

New records of amphibians and reptiles from Ha Giang Province, Vietnam

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Abstract. Based on a new herpetological collection from Ha Giang Province, northern Vietnam we report seven new records of amphibians and reptiles, comprising two species of rhacophorid frog (*Rhacophorus kio*, *R. rhodopus*), one agamid lizard (*Pseudocalotes brevipes*), one lacertid lizard (*Takydromus kuehnei*), one species of colubrid snake (*Lycodon futsingensis*) and two viperid species (*Deinagkistrodon acutus* and *Protobothrops maolanensis*). This is also the second record of *P. maolanensis* from Vietnam. Our findings bring the species number of amphibians to 54 and of reptiles to 57 in Ha Giang Province.

Keywords: Distribution, new records, morphology, taxonomy.

Introduction

In the recent checklist of the herpetofauna of Vietnam, Nguyen et al. (2009) listed 535 species of amphibians and reptiles. Bain and Nguyen (2004) provided the first preliminary herpetofauna list for Ha Giang Province which included 36 species of amphibians and 16 species of reptiles including the descriptions of two new species. Further new records of reptiles and amphibians from Ha Giang Province were published by Ziegler et al. (2006), Le and Ziegler (2009), Nguyen et al. (2009, 2010), Ziegler et al. (2014), and Nguyen et al. (2016). Most recently, three new amphibian species have been described from Ha Giang Province: *Leptotalax nyx*

(Ohler et al., 2011), *Tylototriton ziegleri* (Nishikawa et al., 2013) and *Limnonectes nguyenorum* (McLeod et al., 2015).

In this paper, we report seven new records of amphibians and reptiles for Ha Giang Province based on newly collected specimens from Phong Quang, Tay Con Linh, and Bac Me nature reserves.

Material and Methods

Field surveys were conducted in Phong Quang, Tay Con Linh and Bac Me nature reserves (NR), Ha Giang Province, northeastern Vietnam (Fig. 1) by Ngoc Van Hoang (hereafter NVH) and Hung Duc Nguyen (hereafter HDN) from 29 April to 2 May 2009 and by

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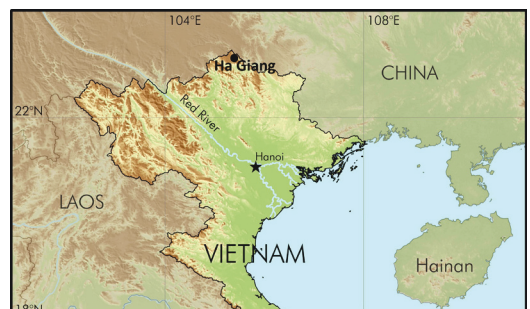


Figure 1. Map showing the location of Ha Giang Province in northern Vietnam.

Cuong The Pham, Hang Thi An, Marta Bernardes, and Mona van Schingen (hereafter CTP *et al.*) from 19 to 25 June 2014. Specimens were collected by hand or by using a snake hook between 8:00 and 23:00 hrs. Most of specimens were photographed in life except for some snakes. 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 Faculty of Biology, Thai Nguyen University of Education (TNUE), Thai Nguyen Province and the Institute of Ecology and Biological Resources (IEBR), Vietnam Academy of Science and Technology, Hanoi, Vietnam.

All measurements except for body and tail lengths in reptiles were taken with a caliper to the nearest 0.1 mm.

For amphibians, abbreviations are as follows: SVL: snout-vent length; HL: head length, from posterior corner of mandible to tip of snout; HW: maximum head width, at the angle of jaws; SL: distance from anterior corner of eye to tip of snout; ED: eye diameter, from anterior corner to posterior corner of eye; NEL: distance from anterior corner of eye to posterior edge of nostril; SNL: distance from anterior edge of nostril to tip of snout; IN: internarial distance; IOD: minimum distance between upper eyelids; UEW: maximum width of upper eyelid; TYD: maximum tympanum diameter;

TYE: distance between anterior margin of tympanum and posterior corner of eye; FLL: forelimb length, from elbow to base of outer tubercle; HAL: hand length, from base of outer palmar tubercle to tip of third finger; FL: thigh length, from vent to knee; TL: tibia length.

