the administrative district where the type-locality lies and of its charming main city Hua Hin. We suggest the following common names: *Ngü Ngod Hua Hin* (Thai), *Hua Hin Kukri Snake* (English), *Oligodon de Hua Hin* (French), *Hua Hin Kukrinatter* (German).



**FIGURE 2.** Preserved holotype of *Oligodon huahin* sp. nov. in lateroventral view. Photograph by M. Sumontha.



**FIGURE 3.** Dorsal, left and ventral views of the head of the live holotype of *Oligodon huahin* **sp. nov.** Photographs by H. Larsen.

### Comparisons with other species

*Oligodon* species found in the Indochinese Peninsula and in Thailand have been tentatively allocated to several groups, based on hemipenial morphology, scalation, number of maxillary teeth and dorsal pattern (David *et al.* 2008b; Green *et al.* 2010; Orlov *et al.* 2010; Jiang *et al.* 2012; Neang *et al.* 2012; Neang & Hun 2013; Vassilieva 2015).

One of the most important characters in the genus *Oligodon* bears on the structure of the hemipenes, especially if the organ is unforked or divided. Hemipenial characters were used by Smith (1943) to define informal species-groups. This character was also emphasized by Wagner (1975). Another character bears on the presence or absence of papillae on the hemipenes. However, although this character has constantly been recognized in the informal group of *Oligodon taeniatus* (Günther, 1861), it has been differently interpreted by various authors in the group of *O. cinereus*. For instance, compare the distal lobes of the hemipenes illustrated for *Oligodon formosanus* (Günther, 1872) by Green (2010: 6) and Green *et al.* (2010: 2), interpreted by these authors as large papillae, and the distal lobes of the hemipenis illustrated by Thy *et al.* (2012: 45) interpreted by these authors as an integral part of the hemipenes said to lack papillae; however to us these distal lobular structures seem homologous, and correspond to the apical hemipenial structures observed in *Oligodon huahin* **sp. nov.** Since the current species groups are still informal and possibly partly artificial, and because several species are not currently assigned to any group, we include in our interspecific comparisons all *Oligodon* known to date from Thailand, Myanmar, Laos, Cambodia and Vietnam, using (a non-exhaustive list of) unambiguous morphological differences.

Compared to the informal “*Oligodon cinereus* group”, whose members all show unforked hemipenes unlike *O. huahin* **sp. nov.**, the new species is distinguished from *O. albocinctus* (Cantor, 1839) by its 15 or 17 (vs. 19 or rarely 21) DSR at midbody, lower VEN number (166–173 vs. 177–210), lower SC number (35–41 vs. 42–69), 6

