Bonn zoological Bulletin 67 (1): 15–24 May 2018

New records of snakes (Squamata: Serpentes) from Hoa Binh Province, northwestern Vietnam

Truong Quang Nguyen[1,2,*], Tan Van Nguyen [1,3], Cuong The Pham[1,2], An Vinh Ong[4] & Thomas Ziegler[5]

[1] *Institute of Ecology and Biological Resources, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet Road, Hanoi, Vietnam*

[2] *Graduate University of Science and Technology, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet Road, Hanoi, Vietnam*

[3] *Save Vietnam's Wildlife, Cuc Phuong National Park, Ninh Binh Province, Vietnam*

[4] *Vinh University, 182 Le Duan Road, Vinh City, Nghe An Province, Vietnam*

[5] *AG Zoologischer Garten Köln, Riehler Strasse 173, D-50735 Cologne, Germany*

[*] *Corresponding author. E-mail: nqt2@yahoo.com*

Abstract. We report nine new records of snakes from Hoa Binh Province based on a reptile collection from Thuong Tien, Hang Kia-Pa Co, Ngoc Son-Ngo Luong nature reserves, and Tan Lac District, comprising six species of Colubridae (*Dryocalamus davisonii*, *Euprepiophis mandarinus*, *Lycodon futsingensis*, *L. meridionalis*, *Sibynophis collaris* and *Sinonatrix aequifasciata*), one species of Pareatidae (*Pareas hamptoni*) and two species of Viperidae (*Protobothrops mucrosquamatus* and *Trimeresurus gumprechti*). In addition, we provide an updated list of 43 snake species from Hoa Binh Province. The snake fauna of Hoa Binh contains some species of conservation concern with seven species listed in the Governmental Decree No. 32/2006/ND-CP (2006), nine species listed in the Vietnam Red Data Book (2007), and three species listed in the IUCN Red List (2018).

Key words. New records, snakes, taxonomy, Hoa Binh Province.

INTRODUCTION

In the recent checklist of the herpetofauna of Vietnam, Nguyen et al. (2009) listed 192 species of snakes. Since then 13 new country records, one new genus and 15 new species of snakes have been described from Vietnam (Ziegler & Nguyen 2010, Uetz et al. 2018). In Hoa Binh Province, previous studies documented a total of 34 species of snakes (Nguyen et al. 2009, Nguyen et al. 2010, Ziegler et al. 2010, Luu et al. 2011). In this paper, we report nine new records of snakes from Hoa Binh Province based on newly collected specimens from Thuong Tien Nature Reserve (Kim Boi District), Hang Kia-Pa Co Nature Reserve (Mai Chau District), Ngoc Son-Ngo Luong Nature Reserve (Tan Lac and Lac Son districts), and Tan Lac District.

MATERIAL & METHODS

Field surveys were conducted in Thuong Tien Nature Reserve (hereafter NR) by V.Q. Luu in March 2009; in Hang Kia-Pa Co and Ngoc Son-Ngo Luong NR, in April, May, September, and October 2014 and April 2015 by T.Q. Nguyen. C.T. Pham, C.V. Hoang, H.N. Ngo, M.D. Le, H.T. An (hereafter TQN et al.) and in Tan Lac District in June 2016 by C.T. Pham, T.V. Nguyen, N.H. Nguyen (hereafter CTP et al.). Specimens were collected by hand or by using a snake hook between 8:00 and 23:00 hrs. Most specimens were photographed in life. Specimens were euthanized in a closed vessel with a piece of cotton wool containing ethyl acetate (Simmons, 2002), fixed in 85% ethanol and subsequently stored in 70% ethanol. Tissue samples of some species were kept separately in 90% ethanol. Specimens were deposited in the collections of the Institute of Ecology and Biological Resources (IEBR), Vietnam Academy of Science and Technology, Hanoi, Vietnam.

Taxonomic identifications of the specimens were made based on the following literature: Smith (1943), Taylor (1965), David et al. (2002), Vogel et al. (2004), Gumprecht et al. (2004), Orlov et al. (2004, 2011), Kim & Oh (2006), Stuart & Heatwole (2008), Yang et al. (2008), Vogel et al. (2009), Hecht et al. (2013), Luu et al. (2013a, b), Le et al. (2015), Nguyen et al. (2011, 2014), Ziegler et al. (2007, 2014), Nemes et al. (2013), Nguyen et al. (2016), Vassilieva et al. (2016), and Pham et al. (2017). For common names, we followed Nguyen et al. (2009) and Uetz et al. (2018). Abbreviations used for morphometry are as follows: SVL (snout-vent length): from tip of snout to anterior margin of cloaca; TaL (tail length): from posterior margin of cloaca to tip of tail.