For reptiles, abbreviations 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; HL: head length, from tip of snout to posterior margin of parietal; HW: head width, at the widest point of temporal region; FIL: forelimb length, from anterior junction of forelimb and body wall to the tip of fourth finger, with the limb held at right angles to the body; HIL: hind limb length, anterior junction of hind limb and body wall to the tip of fourth toe, with the limb held at right angle to the body.

asl: above sea level; nature reserve: NR.

Bilateral scale counts were given as left/right.

Results

Taxonomic accounts

Family Rhacophoridae

Rhacophorus kio Ohler and Delorme 2006

Black-webbed Treefrog / Éch cây ki-ô (Fig. 2)

Specimens examined (n = 2): One adult male (TNUE PQ.756) and adult female (TNUE PQ.748) collected by NVH and HDN, 1 May 2009, near Minh Tan Commune, within Phong Quang NR, Vi Xuyen District (22°55.307'N, 104°55.208'E, elevation 260 m asl.).

Description: Morphological characters of two specimens from Ha Giang Province agreed well with the descriptions of Ohler & Delorme (2006) and Luu *et al.* (2014): SVL 66.5 mm in the male, 81.8 mm in the female; head longer than wide (HL 22.2 mm, HW 21.5 mm in the male; HL 26.6 mm, HW 26.5 mm in the female); snout obtusely pointed in dorsal view, longer than horizontal diameter of eye (SL 11.0 mm, ED 8.2 mm in the male; SL 12.9 mm, 8.9 mm in the female); nostril lateral, oval, closer to the tip of snout than to eye (SNL 4.7 mm, NEL 6.0 mm in the male; SNL 6.2 mm, NEL 7.3 mm in the female); canthus rostralis rounded, loreal region oblique, shallowly concave; interorbital space flat, broader than upper eyelid (IOD 8.0 mm, UEW 4.4 mm in the male; IOD 8.5 mm, UEW 5.5 mm in the female); tympanum distinct, round (TD 4.8 mm in the male; 5.5 in the female); tympanum-eye distance (TYE 1.5 mm in the male; 1.6 mm in the female) three fourth of its diameter; vomerine teeth present, in two



Figure 2. *Rhacophorus kio* (TNUEPQ 756, adult male) from Ha Giang Province, Vietnam. Photo: N. V. Hoang.

oblique rows; tongue notched posteriorly; vocal sac present in the male. Forelimbs slender, short (FLL 12.2 mm in the male, 17.2 mm in the female), approximately three quarters of the hand length (HAL 19.4 mm in the male, 24.0 mm in the female); relative finger lengths I<II<IV<III; enlarged into rounded discs; webbing well developed, formula II-1/3III0-1/2III1/2-1/2IV; subarticular tubercle distinct, oval, formula 1, 1, 2, 2; palmar tubercles indistinct; nuptial pad present. Hindlimbs long, thigh shorter than tibia (FL 31.0 mm, TL 32.5 mm in the male; FL 40.2 mm, TL 41.0 mm in the female); relative toe lengths I<II<V<III<IV; enlarged into rounded discs; toes fully webbed; dermal fringe along outer toe well developed; inner metatarsal tubercle indistinct; subarticular tubercles oval, formula 1, 1, 2, 3, 2.

Skin: Dorsal surface of head, body and limbs smooth; dorsolateral folds absent; throat smooth; belly and ventral surface of thighs with glandular, cloacal supraclacal dermal ridge well-developed and double-lobed.

Colouration in life: Dorsal surface green with some white spots; supratympanic fold green; upper part of flank green with white dots and lower lateral part dark brown with yellow spots; armpit with inky black spot; thigh orange yellow posteriorly; dermal fringes on toes and fingers yellowish white; ventral surface yellow, webbing orange, ink black at base.

Ecological notes: Specimens were found at night,

between 20:00 and 21:00, on tree leaves, ca. 2–2.5 m above a puddle in the secondary forest.