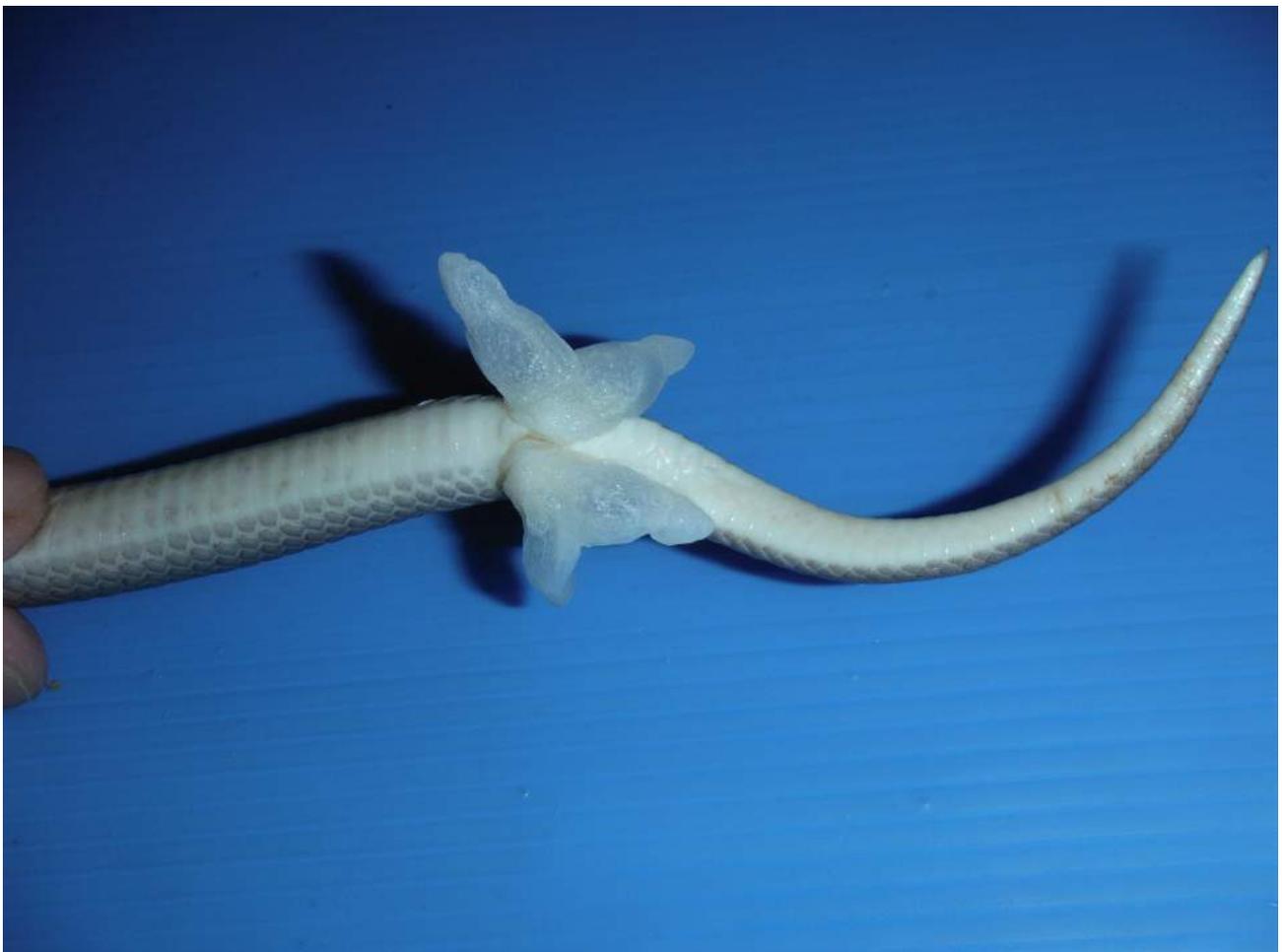
(vs. 10–12) MT, the absence (vs. presence) of dorsal crossbands and chevron on nape, and the absence (vs. presence) of quadrangular blotches on belly; from *O. cinereus* by its 6 (vs. 11–14) MT and the presence (vs. absence) of a striped dorsal pattern; from *O. inornatus* (Boulenger, 1914) by its ASR of 17 (vs. 15), 6 (vs. 11–12) MT, striped pattern (vs. no pattern or with reticulations), and its slightly shorter tail in males (TaL/TL 12.3–13.9 vs. 14.1–14.4 %); from *O. joyntsoni* (Smith, 1917) by its 6 (vs. 11 or 12) MT, lower VEN number (166–173 vs. 186–198), and the presence (vs. absence) of a striped dorsal pattern; from *O. macrurus* (Angel, 1927) by its much lower MT number (6 vs. 13), higher VEN number (166–173 vs. 143–152), much lower SC number (35–41 vs. 76–83), and the absence (vs. presence) of a chevron and large dark head markings; from *O. nagao* David, Nguyen, Nguyen, Jiang, Chen, Teynié & Ziegler, 2012 by its smaller size (maximum known TL 553.7 vs. 786 mm), 6 (vs. 9 or 10) MT with last 2 (vs. 3) enlarged, lower VEN number (166–173 vs. 184–193), and absence (vs. presence) of large markings on upper head surface and of large blotches on dorsum; and from *O. splendidus* (Günther, 1875) by its 6 (vs. 10 or 11) MT, 15 or 17 (vs. 21) MSR, and by the absence (vs. presence) of blotches on dorsum, of a chevron and large markings on upper head surface and of quadrangular blotches on belly (David *et al.* 2012: 46 ambiguously included *O. splendidus* both in the informal groups of *O. cinereus* and *O. purpurascens*). In fact, it is better to consider the “group” of *O. purpurascens* (Schlegel, 1837) to be a subgroup of the “*O. cinereus* group” (see Greene *et al.* 2010).