Identification of sex was performed by dissection (inspection of gonads and inspection of presence of hemi-

Received: 07.01.2018
Accepted: 22.03.2018
Corresponding editor: W. Böhme

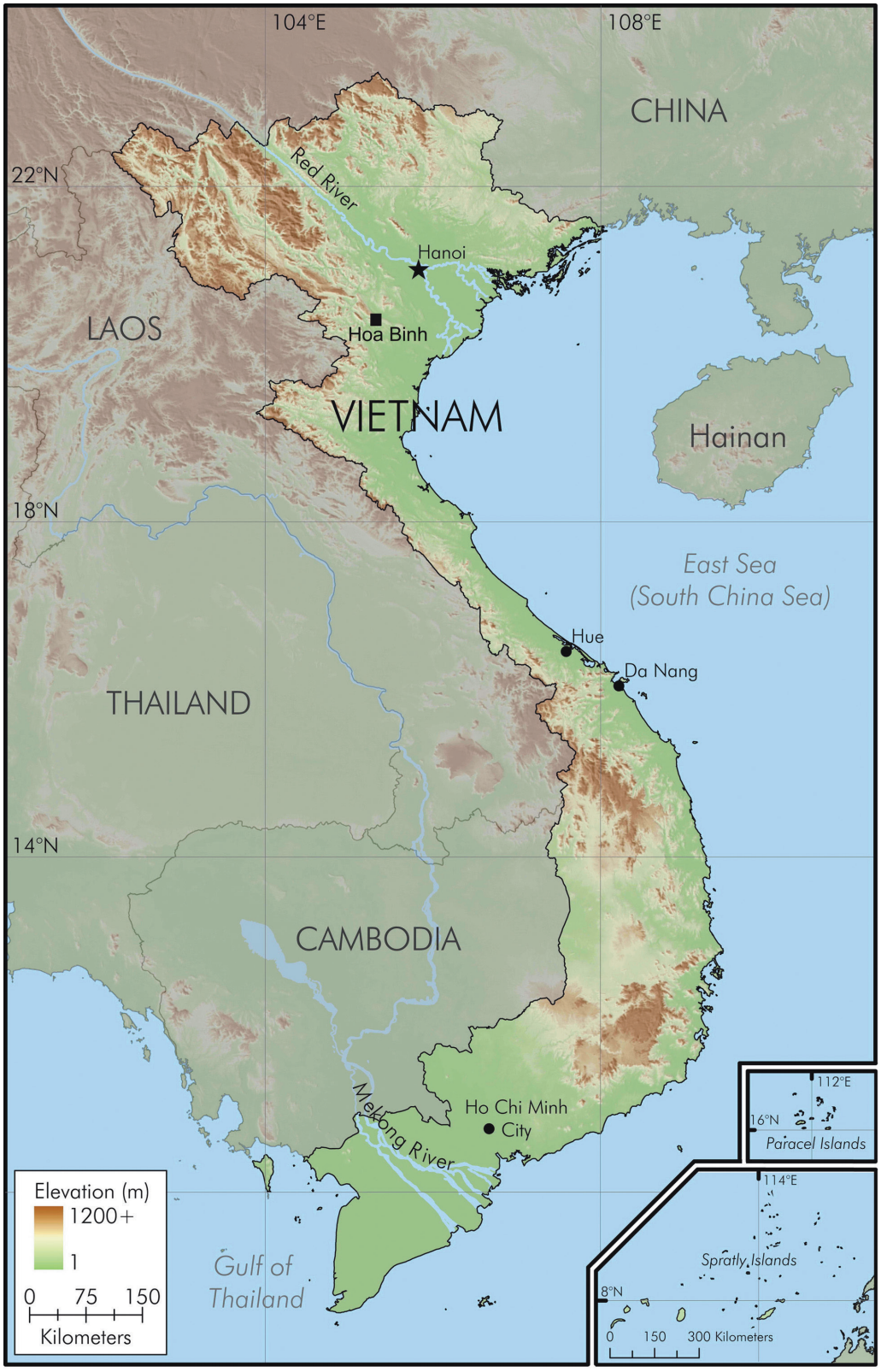

Fig. 1. Map showing the survey site (black square) in Hoa Binh Province, Vietnam.

penes). Measurements were taken after preservation with a measuring tape. The number of ventral scales was counted according to Dowling (1951). The numbers of dorsal scale rows are given at one head length behind head, at midbody, and at one head length before vent, respectively. Scalation was studied by using a binocular. Bilateral scale counts were given as left/right.

RESULTS

Taxonomic accounts

Family Colubridae

***Dryocalamus davisonii* (Blanford, 1878)**
Bridle Snake / Rắn dẻ (Fig. 2a)

Specimen examined (n = 1): IEBR 4058 (adult female) collected by TQN et al. on 22 May 2014, in Ngoc Son-Ngo Luong NR, Lac Son District (20^{0}24.909'N, 105^{0}19.102'E; elevation 350 m above sea level [hereafter asl.]).

Description: Morphological characters of the specimen from Hoa Binh Province agreed well with the descriptions of Smith (1943), Taylor (1965), Das (2010), Orlov et al. (2011), and Vassilieva et al. (2015). SVL 587.7 mm, TaL 191.4 mm. Head distinct from neck; nasal undivided; loreal 1/1, touching the eye; preocular absent; postoculars 2/2; anterior temporal 1/1; posterior temporals 2/2; supralabials 7/7, third and fourth entering orbit; infralabials 8/8; dorsal scale rows 13–13–13, all smooth; ventrals 239 (+ 1 preventral); cloacal undivided; subcaudals 109, divided.

Coloration in life: Dorsum black with 45 white cross-bars and 26 other bars on tail; white cross-bar narrower at posterior part of body; head dark brown with pale cream-colored elongated spots on each side, from parietal shield to supraorbital; venter cream anteriorly, grey posteriorly.