Distribution: In Vietnam, this species has been recorded from Lao Cai and Cao Bang provinces in the North, southwards to Kon Tum and Gia Lai provinces. Elsewhere, this species has also been recorded from eastern India, Southern China, Laos, Thailand, and Cambodia (Nguyen et al., 2009; Frost, 2016; Luu et al., 2014).

Rhacophorus rhodopus Liu & Hu, 1960

Red-webbed Treefrog /Ếch cây măng bời dỏ (Fig. 3)

Specimens examined (n = 3): Two adult males (IEBR 3868, 3869) and one adult female (IEBR 3870) collected by CTP et al., 22 June 2014, near Thuong Tan Commune, within Bac Me NR, Bac Me District (22°42.708'N, 105°15.641'E, elevation 930 m asl.).

Description: Morphological characters of the specimens from Ha Giang Province agreed well with the descriptions of Liu & Hu (1960) and Pham et al. (2016): SVL 39.9-40.5 mm in males, 53.8 mm in the female; head longer than wide (HL 14.7-15.3 mm, HW 14.5-14.9 mm in males; HL 18.5 mm, HW 18.1 mm in the female); snout obtusely pointed in dorsal view, longer than horizontal diameter of eye (SL 6.9-7.3 mm, ED 5.4-5.6 mm in males; SL 8.1 mm, 6.2 mm in the female); nostril lateral, oval, closer to the tip of snout than to eye (SNL 3.4-3.7 mm, NEL 3.7-3.9 mm in males; SNL 4.1 mm, NEL 4.3 mm in the female); canthus rostralis circular, loreal region oblique, shallowly concave; interorbital space flat, broader than upper eyelid (IOD 4.5-5.1 mm, UEW 4.1-4.5 mm in males; IOD 6.2 mm, UEW 4.7 mm in the female); tympanum distinct, round (TD 2.5-2.8 mm in males; 3.5 in the female); tympanum-eye distance (TYE 1.0-1.2 mm in males; 1.3 mm in the female); vomerine teeth present, in two oblique rows, equal in distance from each other as well as to choanae; tongue notched posteriorly; vocal sac present in males. Forelimbs slender, short (FLL 6.8-8.4 mm in males, 11.8 mm in the female), approximately three quarters of the hand length (HAL 19.6-20.2 mm in males, 27.6 mm in the female); relative finger lengths I<II<IV<III; enlarged into rounded discs; webbing well developed, fingers almost fully webbed; subarticular tubercle distinct, oval, formula 1, 1, 2, 2; palmar tubercles indistinct; nuptial pad present. Hindlimbs long, thigh shorter than tibia (FL 18.5-18.6 mm, TL 19.9-20.2 mm in males; FL 21.0 mm, TL 23.0 mm in the female); relative toe lengths I<II<V<III<IV; enlarged into rounded discs; toes fully webbed; dermal



Figure 3. *Rhacophorus rhodopus* (IEBR 3868, adult male and IEBR 3870, adult female) from Ha Giang Province, Vietnam. Photo: C.T. Pham.

fringe along outer toe well developed; inner metatarsal tubercle indistinct; subarticular tubercles oval, formula 1, 1, 2, 3, 2.

Skin: Dorsal surface of head, body and limbs smooth; dorsolateral folds absent; throat smooth; belly and ventral surface of thighs with glandular; supratympanic fold distinct; cloacal dermal fringe present.

Colouration in life: dorsum reddish brown with or without small black spots; axilla and flanks with large black blotches; transverse bands on hind limbs absent or indistinct; ventral yellowish white; webbing of fingers and toes reddish orange.

Ecological notes: The specimens were found on trees and bushes, ca. 0.5-1.5 m above the ground, near a pond, between 19:00 and 22:00. An amplexant pair was observed on 22 June 2014 suggesting that the breeding season of this species is in summer. The surrounding habitat was secondary forest composed of medium and small hardwoods on limestone karst.

Distribution: In Vietnam, this species is known from Lao Cai Province in the North southwards to Lam Dong and Dong Nai provinces. Elsewhere, the species has been reported from northeast India, China, Myanmar, Laos, northern Thailand, and Cambodia (Nguyen *et al.*, 2009; Frost, 2016).