**FIGURE 4.** Dorsal, left and ventral views of the head of the live paratype of *Oligodon huahin* **sp. nov.** (PSUZC 720), showing a presubocular scale on each side. Photographs by H. Larsen.

Within the “*Oligodon cyclurus* group”, in which all species have divided hemipenes without papillae, *O. huahin* **sp. nov.** is distinguished from *O. cattienensis* Vassilieva, Geissler, Galoyan, Poyarkov, Wayne Van Devender & Böhme, 2013 by a generally higher number of SC (35–41 vs. 31–35), 6 (vs. 8–10) MT whose last 2 (vs. 3) are enlarged, the absence (vs. presence) of dorsal blotches and chevron on nape, and the absence (vs. presence) of quadrangular blotches on belly; from *O. chinensis* (Günther, 1888) by its smaller size (maximum known TL 553.7 vs. 729 mm), 6 (vs. 9 or 10) MT, and the absence (vs. presence) of chevron on nape and dorsal

crossbands; from *O. condaoensis* Nguyen, Nguyen, Le & Murphy, 2016, endemic to Hon Ba Island in southern Vietnam, by its much lower number of MT (6 vs. 11–13) with the two (vs. 3) posterior ones enlarged, presence or absence in equal proportions of a PreSubOc scale (vs. absence), and by its lighter dorsal and ventral color; from *O. cyclurus* (Cantor, 1839) by its smaller size (maximum known TL 553.7 vs. 710 mm), 6 (vs. 9 or 10) MT, 15 or 17 (vs. 19) MSR, and the absence (vs. presence) of a reticulated dorsal pattern or dorsal blotches; from *O. fasciolatus* by its much smaller size (maximum known TL 553.7 vs. 807 mm), 15 or 17 (vs. 21) MSR, and the absence (vs. presence) of a reticulated dorsal pattern or dorsal blotches; from *O. formosanus* by its much smaller size (maximum known TL 553.7 vs. 942 mm), much lower MT number (6 vs. 10 or 11), 15 or 17 (vs. 19 or very rarely 17) MSR, and the absence (vs. presence) of a chevron and quadrangular blotches on belly (see also patterns of live individuals illustrated by Huang *et al.* 2011); from *O. kampucheaensis* Neang, Grismer & Daltry, 2012 by its ASR of 17 (vs. 15), higher VEN number (166–173 vs. 164), striped (vs. banded) dorsal pattern and its much lower number of MT (6 vs. 11); from *O. ocellatus* (Morice, 1875) by its much smaller size (maximum known TL 553.7 vs. 852 mm), MSR of 15 or 17 (vs. 19), 6 (vs. 9–11) MT, and the absence (vs. presence) of a chevron on nape and dorsal blotches; from *O. saintgironsi* David, Vogel & Pauwels, 2008 by its ASR of 17 (vs. 19), 6 (vs. 10–12) MT with last 2 (vs. 3) enlarged, hemipenes reaching *in situ* the 14<sup>th</sup> (vs. 24<sup>th</sup>) VEN, and the absence (vs. presence) of chevron on nape and dorsal blotches. Based on its striped pattern and especially its hemipenial structures, we suggest that *Oligodon huahin* **sp. nov.** is a member of the “*O. cyclurus* group”.