Ecological notes: The specimen was found at 22:00 on the ground. The surrounding habitat was secondary forest composed of medium and small hardwoods and shrub.

Distribution: In Vietnam, this species has been recorded from Thanh Hoa Province southwards to Kien Giang Province. This is the first record of *D. davisonii* from Ngoc Son-Ngo Luong NR as well as from Hoa Binh Province and the Northwest of Vietnam. Elsewhere, the species has been reported from Myanmar, Laos, Thailand and Cambodia (Nguyen et al. 2009, Orlov et al. 2011).

***Euprepiophis mandarinus* (Cantor, 1842)**
Mandarin Ratsnake / Rắn sọc quan (Fig. 2b)

Specimen examined (n = 1): Photographic record only, by T.Q. Nguyen on 12 April 2014, in Hang Kia-Pa Co NR, Mai Chau District (20^{0}43.445'N, 104^{0}53.310'E; elevation 1381 m asl.).

Description: Morphological characters of the specimen from Hoa Binh Province agreed well with the descriptions of Smith (1943), Yang & Rao (2008), Das (2010), and Ziegler et al. (2014). The photographed specimen resembles *Euprepiophis mandarinus* in the following characters: Dorsum brown above, with a series of large black, diamond shaped marks that enclose oval, rounded or squarish yellow spots; black marks edged by narrow yellow margins; head with three black marking-bands across snout, a crescent V-shaped mark through the eye and divided into two stripes, and a forward pointing shaped mark on the neck.

Ecological notes: The specimen was found at 21:30 on the ground, on the banks of a rocky stream. The surrounding habitat was secondary forest composed of medium and small hardwoods and shrub.

Distribution: In Vietnam, this species has been recorded from Lai Chau and Ha Giang provinces in the North southwards to Dak Lak Province. This is the first record of *E. mandarinus* from Hang Kia-Pa Co NR as well as from Hoa Binh Province. Elsewhere, the species has been reported fom India, China, Taiwan, Myanmar and Laos (Nguyen et al. 2009, Ziegler et al. 2014).

***Lycodon futsingensis* (Pope, 1928)**
Futsing Wolf Snake / Rắn khuyết fut-sing (Fig. 2c)

Specimen examined (n = 1): IEBR 4171 (juvenile) collected by TQN et al. on 14 April 2014, in Hang Kia-Pa Co NR, Mai Chau District (20^{0}43.667'N, 104^{0}51.823'E; elevation 901 m asl.).

Description: Morphological characters of the specimen from Hoa Binh Province agreed well with the descriptions of Vogel et al. (2009), Hecht et al. (2013), Luu et al. (2013), Nguyen et al. (2014), Nguyen et al. (2016), and Pham et al. (2017). SVL 265.9 mm, TaL 75.7 mm. Head distinct from neck; rostral broader than high; internasal not in contact with loreal; nasal divided; loreal 1/1, small, not touching the eye; preocular 1/1; subocular absent; postoculars 2/2; anterior temporals 2/2; posterior temporals 2/2; supralabials 8/8, third to fifth entering orbit; infralabials 10/10; dorsal scale rows 17–17–15, all smooth; ventrals 202 (+ 1 preventral); cloacal undivided; subcaudals 90, divided.

Coloration in life: Dorsum pale brownish grey with 27 brown rings on body and 8 rings on the tail; head dark brown with a large light band, from eye to neck; the rings wider at base, the first one starting at ventral scale 15, at its base comprising 6 ventrals in width and dorsally comprising 2 dorsal scales; venter cream, with dark marbling, dark grey posteriorly.

Ecological notes: The specimen was found at 21:00 on a forest path. The surrounding habitat was secondary forest composed of small hardwoods, liane and shrub.

Fig. 2. a) *Dryocalamus davisonii* (IEBR 4058), **b)** *Euprepiophis mandarinus*, **c)** *Lycodon futsingensis* (IEBR 4171), **d)** *Lycodon meridionalis* (IEBR 4151), **e)** *Sinonatrix aequifasciata* (IEBR 4226), and **f)** *Sibynophis collaris* (IEBR 4224) from Hoa Binh Province, Vietnam.

Distribution. In Vietnam, this species was reported from Lao Cai Province in the North southwards to Da Nang City. This is the first record of *L. futsingensis* from Hang Kia-Pa Co NR as well as from Hoa Binh Province. Elsewhere, the species has been reported from China and Laos (Nguyen et al. 2009, Luu et al. 2013, Nguyen et al. 2016, Pham et al. 2017).

***Lycodon meridionalis* (Bourret, 1935)**

Southern Big-tooth Snake / Rắn lệch đầu kim tuyến (Fig. 2d)

Specimens examined (n = 4): IEBR 4050, 4051 (two adult males), and IEBR 4156 (adult female) collected by TQN et al. in April 2014, in Hang Kia-Pa Co NR, Mai Chau District (20^{0}25.072'N, 105^{0}19.102'E; elevation

300 m asl.); and IEBR 4154 (adult male) collected by CTP et al. on 19 June 2016, in Ngoc Son-Ngo Luong NR, Lac Son District (20°28.076'N, 105°18.216'E; elevation 733 m asl.)