Family Agamidae

Pseudocalotes brevipes (Werner, 1904)

Vietnam False Bloodsucker / Không việt nam (Fig. 4)

Specimen examined (n = 1): One female TNUEPQ 797 (SVL 63.0 mm, TaL 106.6 mm, HL 15.6 mm, HW 10.1 mm, FIL 25.2 mm, HIL 37.0 mm) collected by NVH and HDN, 1 May 2009, near Lao Zin Phan Zone, Minh Tan Commune within Phong Quang NR, Vi Xuyen District (22°58.051'N, 104°54.115'E, elevation 270 m asl.).

Description: Morphological characters of the specimens from Ha Giang Province agreed well with the descriptions of Hallermann (2000), Hallermann and Böhme (2000), Hallermann *et al.* (2010), Nguyen (2011), and Nguyen *et al.* (2011): Head large, longer than wide; upper head scales in supraorbital and parietal region strongly keeled. Supralabials 8/9; infralabials 8/9; tympanum exposed, horizontal diameter (1.9 mm), smaller than a half of orbit (5.0 mm). Nuchal crest spines five, dorsal crest spines absent; subdigital lamellae of fourth finger 17/17; subdigital lamellae of fourth toe 21/21; fold in front of shoulder absent; midbody scale rows 68; middorsal scale row pointing straight backwards, lateral scales keeled, ventral scales strongly keeled.

Colouration in preservative: Head and dorsal body grayish brown, gular region darker with keeled scales,



Figure 4. *Pseudocalotes brevipes* (TNUEPQ 797, adult female) from Ha Giang Province, Vietnam. Photo: N. V. Hoang.

ventral side grey; light spots present on elbows and on knees. For coloration in life see Fig. 4.

Ecological notes: The adult female was found at night, between 20:00 and 22:00, on a tree branch. The surrounding habitat was secondary forest.

Distribution: In Vietnam, this species has been recorded from Cao Bang, Lang Son, Thai Nguyen, Quang Ninh, Hai Duong and Vinh Phuc provinces and the cities of Hai Phong and Hanoi (Nguyen et al., 2009; Nguyen 2011; Nguyen et al., 2011; Gawor et al. 2016). Elsewhere the species is known only from Guangxi in southern China (Nguyen et al., 2009).

Family Lacertidae

Takydromus kuehnei Van Denburgh, 1909

Kuhne's Grass Lizard / Liu diu kuc-ni (Fig. 5)

Specimens examined (n = 2): One adult male TNUEPQ 849 (SVL 65.5 mm, TaL 223.0 mm) and one adult female TNUE PQ 850 (SVL 60.0 mm, TaL 111.6* mm) collected by NVH & HDN, 1 May 2009, near the trail in Minh Tan Commune within Phong Quang NR, Vi Xuyen District (22°58.051'N, 104°54.115'E, elevation 270 m asl.).

Description: Morphological characters of the specimens from Ha Giang Province agreed well with the descriptions of Ziegler and Bischoff (1999), Lue and Lin (2008), and Hecht et al. (2013): supralabials 6/6; infralabials 6/6; chin shields in 4 pairs; dorsal scales in

6 rows at midbody, without a non-contiguous vertebral row of smaller scales; ventral scales smooth, widened, in 6 rows at midbody; lateral scales in 12–13 rows at midbody on each sides, smaller than dorsal and ventral scales; femoral pores 4/5 in the male and 3/3 in the female; subdigital lamellae of fourth finger 18/18 in the male, 16/17 in the female; subdigital lamellae of fourth toe 25/25 in the male, 23/23 in the female.

Colouration in life: Dorsal surface brown; upper part of flanks black with numerous yellowish spots, lower part of flanks light brown; chin, throat and belly whitish; lower part of limbs cream; lower part of tail brown.

Ecological notes: Specimens were found at 9:00 while moving across a dirt road. The surrounding habitat was secondary forest.

Distribution: In Vietnam, this species has been recorded from Quang Ninh, Bac Giang, Son La, Hoa Binh, Ninh Binh, Thanh Hoa, Nghe An, and Ha Tinh provinces (Nguyen et al., 2009; Hecht et al., 2013). Elsewhere, the species has been reported from southeast China (Nguyen et al., 2009).