**FIGURE 5.** Hemipenes of the preserved holotype of *Oligodon huahin* **sp. nov.** Photograph by M. Sumontha.

Compared with species of the “*Oligodon taeniatus* group”, largely present in Thailand and characterized by deeply forked hemipenes with two large papillae, *O. huahin* **sp. nov.** differs from *O. barroni* (Smith, 1916) by its higher VEN number (166–173 vs. 136–160), the presence (vs. absence) of dorsal stripes, the absence (vs. presence) of dorsal blotches, and its much lower number of MT (6 vs. 10–13); from *O. deuwei* David, Vogel & van Rooijen, 2008 by its much lower number of MT (6 vs. 12–14), higher VEN number (166–173 vs. 140–155), and absence

(vs. presence) of black markings on head and of quadrangular blotches on belly; from *O. moricei* David, Vogel & van Rooijen, 2008 by its much lower number of MT (6 vs. 12), lower VEN number (166–173 vs. 175), much less defined dorsal stripes and absence (vs. presence) of quadrangular blotches on belly; from *O. mouhoti* by its much larger size (maximum known TL 553.7 vs. 339 mm), much lower number of MT (6 vs. 14–16), higher VEN number (166–173 vs. 145–163), and absence (vs. presence) of five large markings on the upper surface of the head, of quadrangular black blotches on belly and of two large blotches on the upper surface of the tail; from *O. pseudotaeniatus* by its much larger size (maximum known TL 553.7 vs. 320 mm), much lower number of MT (6 vs. 15), higher VEN number (166–173 vs. 137–156), and absence (vs. presence) of three large markings on the upper surface of the head and of quadrangular black blotches on belly; and from *O. taeniatus* by its much lower number of MT (6 vs. 14–18), 15 or 17 (vs. 19) MSR, higher VEN number (166–173 vs. 142–165), and absence (vs. presence) of five large markings on the upper surface of the head and of quadrangular black blotches on belly. *Oligodon huahin* **sp. nov.** is distinguished from *O. arenarius* Vassilieva, 2015 by its much higher VEN number (166–173 vs. 131–144), forked (vs. unforked) hemipenes, absence (vs. presence) of dark chevron on nape, and ivory (vs. pinkish) ventral color.



**FIGURE 6.** Live *Oligodon huahin* **sp. nov.** (QSMI 1502) *in situ* at the type locality. Photograph by H. Larsen.

*Oligodon huahin* **sp. nov.** differs from the “*O. cruentatus-planiceps-theobaldi-torquatus* group” characterized by unforked, spinose hemipenes, as follows: from *O. cruentatus* (Günther, 1868) by 6 (vs. 14–16) MT, single (vs. divided) anal plate, forked (vs. unforked) hemipenes without (vs. with) spines, and absence (vs. presence) of dark chevron on nape and subrectangular blotches on belly; from *O. planiceps* (Boulenger, 1888) by its 15 or 17 (vs. 13) MSR, 7 or 8 (vs. 5) SL, much higher VEN number (166–173 vs. 132–145), higher SC number (35–41 vs. 22–27), single (vs. divided) anal, and the absence (vs. presence) of black quadrangular blotches on belly and of large markings on the upper head surface; from *O. theobaldi* (Günther, 1868) by its 6 (vs. 15 or 16) MT, single (vs. divided) anal, and the absence (vs. presence) of chevron and large dark marks on upper surface of head; and from *O. torquatus* (Boulenger, 1888) by its much lower MT number (6 vs. 15 or 16) and the absence (vs. presence) of black quadrangular blotches on belly.