Description: Morphological characters of the specimens from Hoa Binh Province agreed well with the descriptions of Orlov & Ryabov (2004), Hecht et al. (2013), Ziegler et al. (2014), and Nguyen et al. (2016). SVL: 929.5–1341.7 mm in males (n = 3), 873.1 mm in the single female (n = 1), TaL: 246.7–364.8 mm in males (n = 3), 258.7 mm in the single female (n = 1). Head distinct from neck; internasals not in contact with loreal; nasal divided; loreal 1/1, not touching the eye; preocular 1/1; subocular absent; postoculars 2/2; anterior temporals 2/2; posterior temporals 3/3; supralabials 8/8, third to fifth entering orbit; infralabials 10/10; dorsal scale rows 17–17–15, strongly keeled except 5 outermost rows smooth, outer dorsal scales enlarged; ventrals 242–257 (+ 2–3 preventrals); cloacal undivided; subcaudals 100–118, divided.

Coloration in life: Dorsum black with 100–119 narrow yellow cross-bars on body and 31–41 on tail, bifurcated on the sides, enclosing dark spots; head black with symmetrical light markings, the most conspicuous being the one running from the eye to the margin of the snout and another stretching from the hind margin of the parietals; venter light yellow.

Ecological notes: The specimens were found between 19:00 and 22:30, on the ground or on rocks. The surrounding habitat was secondary forest composed of medium and small hardwoods, liane and shrub.

Distribution: In Vietnam, this species has been reported from Lao Cai and Ha Giang provinces in the North southwards to Thanh Hoa Province. This is the first record of *L. meridionalis* from Hang Kia-Pa Co and Ngoc Son-Ngo Luong NRs as well as from Hoa Binh Province. Elsewhere, the species has been reported from China and Laos (Nguyen et al. 2009, Ziegler et al. 2014, Nguyen et al. 2016).

***Sibynophis collaris* (Gray, 1853)**
Common Many-tooth Snake / Rắn rồng cổ đen (Fig. 2e)

Specimen examined (n = 1): IEBR 4224 (adult female) collected by V.Q. Luu in March 2009, in Thuong Tien NR, Kim Boi District (near 20°36'N, 105°29'E; elevation 608 m asl.).

Description: Morphological characters of the specimen from Hoa Binh Province agreed well with the descriptions of Smith (1943), Taylor (1965), Kim & Oh (2006), Nemes et al. (2013), and Vassilieva et al. (2015). SVL 324 mm, TaL 184 mm. Head distinct from neck; internasal not in contact with loreal; nasal divided; loreal 1/1, small, not touching the eye; preocular 1/1; subocular absent; postoculars 2/2; anterior temporal 1/1; posterior temporals 2/2; supralabials 10/10, fourth to sixth entering orbit; infralabials 9/9; dorsal scale rows 17–17–17, all smooth; ventrals 168 (+ 1 preventral); cloacal divided; subcaudals 120, divided.

Coloration in preservative: Dorsum brown, with a vertebral series of small black spots, light dorsolateral lines mostly present; head black with a black stripe running from neck to the back of the head; a white stripe along supralabials to the neck; venter yellow, each ventral with a lateral dark spot.

Distribution. In Vietnam, this species has been reported from Dien Bien and Son La provinces in the North southwards to Lam Dong and Dong Nai provinces. This is the first record of *S. collaris* from Thuong Tien NR as well as from Hoa Binh Province. Elsewhere, the species has been reported from India, Nepal, China, Taiwan, Korea, Laos, Thailand, Cambodia, and Malaysia (Kim & Oh 2006, Nguyen et al. 2009, Nemes et al. 2013, Vassilieva et al. 2015).

***Sinonatrix aequifasciata* (Barbour, 1908)**
Asiatic Water Snake / Rắn hoa cân vân đốm (Fig. 2f)

Specimens examined (n = 2). IEBR 4225 (adult male) and IEBR 4226 (adult female) collected by TQN et al. on 17 April 2015, in Ngoc Son-Ngo Luong NR, Lac Son District (20°26.671'N, 105°16.139'E; elevation 250 m asl.).

Description: Morphological characters of the specimens from Hoa Binh Province agreed well with the descriptions of Vogel et al. (2004), Stuart & Heatwole (2008), Hecht et al. (2013), and Le et al. (2015). IEBR 4225: SVL 666.9 mm, TaL 208.3 mm; IEBR 4226: SVL 729.1 mm, TaL 236.1 mm. Head elongated, indistinct from neck; nuchal groove distinct; loreal present; preoculars 1/1 or 2/2; postoculars 3/4 or 3/5; anterior temporals 2/2, posterior temporals 2/3 or 3/3; supralabials 9/9, the fifth entering orbit, the seventh largest; infralabials 10/10; dorsal scale rows 19–19–17, strongly keeled; ventrals 144–153 (+ 2–3 preventrals); cloacal divided; subcaudals 70–74, divided.

Coloration in life: Dorsal surface with 21 black double-bands on body, flanks with dark markings, in X-shape and 10–12 on tail; interspaces with brownish tinge on each band, narrower than the dark bars; venter cream with black markings.

Ecological notes: The specimens were found between 19:00 and 21:30, on branches of trees, about 1.0–1.5 m above the ground, on the banks of a rocky stream. The surrounding habitat was secondary forest composed of medium and small hardwoods, liane and shrub.