Family Colubridae

Lycodon futsingensis (Pope, 1928)

Futsing Wolf Snake / Rắn lếch đầu fut-sing (Fig. 6)

Specimen examined (n = 1): One adult male TNUECB 1564 (SVL 317.8 mm, TaL 82 mm) collected by NVH & HDN, 2 May 2009, near Co Sau stream, Cao Bo



Figure 5. *Takydromus kuehnei* (TNUETH PQ 849, adult male) from Ha Giang Province, Vietnam. Photo: N. V. Hoang



Figure 6. *Lygodon futsingensis* (TNUECB 1564, adult male) from Ha Giang Province, Vietnam. Photo: A.V. Pham.

Commune within Tay Con Linh NR, Vi Xuyen District (22°45.593'N, 104°51.547'E, elevation 670 m asl.).

Description: Morphological characters of the specimen from Ha Giang Province agreed well with the descriptions of Pope (1928), Vogel *et al.* (2009), and Hecht *et al.* (2013): Body long, slightly cylindrical; head distinct from neck; snout long, slightly prominent; eye large, vertically elliptic; rostral broader than deep, partly visible from above; internasals not touching loreal and preocular; prefrontal longer than half of frontal; frontal hexagonal in shape; parietals longer than wide; nasal divided; loreal 1/1, not entering orbit; preocular 1/1, enlarged; postoculars 2/2, bordering anterior temporals; anterior temporals 2/2, posterior temporals 3/3; supralabials 8/8, third and fifth touching the eye, eighth largest; infralabials 9/9, first to fifth bordering chin shields; dorsal scale rows 17–17–15, smooth; ventrals 204; cloacal scale undivided; subcaudals 85, paired.

Colouration in preservative. Dorsal surface dark brown, with 24 light brown bands on body, 12 bands on tail; some bands in Y-shape; head dark brown with a large light band, from eye to neck; belly cream, posterior part mottled; lower surface of tail dark brown.

Ecological notes: The adult male was collected at 22:00 while moving on the forest floor, near a stream. The surrounding habitat was secondary forest.

Distribution: In Vietnam, this species has been recorded from Lao Cai and Cao Bang provinces in

the North southwards to Quang Binh and Da Nang provinces. Elsewhere, this species is known from Fujian, Guangdong, Hong Kong in China and Laos (Nguyen *et al.*, 2009; Luu *et al.*, 2013; Hecht *et al.*, 2013).

***Deinagkistrodon acutus* (Günther, 1888)**

Chinese Moccasin / Rắn lục mũi hếch (Fig. 7)

Specimen examined (n = 1): One adult male TNUECB 1566 (SVL 331.5 mm, TaL 55 mm) collected by NVH and HDN, 2 May 2009, near Gien Thay mountain, Cao Bo Commune within Tay Con Linh NR, Vi Xuyen District (22°47.461'N, 104°52.051'E, elevation 1640 m asl.).

Description: Morphological characters of the specimen from Ha Giang Province agreed well with the descriptions of Günther (1888) and Smith (1943): Body cylindrical; head triangular, distinguished from neck; snout long, with a pointed dermal appendage directed forward, covered by the internasals and rostral; nasal single, posterior nasal scale united with the nasal; number of small scales between nasal and scale 3/3, forming anterior border of loreal pit; preoculars 2/2; postoculars 2/2; temporals 3/3; subpralabials 7/7, first in contact with nasal scale, third supralabial largest, concave in the anterior part; infralabials 11/11, first to third bordering chin shields; dorsal scale rows 23–21–17, keeled; ventrals 167; cloacal scale undivided; subcaudals 56, paired.



Figure 7. *Deinagkistrodon acutus* (TNUECB 1566, adult male) from Ha Giang Province, Vietnam. Photo: N. V. Hoang.

Colouration in preservative: Dorsal surface brown-yellowish, head is uniform dark brown; the two colours sharply defined by a black streak from the eye to the neck; each side of the body ornamented with a series of large dark-coloured triangles, the point of each triangle meeting that of the other side in the median line of the back; lower parts whitish, with a series of large rounded black spots on each side and smaller ones of irregular shape in the middle.