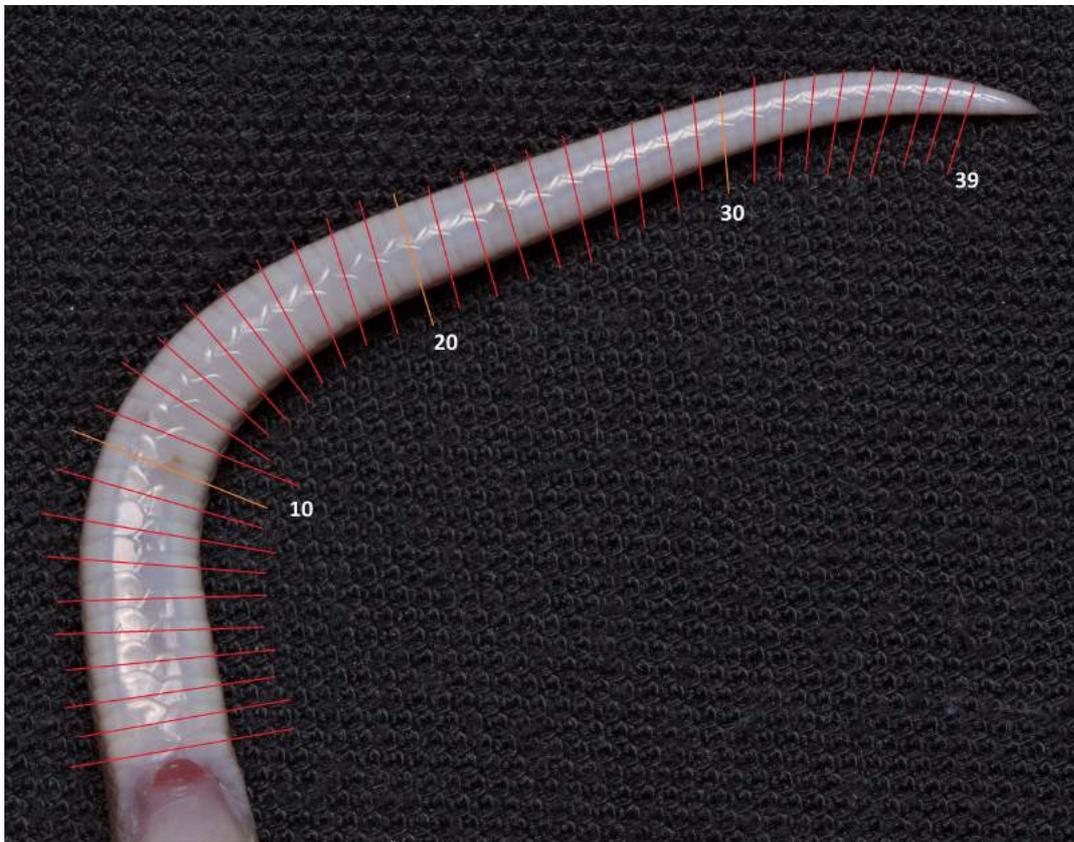


**FIGURE 7.** Live *Oligodon huahin* sp. nov. (“specimen 4”) in defensive posture, showing the underside of its tail. Photograph by M. Sumontha.