Distribution: In Vietnam, this species has been reported from Lao Cai and Ha Giang provinces in the North southwards to Nghe An and Ha Tinh provinces. This is the first record of *S. aequifasciata* from Ngoc Son-Ngo Luong NR as well as from Hoa Binh Province. Elsewhere, the species has been reported from China and Laos (Stuart

et al. 2008, Nguyen et al. 2009, Hecth et al. 2013, Le et al. 2015).

Family Pareatidae

***Pareas hamptoni* (Boulenger, 1905)**
Hampton's Slug Snake / Rắn hổ mây ham-tơn (Fig. 3a)

Specimens examined (n = 2): IEBR 4227, 4228 (adult males) collected by TQN et al. in October 2014, in Ngoc Son-Ngo Luong NR, Lac Son District (20026.862'N, 105020.144'E; elevation 553 m asl.)

Description: Morphological characters of the specimens from Hoa Binh Province agreed well with the descriptions of Smith (1943), Taylor (1965), Ziegler et al. (2007), Nguyen et al. (2011), and Nemes et al. (2013). SVL 363–524 mm, TaL 108–179 mm (n = 2). Body strongly compressed; head distinct from neck; nasal undivided; loreal 1/1, touching the eye; preocular 1/1; postoculars 1/1; subocular 1, long and slender, separating the eye from the labials; anterior temporal 1/1; posterior temporals 2/2; supralabials 7/7, third to fifth below the eye, seventh very long; infralabials 8/8; mental groove absent; dorsal scale rows 15–15–15, all smooth except posterior upper dorsal scales slightly keeled, anterior vertebral scales slightly enlarged; ventrals 199–202 (+ 1 preventral); cloacal undivided; subcaudals 98–100, divided.

Coloration in life: Light brown dorsally, with dorsolateral rows of alternating spots, forming a zigzag line, spots absent at the margin of the ventrals.

Ecological notes: The specimens were found between 19:00 and 22:30 on branches of trees, about 1.5–2.0 m above the ground, on forest paths. The surrounding habitat was secondary forest composed of medium and small hardwoods, liane and shrub

Distribution: In Vietnam, this species has been reported from Lao Cai and Ha Giang provinces in the North southwards to Lam Dong and Dong Nai provinces. This is the first record of *P. hamptoni* from Ngoc Son-Ngo Luong NR as well as from Hoa Binh Province. Elsewhere, the species has been reported from China, Myanmar, Laos, and Cambodia (Nguyen et al. 2009).

Family Viperidae

***Protobothrops mucrosquamatus* (Cantor, 1839)**
Brown spotted pitviper / Rắn lục cườm (Fig. 3b, c)

Specimens examined (n = 2): IEBR 4230 (adult male) collected by C.V. Hoang in Ngoc Son-Ngo Luong NR, Lac Son District (20°25.034'N, 105°23.107'E; elevation 440 m asl.) and IEBR 4231 (adult female) collected by C.T. Pham et al. on 8 June 2016, in Thanh Hoi Commune, Tan Lac District (20°34.865'N, 105°19.731'E; elevation 170 m asl.).

Description: Morphological characters of the specimens from Hoa Binh agreed well with the description of Stuart & Heatwole (2008), Nguyen et al. (2011), Luu et al. (2013), and Nemes et al. (2013). IEBR 4230: SVL 544.0 mm, TaL 129 mm; IEBR 4231: SVL 605.3 mm, TaL 134.0 mm. Hemipenes short and thick. Head triangular, clearly distinct from the neck; nasal undivided; internasals separated from each other by three scales; two small scales between the nasal and the shield bordering the anterior region of the loreal pit; postoculars 2/2; supralabials 8/8 or 11/11, the first supralabial completely separated from the nasal, third supralabial large, in contact with the subocular, fourth and fifth supralabials separated from the subocular by two scales; temporals small; infralabials 13/14, the first pair in contact with each other, the first three pairs in contact with the chin shields; dorsal scale rows 23(25)–23–17(21), rhomboid, strongly keeled throughout but smooth on the first outer row; ventrals 203–214 (+ 2 preventrals); cloacal undivided; subcaudals 88–97, divided.

Coloration in life: Dorsal head brown, paler below; dorsum greyish brown, with a series of large brown, dark-edged spots; a dark brown line from the eye to the angle of the mouth, edged in black; ventral surface brownish with white blotches; dorsal tail light brown, with a series of conspicuous black spots.

Ecological notes: The specimens were found between 19:00 and 22:30, on forest paths. The surrounding habitat was secondary forest composed of medium and small hardwoods, liane and shrub.

Distribution: In Vietnam, this species has been reported from Lao Cai and Ha Giang provinces in the North southwards to Kon Tum and Gia Lai provinces. This is the first record of *P. mucrosquamatus* from Ngoc Son-Ngo Luong NRas well as from Hoa Binh Province. Elsewhere, the species has been reported from India, Bangladesh, China, Taiwan, and Myanmar (Nguyen et al. 2009, Luu et al. 2013, Nemes et al. 2013).

***Trimeresurus gumprechti* David, Vogel, Pauwels & Vidal, 2002**
Gumprecht's green pitviper / Rắn lục gum-p-ret (Fig. 3d)

Specimen examined (n = 1): IEBR 3918 (subadult male) collected by TQN et al. on 12 April 2014, in Hang Kia-Pa Co NR, Mai Chau District (20°44.184'N; 104°53.362'E, elevation 1201 m asl.)