Ecological notes: The adult male was collected at 21:30 on dry leaves near a bush on the forest floor. The surrounding habitat was secondary forest.

Distribution: In Vietnam, this species has been recorded from Lai Chau, Lao Cai, Cao Bang, Lang Son and Vinh Phuc provinces. Elsewhere, this species is known from Taiwan, China (from Zhejiang and Fujian west to Guizhou and South Sichuan, Hubei, Hunan, and Guangdong) and Laos (Nguyen et al., 2009).

***Protobothrops maolanensis* Yang, Orlov & Wang, 2011**

Maolan Pitviper/ Rắn lục mao-lan (Fig. 8)

Specimen examined (n = 1). One adult female IEBR 3871 (SVL 665.1 mm, TaL 172.2 mm) collected by CTP et al., 24 June 2014, near Lac Nong Commune within Bac Me NR, Ba Me District (22°43.139'N, 105°12.365'E, elevation 366 m asl.).

Description: Morphological characters of the specimens from Ha Giang Province agreed well with the descriptions of Yang et al. (2011), Chen et al. (2013), and Kropachev et al. (2015): Body moderately elongated, slender and slightly compressed; head small, triangular, distinctly set off from the neck, covered with very small convex scales of an irregular shape on the upper surface; eyes large, convex; rostral scale trapezoidal, barely visible from above; internasal not in contact with rostral and separated from each other by 4 small scales; nasals very large, trapezoidal, not separated, their anterior portions are large and visible from above; mental relatively large, triangular; 1/1 chin shields, longer than wide; 2/1 small scales between nasal and scale forming anterior border of loreal pit; loreals 2/2; preoculars 3/3; postoculars 2/2; temporals 3/3; subpralabials 9/9, first in contact with nasal scale; infralabials 11/12, first to third bordering chin shields; dorsal scale rows 23–21–17, keeled; ventrals 198; cloacal scale undivided; subcaudals 85, paired.

Colouration in life: Head gray-brown, dorsal surface gray-brown with dark-brown transverse bands; ventral surface whitish.



Figure 8. *Protobothrops maolanensis* (IEBR 3871, adult female) from Ha Giang Province, Vietnam. Photo: C.T. Pham.

Ecological notes: The specimen was found on the forest ground, near a cave, at 20:30. The surrounding habitat was secondary forest composed of medium and small hardwoods on limestone karst.

Distribution: In Vietnam, this species was recently reported from Lang Son Province (Kropachev et al., 2015). Elsewhere, this species is known from Guizhou and Guangxi provinces in China (Yang et al., 2011; Chen et al., 2013).

Discussion

Based on our new herpetological collection two additional species of amphibians (*Rhacophorus kio*, *R. rhodopus*) and five additional species of reptiles (*Pseudocalotes brevipes*, *Takydromus kuehnei*, *Lycodon futsingensis*, *Deinagkistrodon acutus*, and *Protobothrops maolanensis*) have been added to the herpetofaunal list of Ha Giang Province. *P. maolanensis* was recently described from Guizhou Province in China and subsequently recorded from Guangxi, China (Yang et al., 2011; Kropachev et al., 2015). Chen et al. (2013) found specimens in Guangxi that are intermediary between *P. maolanensis* and *P. trungkhanhensis*. Based on morphological examination, the specimen from Ha Giang is more similar to *P. maolanensis* (the specimen from Ha Giang has loreals 2/2 and dorsal scale rows

23–21–17 vs. loreal 1/1 and dorsal scale rows 19-19-17 in *P. trungkhanhensis*).

Our new findings bring the total number of amphibians and reptiles recorded from Ha Giang Province to 111 and further field work is required to explore the actual diversity of reptiles and amphibians of this province.