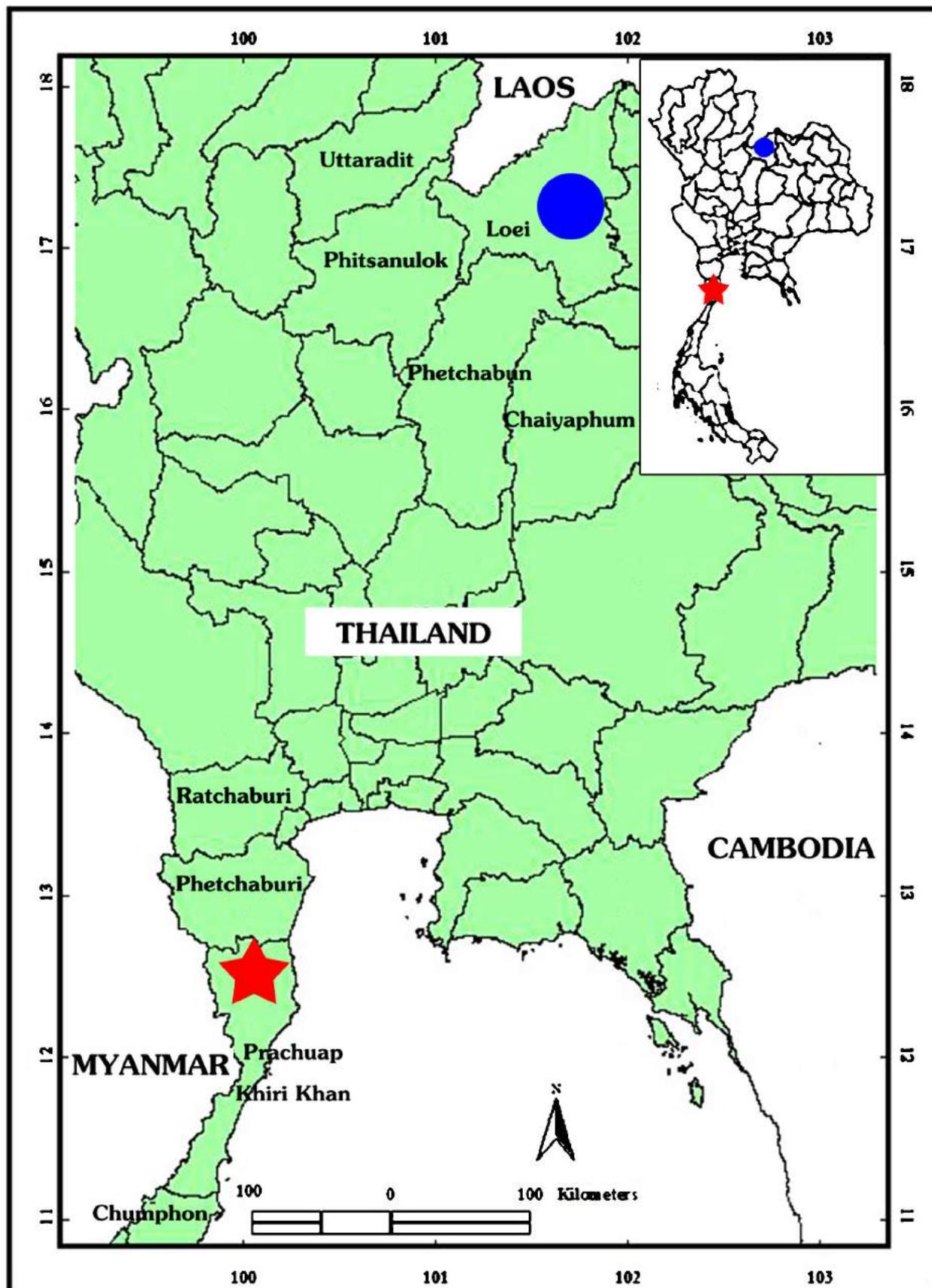
The new species differs from *Oligodon annamensis* Leviton, 1953 of which hemipenes are unknown, by the presence (vs. the absence) of a LOR, two (vs. one) PosOc, 15 or 17 (vs. 13) MSR and the absence (vs. presence) of dorsal crossbars and quadrangular blotches on belly; from *O. catenatus* (Blyth, 1854) by the presence (vs. absence) of a LOR and internasals, 15 or 17 (vs. 13) MSR, single (vs. divided) anal, its forked (vs. unforked) hemipenes without (vs. with) spines, and absence (vs. presence) of quadrangular blotches on belly; from *O. dorsalis* (Gray, 1835) by its single (vs. divided) anal, absence (vs. presence) of spines on hemipenes, and absence (vs. presence) of quadrangular blotches on belly; from *O. eberhardti* Pellegrin, 1910 by its 7 or 8 (vs. 6) SL, 15 or 17 (vs. 13) MSR, single (vs. divided) anal, and absence (vs. presence) of quadrangular blotches on belly; from *O. hamptoni* Boulenger, 1918 by its 7 or 8 (vs. 5) SL, single (vs. divided) anal, higher SC number (35–41 vs. 30–32), forked (vs. unforked) hemipenes, the absence (vs. presence) of a chevron on nape, and the absence (vs. presence) of quadrangular blotches on belly, from *O. jintakunei*, still known only by its holotype from Krabi Province, by its distinct (vs. fused) internasals and prefrontals, lower numbers of VEN (166–173 vs. 189) and SC (35–41 vs. 46), and the absence (vs. presence) of dorsal crossbars; from *O. lacroixi* Angel & Bourret, 1933 by the presence (vs. absence) of a LOR and internasals, 7 or 8 (vs. 5) SL, 6 (vs. 8–12) MT, and the absence (vs. presence) of a chevron on nape and of quadrangular blotches on belly; and from *O. mcdougalli* Wall, 1905 known only by its holotype from southwestern Myanmar, by the presence (vs. absence) of a LOR, 15 or 17 (vs. 13) MSR, much lower VEN number (166–173 vs. 199), anal single (vs. divided), forked (vs. unforked) hemipenes, and the absence (vs. presence) of a chevron on nape. It is distinguished from *Oligodon purpurascens* by its 15 or 17 (vs. 19 or 21) MSR, forked hemipenes without papillae (vs. unforked with papillae), 6 (vs. 9 or 10) MT, the absence (vs. presence) of a chevron on nape, and the absence (vs. presence) of dorsal crossbands and quadrangular blotches on belly.