Description: Morphological characters of the specimen from Hoa Binh agreed well with the description of David et al. (2002). SVL 441.75 mm, TaL 100 mm. Hemipenes short and thick with spines. Head triangular, clearly distinct from the neck; rostral visible from above, triangular; nasal undivided; internasals separated from each other by a scale; two small scales between the nasal and the shield bordering the anterior region of the loreal pit; postoculars 2/2; supralabials 10/10, the first separated from the

Fig. 3. a) *Pareas hamptoni* (IEBR 4227), b) *Protobothrops mucrosquamatus* (male) (IEBR 4230) and c) female (IEBR 4231), and d) *Trimeresurus gumprechti* (IEBR 3918) from Hoa Binh Province, Vietnam..

nasal, third large, in contact with subocular, fourth and fifth separated from subocular by a small scale; temporals small; infralabials 13/12, the first pair in contact with each other, the first three pairs in contact with the chin shields; dorsal scale rows 23–21–15, rhomboid, strongly keeled throughout but smooth on the outermost row; ventrals 160 (+ 4 preventrals); cloacal undivided; subcaudals 70, divided.

Coloration in life: Dorsal and ventral surface green with a white ventrolateral stripe, edged in red below; lateral head with a white postocular streak, edged in red below; tail green with upper part of posterior half rusty red; eyes red.

Ecological notes: The specimen was found at 21:00 on tree branches near a small stream, approximately 0.2 m above the ground. The surrounding habitat was secondary forest composed of medium and small hardwoods, liane and shrub. A tree frog (*Kurixalus* sp.) and a water skink (*Tropidophorus* sp.) were found in the stomach of this specimen.

Distribution. In Vietnam, this species has been reported from Lai Chau and Lao Cai provinces (Nguyen et al. 2009). This is the first record of *T. gumprechti* for Hang Kia-Pa Co NR as well as for Hoa Binh Province. Elsewhere, the species has been reported from China, Myanmar, Laos, and Thailand (David et al. 2004, Nguyen et al. 2009).

DISCUSSION

Our new records of nine snake species bring the total number of snake species in Hoa Binh Province to 43 (Table 1). The most diverse family is Colubridae with 27 recorded species, followed by Elapidae (4 species) and Viperidae (4 species). The snake fauna of Hoa Binh

Table 1. List of snake species recorded from Hoa Binh Province, Vietnam. Data sources: 1: Nguyen et al. (2009), 2: Nguyen et al. (2010), 3: Ziegler et al. (2010), 4: Luu (2011), 5: This study. Decree 32 (2006) = Governmental Decree No 32/2006/ND-CP dated on 30 March 2006 by the Government of Vietnam on the management of endangered wild flora and fauna. Group IB: prohibited exploitation and use for commercial purpose and Group IIB: limited exploitation and use for commercial purpose; RBVN (2007) = Vietnam Red Data Book. Part I. Animals. Descriptions of nationally endangered species of wild animals. CR = Critically Endangered, EN = Endangered, VU = Vulnerable; IUCN (2018) = The IUCN Red List of Threatened Species. CR = Critically Endangered, EN = Endangered, VU = Vulnerable, LR/nt = Lower Risk/Near Threatened, * new provincial record.

Species name	Previous record	IUCN (2017)	RBVN (2007)	Decree 32 (2006)
Pythonidae				
Python bivittatus (Kuhl, 1820)	1	VU	CR	II B
Xenopeltidae				
Xenopeltis unicolor Reinwardt, 1827	1, 5			
Colubridae				
Ahaetulla prasina (Boie, 1827)	1, 4, 5			
Amphiesmoides ornaticeps (Werner, 1924)	2			
Amphiesma stolatum (Linnaeus, 1758)	1, 4, 5			
Boiga kraepelini Stejneger, 1902	3			
Boiga multomaculata (Boie, 1827)	1, 5			
Calamaria pavimentata Duméril, Bibron & Duméril, 1854	1			
Calamaria septentrionalis Boulenger, 1890	1			
Coelognathus radiatus (Boie, 1827)	1, 5		VU	II B
Cyclophiops multicinctus (Roux, 1907)	1, 5			
Dendrelaphis pictus (Gmelin, 1789)	4			
Dryocalamus davisonii (Blanford, 1878)*	5			
Elaphe moellendorffi (Boettger, 1886)	1, 4, 5		VU	
Euprepiophis mandarinus (Cantor, 1842)*	5		VU	
Lycodon futsingensis (Pope, 1928)*	5			
Lycodon meridionalis (Bourret, 1935)*	5			
Oligodon taeniatus (Günther, 1861)	4			
Opisthotropis lateralis Boulenger, 1903	1			
Plagiopholis nuchalis (Boulenger, 1893)	1			
Ptyas korros (Schlegel, 1837)	1, 4, 5		EN	
Ptyas mucosa (Linnaeus, 1758)	1, 5		EN	II B
Rhabdophis chrysargos (Schlegel, 1837)	1			
Rhabdophis subminiatus (Schlegel, 1837)	1, 4, 5			
Sibynophis chinensis (Günther, 1889)	1, 4			
Sibynophis collaris (Gray, 1853)*	5			
Sinonatrix aequifasciata (Barbour, 1908)*	5			
Sinonatrix percarinata (Boulenger, 1899)	1, 5			
Xenochrophis flavipunctatus (Hallowell, 1860)	1, 4, 5			
Elapidae				
Bungarus fasciatus (Schneider, 1801)	1, 4, 5		EN	II B
Bungarus multicinctus Blyth, 1861	1, 4, 5			II B
Naja atra Cantor, 1842	1, 4	VU	EN	II B
Ophiophagus hannah (Cantor, 1836)	1, 4	VU	CR	I B
Homalopsidae				
Hypsiscopus plumbea (Boie, 1827)	1, 5			
Myrrophis chinensis (Gray, 1842)	1, 5			
Lamprophiidae				
Psammodynastes pulverulentus (Boie, 1827)	1			
Pareatidae				
Pareas hamptoni (Boulenger, 1905)*	5			
Pareas macularius Theobald, 1868	1, 5			
Pareas margaritophorus (Jan, 1866)	1, 5			
Viperidae				
Protobothrops mucrosquamatus (Cantor, 1839)*	5			
Trimeresurus albolabris (Gray, 1842)	1			
Trimeresurus gumprechti David, Vogel, Pauwels & Vidal, 2002*	5			
Trimeresurus stejnegeri Schmidt, 1925	1			