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References

- Bain, R.H., Nguyen, T.Q. (2004): Herpetofaunal diversity of Ha Giang Province in Northeastern Vietnam, with descriptions of two new species. *American Museum Novitates* **3453**: 1-42.
- Chen, T-b., Luo, J., Meng, Y-j., Wen, B-h., Jiang, K. (2013): Discovery of *Protobothrops maolanensis* in Guangxi, with taxonomic discussion. *Sichuan Journal of Zoology* **32** (1): 116-118.
- Frost, D.R. (2016): Amphibian Species of the World: an Online Reference. Version 6.0. Electronic Database accessible at <http://research.amnh.org/herpetology/amphibia/index.html>. American Museum of Natural History, New York, USA. Accessed on 16 August 2016.
- Gawor, A., Pham, C.T., Nguyen, T.Q., Nguyen, T.T., Schmitz A. & Ziegler, T. (2016). The herpetofauna of the Bai Tu Long National Park, northeastern Vietnam. *Salamandra* **52**: 23-41.
- Günther, A. (1888): On a collection of reptiles from China. *Annals & Magazine of Natural History* **1**: 165-172.
- Hallermann, J. (2000): The taxonomic status of *Acanthosaura* fruhstorferi Werner, 1904 and *Calotes brevipes* Werner, 1904 (Squamata: Agamidae). *Mitteilungen aus dem Zoologischen Museum in Berlin, Zoologische Reihe* **76**: 143-150.
- Hallermann, J., Böhme, W. (2000): A review of the genus *Pseudocalotes* (Squamata: Agamidae), with description of a new species from West Malaysia. *Amphibia-Reptilia* **21**: 193-210.
- Hallermann, J., Nguyen, Q.T., Orlov N.L., Ananjeva, N. (2010): A new species of the genus *Pseudocalotes* (Squamata: Agamidae) from Vietnam. *Russian Journal of Herpetology* **17**: 31-40.
- Hecht, V.L., Pham, T.C., Nguyen, T.T., Nguyen, Q.T., Bonkowski, M., Ziegler T. (2013): First report on the herpetofauna of Tay Yen Tu Nature Reserve, northeastern Vietnam. *Biodiversity Journal* **4**: 507-552.
- Kropachev, I.I., Shiryayev, A.K., Nguyen, T.T., Orlov, N.L. (2015): New record of *Protobothrops* cf. *maolanensis* in Northeastern Vietnam, with data on its morphology and biology. *Russian Journal of Herpetology* **22**: 93-102.
- Le, Q.K., Ziegler, T. (2009): Geographic Distribution: *Protobothrops cornutus* (Smith's horned pitviper). *Herpetological Review* **40**: 115.
- Liu, C.C., Hu, S.Q. (1960): Preliminary report of Amphibia from southern Yunnan. *Acta Zoologica Sinica* **11**: 509-533 (in Chinese with English abstract).
- Lue, K-y., Lin, S-m. (2008): Two new cryptic species of *Takydromus* (Squamata: Lacertidae) from Taiwan. *Herpetologica* **64**: 379-395.
- Luu, V.Q., Le, C.X., Do, H.Q., Hoang, T.T., Nguyen, T.Q., Bonkowski, M., Ziegler, T. (2014): New records of amphibians from Thuong Tien Nature Reserve, Hoa Binh Province, Vietnam. *Herpetology Notes* **7**: 51-58.
- Luu, V.Q., Nguyen, Q.T., Calame, T., Hoang, T.T., Southickack, S., Bonkowski, M., Ziegler, T. (2014): New country records of reptiles from Laos. *Biodiversity Data Journal* **1**: e1015; doi: 10.3897/BDJ.1.e1015
- McLeod, D.S., Kurlbaum, S., Hoang, V.N. (2015): More of the same: a diminutive new species of the *Limnonectes kuhlii* complex from northern Vietnam (Anura: Dicroglossidae). *Zootaxa* **3947**: 201-214.
- Nguyen, T.Q. (2011): Systematics, ecology, and conservation of the lizard fauna in northeastern Vietnam, with special focus on the genera *Pseudocalotes* (Agamidae), *Goniurosaurus* (Eublepharidae), *Sphenomorphus* and *Tropidophorus* (Scincidae) from this country. Dissertation, University of Bonn: 19–21.
- Nguyen, V.S., Ho, T.C., Nguyen, Q.T. (2009): Herpetofauna of Vietnam. Edition Chimaira, Frankfurt am Main, 768 pp.
- Nguyen, T.Q., Nguyen, S.V., Orlov, N., Hoang, T.N., Böhme, W., Ziegler, T. (2010): A review of the genus *Tropidophorus* (Squamata: Scincidae) from Vietnam with new species records and additional data on natural history. *Zoosystematics and Evolution* **86**: 5-19.
- Nguyen, T. Q., Stenke, R., Nguyen, H.X., Ziegler, T. (2011): The terrestrial reptile fauna of the biosphere reserve cat ba archipelago, Hai Phong, Vietnam. *Bonner Zoologische Monographien* **57**: 99-115.
- Nguyen, T.V., Pham, C.V. Nguyen, T.Q., Hoang, C.V. (2016): Redescription and new record of *Xenophrys jingdongensis* (Fei & Ye, 1983) (Anura: Megophryidae) from Ha Giang Province, Vietnam. Proceedings of the third National Scientific Conference on Reptiles and Amphibians in Vietnam. 111–116.
- Nishikawa, K., Matsui, M., Nguyen, T.T. (2013): A new species of *Tylosotriton* from northern Vietnam (Amphibia: Urodela: Salamandridae). *Current Herpetology* **32**: 34-49.
- Ohler, A., Delorme, M., (2006): Well known does not mean well studied: morphological and molecular support for existence of sibling species in the Javanese gliding frog *Rhacophorus reinwardtii* (Amphibia, Anura). *Comptes Rendus. Biologies. Paris* **329**: 86-97.
- Ohler, A., Wollenberg, K.C., Grosjean, S., Hendrix, R., Vences, M., Ziegler, T., Dubois, A. (2011): Sorting out *Lalos*: description of new species and additional taxonomic data on megophryid frogs from northern Indochina (genus *Leptotalax*, Megophryidae, Anura). *Zootaxa* **3147**: 1-83.
- Pham, T.C., Nguyen, Q.T., Hoang, V.C., Ziegler, T. (2016): New records and an updated list of amphibians from Xuan Lien