**FIGURE 8.** Dorsal, right and ventral views of the head of *Oligodon huahin* sp. nov. (“specimen 5”), showing a multiple tick infestation. Photographs by H. Larsen.



**FIGURE 9.** Ventral view of the tail of *Oligodon huahin* sp. nov. (“specimen 7”), showing the subcaudal count, the single anal and the typical immaculate ivory surface. Photograph by H. Larsen.



**FIGURE 10.** Geographical location of the type-locality of *Oligodon huahin* sp. nov. in Prachuap Khiri Khan Province, peninsular Thailand (red star), and of the first Thai record of *O. devei* in Loei Province, northeastern Thailand (blue dot). Map by W. Sodoab.



**FIGURE 11.** Biotope of *Oligodon huahin* **sp. nov.** at the type locality. Photograph by H. Larsen.

*Oligodon huahin* **sp. nov.** is added to a list of endemic reptile species we have recently described from the northern part of the Thai Peninsula, in Phetchaburi and Prachuap Khiri Khan provinces: *Cnemaspis punctatonuchalis* Grismer, Sumontha, Cota, Grismer, Wood, Pauwels & Kunya, 2010, *Cyrtodactylus phetchaburiensis* and *C. samroyot* Pauwels & Sumontha, 2014 and *Ptychozoon kaengkrachanense* Sumontha, Pauwels, Kunya, Limlikhitaksorn, Ruksue, Taokratok, Ansermet & Chanhom, 2012. Far from being remote, their type-localities are within about four hours or less of easy drive from Bangkok metropolis, and illustrate how much still remains to be done to fully inventory the herpetofauna of Thailand. The biotope where *Oligodon huahin* **sp. nov.** was found shows that it can cope with a high level of environmental disturbance. The fact that it lacks any special pattern or bright colors makes it unattractive for the pet trade. Consequently, in spite of its apparently restricted geographic distribution, *Oligodon huahin* **sp. nov.** does not seem to be currently under threat.

#### **Addition of *Oligodon devei* to the herpetofauna of Thailand**

We report here on an adult female, QSMI 1503 (MS 609), collected by one of us (WS) on 18 December 2016 in Ban Na Muang (17.613402 N, 101.688626 E, approximately 270 m asl; Fig. 10), Si Song Rak, Muang District, Loei Province. It shows a SVL of 267.0 mm, TaL of 42.1 mm, HL 9.9 mm (right), HW 5.9 mm (right), HD 4.1 mm, ED 1.7 mm (right), SnL 2.5 mm (right), 17-17-15 DSR, all smooth, a round pupil, 7 (3-4) / 7 (3-4) SL, on both sides 2<sup>nd</sup> and 3<sup>rd</sup> SL in contact with LOR, 1/1 LOR, 1/1 PreOc, 0/0 PreSubOc, 2/2 PosOc, Tem 1+2 / 1+2, 8 (4) / 8 (4) IL, 1 PV + 149 VEN, a single anal scale and 35 divided SC. The DSR reductions from 17 to 15 both occur above the 97<sup>th</sup> VEN by fusion of rows 4 and 5 (left) and 3 and 4 (right). On each side the two posteriormost maxillary teeth are strongly enlarged. In life it showed a broad, light brown vertebral stripe, edged with two dark