Province also contains several species of conservation concern. Three species are listed in the IUCN Red List

(2018): *Python bivittatus*, *Naja atra* and *Ophiophagus hannah*, nine species are listed in the Red Data Book of Vietnam (2007): *Python bivittatus*, *Coelognathus radiatus*, *Elaphe moellendorffi*, *Euprepiophis mandarinus*, *Ptyas korros*, *P. mucosa*, *Bungarus fasciatus*, *Naja atra*, and *Ophiophagus hannah*; seven species are listed in the Vietnam Governmental Decree No. 32/2006/ND-CP (2006): *Python bivittatus*, *Coelognathus radiatus*, *Ptyas mucosa*, *Bungarus fasciatus*, *B. multicinctus*, *Naja atra*, and *Ophiophagus hannah* (see Table 1).

Acknowledgements. We are grateful to the directorates of the Forest Protection Department of Hoa Binh Province for their support of our field work and issuing relevant permits. We thank V.Q. Luu, H.T. An, C.V. Hoang, H.N. Ngo, M.D. Le, N.H. Nguyen (Hanoi) for their assistance in the field. We thank to E. Sterling (New York) and K. Koy (Berkeley) for providing the map. For the fruitful cooperation within joint amphibian projects we cordially thank S.V. Nguyen (IEBR, Hanoi) and T. Pagel and C. Landsberg (Cologne Zoo). This research is supported by the National Foundation for Science and Technology Development (NAFOSTED, Grant No. 106.05-2017.329).

REFERENCES

Das I (2010) A field guide to the Reptiles of South-east Asia. New Holland Publishers (UK), Ltd., London, 376 pp.

David P, Vogel G, Pauwels OSG, Vidal N (2002) Description of a new species of the genus *Trimeresurus* from Thailand, related to *Trimeresurus stejnegeri* Schmidt, 1925 Serpentes, Crotalidae. The Natural History Journal of Chulalongkorn University 2(1): 5–19

Dowling HG (1951) A proposed standard system of counting ventrals in snakes. British Journal of Herpetology 1(5): 97–99

Gumprecht A, Tillack F, Orlov NL, Captain A, Ryabow S (2004). Asian pitvipers. Geitje Books, Berlin, 368 pp.

Hecht VL, Pham CT, Nguyen TT, Nguyen TQ, Bonkowski M, Ziegler T (2013) First report on the herpetofauna of Tay Yen Tu Nature Reserve, northeastern Vietnam. Biodiversity Journal 4: 507–552

IUCN (2018) The IUCN Red List of Threatened Species. Version 2017.3. http://www.iucnredlist.org. Accessed in January 2018

Kim BS, Oh HS (2006) A taxonomic reinvestigation of the collared many-toothed snake *Sibynophis collaris* Gray (Reptiles: Serpentes: Colubridae) from Jeju Island, Korea. Integrative Biosciences 10:121–123

Le DT, Pham AV, Pham CT, Nguyen HLS, Ziegler T, Nguyen TQ (2015) Review of the genus *Sinonatrix* in Vietnam with a new country record of *Sinonatrix yunnanensis* Rao et Yang, 1998. Russian Journal of Herpetology 22(2): 84–88

Luu VQ (2011) The research results on diversity of reptile species composition in Thuong Tien Nature Reserve, Hoa Binh Province. Journal of Ecological Economy 39: 65–70

Luu VQ, Nguyen TQ, Calame T, Hoang TT, Southichack S, Bonkowski M, Ziegler T. (2014) New country records of reptiles from Laos. Biodiversity Data Journal 1: e1015

Luu VQ, Nguyen TQ, Pham CT, Dang NK, Vu TN, Miskovic S, Bonkowski M, Ziegler T (2013) No end in sight? Further new records of amphibians and reptiles from Phong Nha-Ke Bang National Park, Quang Binh Province, Vietnam. Biodiversity Journal 4: 285–300

Nemes L, Babb R, Devender WV, Nguyen KV, Le QK, Vu TN, Rauhaus A, Nguyen TQ, Ziegler T (2013) First contribution to the reptile fauna of QuangNgai Province, central Vietnam. Biodiversity Journal 4(2): 301–326