- Nature Reserve, Thanh Hoa Province, Vietnam. Herpetology Notes **9**: 31-41.
- Pope, C.H. (1928): Seven new reptiles from Fukien Province, China. American Museum Novitates **320**: 1-6.
- Simmons, J.E. (2002): Herpetological collecting and collections management. Revised edition. Society for the Study of Amphibians and Reptiles, Herpetological Circular **31**: 1-153.
- Smith, M.A. (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).
- Vogel, G., David, P., Pauwels, O.S.G., Sumontha, M., Norval, G., Hendrix, R., Vu, N.T., 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.
- Werner, F. (1904): Beschreibung neuer Reptilien aus den Gattungen *Acanthosaura*, *Calotes*, *Gastropholis* und *Typhlops*. Zoologischer Anzeiger **27**: 461-464.
- Yang, J-H., Orlov, N.L., Wang, Y-Y. (2011): A new species of pitviper of the genus *Protobothrops* from China (Squamata: Viperidae). Zootaxa **2936**: 59-68.
- Ziegler, T., Bischoff, W. (1999): *Takydromus (Platyplacopus) kuehnei vietnamensis* ssp. n., eine neue Schnellläufereidechsen-Unterart aus Vietnam (Reptilia: Squamata: Lacertidae). Salamandra **35**: 209-226.
- Ziegler, T., Tran, T.A.D., Nguyen, Q.T., Perl, R.G.B., Wirk, L., Kulisch, M., Lehmann, T., Anna, R., Nguyen, T.T, Le, K.Q., Vu, N.T. (2014): New amphibian and reptile records from Ha Giang Province, northern Vietnam., Herpetology Notes **7**: 185-201.
- Ziegler, T., Vu, N.T., Le, K.Q., Nguyen, T.Q., Hallermann, J., Le, V.K., Hoang, T.M. (2006): Neue Verbreitungsgebiete einiger wenig bekannter vietnamesischer Amphibien und Reptilien. Sauria **28**: 29-40.