brown paravertebral stripes; light grayish brown flanks with a dorsolateral stripe on each side, less contrasted and marked than the paravertebral stripes; five well defined large marks on dorsal surface of head: a transverse bar across the snout, a sagittal blotch, two oblique streaks directed posteriorly downwards, and one broad nuchal, arrow-shaped mark (not reaching the ventrals) (Figs. 12–13). The ventral surfaces of the body and tail are bright red in their middle, white on the sides, and show irregularly distributed black rectangular blotches. The undersurface of tail is mostly bright red. There are no black blotches on the upper surface of the tail. The tongue is uniformly bright red and the pupil is black. Using the key provided in the work of David *et al.* (2008) in which this species was described, it is unambiguously identifiable as *O. deuvei*. Its morphological and chromatical characters agree in all respects with the definition of the species provided by David *et al.* (2008b) and exclude an identification as any other member of the informal “*Oligodon taeniatus* group”. Two other conspecific individuals had been earlier caught, photographed and released by WS (on 29 May and 24 July 2016, respectively) in the same locality; they were found in bamboo thickets along a paddy field. *Oligodon deuvei*, currently recorded from southern Vietnam, Cambodia and Laos, was expected by David *et al.* (2008b) to also occur in northeastern Thailand, a zoogeographical hypothesis confirmed by our present record.



**FIGURE 12.** Adult female *Oligodon deuvei* (QSMI 1503) from Loei Province, northeastern Thailand, in laterodorsal view. Photograph by M. Sumontha.

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**FIGURE 13.** Adult female *Oligodon deuvei* (QSMI 1503) from Loei Province, northeastern Thailand, in ventral view. Photograph by M. Sumontha.

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**APPENDIX.** Comparative material examined.

- Oligodon fasciolatus*: CUMZ (R) 1998.12.11.2, “Km 22, road 3219 from Hua Hin to Pala-U Waterfall, Thailand”; IRSNB 1188 $\beta$ , “Pak-Chong, Siam”; IRSNB 15491, “Chiang Mai city, Muang District, Chiang Mai Province, Thailand”; IRSNB 15492, “Ban Khao Tao, Hua Hin District, Prachuap Khiri Khan Province, Thailand”; IRSNB 16552, “Cha-am, Cha-am District, Phetchaburi Province, Thailand”; MNHN 1998.0530, “Ban Khao Kling, Kaeng Krachan District, Phetchaburi Province, Thailand”; QSMI 223–224, “Thailand”; QSMI 359, “Thailand”; QSMI 381, “Thailand”; QSMI 533, “Korat Zoo, Nakhon Ratchasima Province, Thailand” (albino specimen, see Pauwels *et al.*, 2008).
- Oligodon jintakunei*: QSMI 385, “Krabi Prov., Thailand” (holotype).
- Oligodon maculatus* (Taylor): IRSNB 14935–37, “Manobo Tasaday Special Forest Reserve, around Mt. Tasaday, 6°18'10"N-124°32'52"E, alt. 1000-1100 m, Barangay Ned, Municipality of Lake Sebu, South Cotabato Province, Mindanao Island, Philippines”.
- Oligodon mouhoti*: IRSNB 16553, “Khao Nakwang, Nayang subdistrict, Cha-am District, Phetchaburi Province, Thailand”; IRSNB 16554 and MNHN 1999.7635, “Ban Salakern, Ban Lat District, Phetchaburi Province, Thailand”; MNHN 1998.0572, “Ban Ton Kaet, Kaeng Krachan District, Phetchaburi Province, Thailand”; THNHM 1295, “Forestry Training Center, Cha-am, Cha-am District, Phetchaburi Province, Thailand”.
- Oligodon purpurascens*: IRSNB 527, “Java”; IRSNB 1188, “Trang, P. [= Peninsular] Siam”; IRSNB 2802, “Telokbetong”; RFD (field number P243), “Sanang Mahnora Forest Park, Muang District, Phang-Nga Province, Thailand”.
- Oligodon taeniatus*: IRSNB 436 $\beta$ , “Cochinchine”; IRSNB 1403, “Pak-Chong, Siam”.
- Oligodon theobaldi*: USNM 520624, “Burma: Sagaing; Kanbalur Township; Chatthin, ca. 2 km WNW of Chatthin Wildlife Sanctuary, San Myaung Camp, 360 ft, 23°34'46"N, 095°44'26"E” (see David *et al.*, 2008b: 17).