Nguyen TQ, David P, Tran TT, Luu VQ, Le QK, Ziegler T (2010). *Amphiesmoides ornaticeps* (Werner, 1924), an addition to the snake fauna of Vietnam, with a redescription and comments on the genus *Amphiesmoides* Malnate, 1961 (Squamata: Natricidae). Revue suisse de Zoologie 117: 45–56

Nguyen TQ, Stenke R, Nguyen HX, Ziegler T (2011) Te terrestrial reptile fauna of the biosphere Reserve Cat Ba Archipelago, Hai Phong, Vietnam. Bonner zoologische Monographien 57: 99–115

Nguyen SV, Ho CT, Nguyen TQ (2009) Herpetofauna of Vietnam. Edition Chimaira, Frankfurt am Main, 768 pp.

Nguyen TV, Pham CT, Nguyen TQ (2016) New records and an updated list of snakes (Squamata: Serpentes) from Xuan Lien Nature Reserve, Thanh Hoa Province, Vietnam. Journal of Biology 38(3): 324–332

Orlov NL, Ryabov SA (2004) Revalidization and change of taxonomic status of *Dinodon rufozonatum meridionale* Bourret, 1935 (Serpentes: Colubridae: Colubrinae). Russian Journal of Herpetology 11(3): 181–197

Orlov NL, Nguyen TT, Nazarov RA, Melnikov DA (2011) The northernmost record of colubrid snake *Dryocalamus davisonii* (Blanford, 1878) [Serpentes: Colubridae: Colubrinae]. Russian Journal of Herpetology 18(2): 154–156

Pham AV, Pham CT, Hoang NV, Ziegler T, Nguyen TQ (2017) New records of amphibians and reptiles from Ha Giang Province, Vietnam. Herpetology Notes 10: 183–191

Simmons JE (2002) Herpetological collecting and collections management. Revised edition. Society for the Study of Amphibians and Reptiles, Herpetological Circular 31: 1–153

Smith MA (1943) The fauna of British India, Ceylon and Burma, including the whole of the Indo-Chinese Subregion. Reptilia and Amphibia. Vol. III. Serpentes. Taylor and Francis (London)

Stuart BL, Heatwole H (2008) Country records of snakes from Laos. Hamadryad 33: 97–106

Taylor EH (1965) The serpents of Thailand and adjacent waters. University of Kansas Science Bulletin 45(9): 609–1096

The Government of Vietnam (2006) The Governmental Decree No. 32/2006/NĐ-CP, dated on 30th March 2006, on management of endangered, precious, and rare species of wild plants and animals, 13 pp.

Tran K, Ho CT, Nguyen SV, Pham T (2007) Reptiles and Amphibians. *In*: Dang T.N., Tran K., Dang H. H., Nguyen C., Nguyen T. N., Nguyen Y. H. & Dang D. T. (eds). Vietnam Red Data Book, Part 1. Animals. Science and Technology Publishing House, Hanoi, pp. 219–276 + 8 pls.

Uetz P, Freed P, Hošek J (eds) (2018) The Reptile Database, available at http://www.reptile-database.org. Accessed in January 2018.

Vassilieva AB, Galoyan EA, Poyarkov NA and Geissler P (2016) A photographic field guide to the amphibians and reptiles of the lowland monsoon forests of southern Vietnam. Edition Chimaira, Frankfurt am Main, 324 pp.

Vogel G, David P, Pauwels OSG, Brachte N (2004) On the occurrence of the watersnake *Sinonatrix aequifasciata* (Barbour, 1908) (Serpentes, Colubridae, Natricinae) in Vietnam. Hamadryad 29(1): 110–114

Vogel G, David P, Pauwels OSG, Sumontha M, Norval G, Hendrix R, Vu TN, Ziegler T (2009) A revision of *Lycodon ruhstrati* (Fischer 1886) auctorum (Squamata: Colubridae), with the description of a new species from Thailand and a new subspecies from the Asian mainland. Tropical Zoology 22: 131–182

Yang DT, Rao DQ (2008) Amphibia and Reptilia of Yunnan. Kunming, Yunnan Publishing Group Corporation, Yunnan Science

Ziegler T, Hendrix R, Vu TN, Vogt M, Forster B, Dang KN (2007) The diversity of a snake community in a karst forest ecosystem in the centralTruong Son, Vietnam, with an identification key. Zootaxa 1493: 1–40

Ziegler T, Nguyen TQ (2010) New discoveries of amphibians and reptiles from Vietnam. Bonn zoological Bulletin 57(2): 137–147

Ziegler T, Orlov NL, Giang TT, Nguyen TQ, Nguyen TT, Le QK, Nguyen KV, Vu TN (2010) New records of cat snakes, *Boiga* Fitzinger, 1826 (Squamata, Serpentes, Colubridae), from Vietnam, inclusive of an extended diagnosis of *Boiga bourreti* Tillack, Le & Ziegler, 2004. Zoosystematics and Evolution 86(2): 263–274

Ziegler T, Tran TAD, Nguyen TQ, Perl RGB, Wirk L, Kulisch M, Lehmann T, Anna R, Nguyen TT, Le QK, Vu TN (2014) New amphibian and reptile records from Ha Giang Province, northern Vietnam. Herpetology Notes 7: 185–201