Biodiversity Journal, 2013, 4 (4): 507–552

MONOGRAPH

First report on the herpetofauna of Tay Yen Tu Nature Reserve, northeastern Vietnam

Vera L. Hecht[1], Cuong T. Pham[2], Tao T. Nguyen[3], Truong Q. Nguyen[2,4], Michael Bonkowski[4] & Thomas Ziegler[1,4,*]

[1]AG Zoologischer Garten Köln, Riehler Strasse 173, - 50735 Cologne, Germany; e-mail: ziegler@koelnerzoo.de
[2]Institute of Ecology and Biological Resources, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet Road, Hanoi, Vietnam; e-mail: nqt2@yahoo.com
[3]Vietnam National Museum of Nature, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet Road, Hanoi, Vietnam; e-mail: nguyenthientao@gmail.com
[4]Zoological Institute, University of Cologne, Zülpicher Strasse 47b, D-50674 Cologne, Germany; email: m.bonkowski@uni-koeln.de
[*]Corresponding author

ABSTRACT A total number of 76 species of amphibians and reptiles were recorded during recent field surveys from the Tay Yen Tu Nature Reserve in Bac Giang Province, northeastern Vietnam, comprising one caecilian species, one newt species, 34 species of anurans, 18 species of lizards, and 22 species of snakes. Thirty species are reported for the first time from Yen Tu Nature Reserve as well as for Bac Giang Province. Among the recorded species, five are currently known only from Vietnam. A high level of species diversity and endemism of the herpetofauna underlines the importance of biodiversity conservation in this nature reserve, which covers a major part of the remaining lowland evergreen forest in northeastern Vietnam.

KEY WORDS Amphibians; Bac Giang Province; diversity; new records; reptiles.

Received 24.10.2013; accepted 30.11.2013; printed 30.12.2013

INTRODUCTION

The Tay Yen Tu Nature Reserve is located in Bac Giang Province, about 100 km northeast of Hanoi (Tordoff et al., 2004; Ha et al., 2010). This nature reserve is situated in the western side of the Yen Tu massif, which is known as the largest granite formation in northeastern Vietnam (Ha et al., 2010; Fig. 1). The main habitat type of the Yen Tu massif is evergreen broad-leaved tropical forest (Averyanov et al., 2003; Tordoff et al., 2004; Fig. 2). The total area of the Tay Yen Tu Nature Reserve comprises 16,466 ha and includes two non-contiguous sectors: the Thanh Son-Luc Son sector and the Khe Ro sector. The Thanh Son-Luc Son sector is centered on the 1,068 m high Mount Yen Tu, whereas the Khe Ro sector is allocated around the 886 m high Mount Da Bac (Tordoff et al., 2004).

A comprehensive study on the biodiversity has not been conducted in Tay Yen Tu Nature Reserve to date, however, the results of preliminary field research have indicated that this area supports a number of species of national or global conservation concern (Ha et al., 2010). Four new species have been discovered from Yen Tu Mountain in the last decade: *Sphenomorphus cryptotis* Darevsky, Orlov et Cuc, 2004, *Scincella devorator* Darevsky, Orlov et Cuc, 2004 (Darevsky et al., 2004), *Tylototriton*

vietnamensis Böhme, Schöttler, Nguyen et Köhler, 2005 (Böhme et al., 2005), and *Odorrana yentuensis* Tran, Orlov et Nguyen, 2008 (Tran et al., 2008). In addition, three new country records were recently reported from this nature reserve: *Shinisaurus crocodilurus* Ahl, 1930, *Amphiesmoides ornaticeps* (Werner, 1924), and *Rhacophorus maximus* Günther, 1858 (Le & Ziegler, 2003; Nguyen et al., 2008; Nguyen et al., 2010a). The discoveries of new reptiles and amphibians from Yen Tu Mountains underscore the unrealized biodiversity of northeastern Vietnam. Based on the results of our recent field surveys in the period between 2008 and 2010, we herein provide the first list of amphibians and reptiles recorded from Tay Yen Tu Nature Reserve.

MATERIALS AND METHODS

Field surveys in the Tay Yen Tu Nature Reserve took place in April 2008, in May and October 2009, and from April to July 2010. Survey transects were set up along streams, ponds, and forest paths within both sectors of the nature reserve. The habitat surrounding the ponds consisted of bamboo forest or mixed forest of bamboo and secondary forest; the streams were located in disturbed primary forest or secondary low-land forest (Figs. 3–5). In the Thanh Son - Luc Son Sector, the following streams were surveyed: Suoi Tuyen I (= stream 2); Suoi Tuyen II (= stream 1); Khe cam 1 (= stream 3); stream 4; stream 5; Ba Bep Stream (= stream 6). In addition, the surroundings of the following ponds were surveyed: Ao Cua; Khe Cam 1; Khe Cam 3; Deo Gio; Ba Bep; May Khoan; Da Lua 1; Da Lua 2; Lai Am 1 and Lai Am 2. In the Khe Ro Sector, night excursions were conducted in the forest near the Vung Tron Ranger Station; further surveys took place nearby Dong Ri and Dong Thong Ranger Stations. Surveyed sites are situated at elevations between 75 and 600 m above sea level.

Specimens collected during field surveys were deposited in the museum collections. Taxonomic identifications were made following Boulenger (1912), Pope (1935), Smith (1935, 1943), Bourret (1936, 1942, 2009), Manthey & Grossmann (1997), Ziegler (2002), Bain & Nguyen (2004a, b), Darevsky et al. (2004), Tran et al. (2008), Vogel et al. (2009), Nguyen et al. (2011a, b), and Nguyen et al. (2012). Ventral scales of snakes were counted according to Dowling (1951). Systematics and nomenclature generally followed Nguyen et al. (2009) and Zaher et al. (2009). The gender was identified based on external sexual characters, and if required, from the inspection of the gonads after dissection.

ABBREVIATIONS. Abbreviations of collectors. NQT: T.Q. Nguyen; NTT: T.T. Nguyen; NVS: S.V. Nguyen; PTC: C.T. Pham; TTT: T.T. Tran; TZ: T. Ziegler; VH: V.L. Hecht.

Collections. Institute of Ecology and Biological Resources (IEBR), Hanoi, Vietnam; Vietnam National Museum of Nature (VNMN), Hanoi, Vietnam; Vinh Phuc College of Education, Vietnam (TYT numbers); and Zoologisches Forschungsmuseum Alexander Koenig (ZFMK), Bonn, Germany.

Others abbreviations. NR: nature reserve; asl: above sea level; ED: horizontal eye diameter (eye length); EN: distance between anterior corner of eye and nostril; ET: distance between posterior corner of eye and tympanum; HL: head length; HW: head width; IN: internarial distance; IntOrb: interorbital distance; NtoS: distance between nostril and tip of snout; SL: snout length; SVL: snout-vent length (from tip of snout to cloaca); TaL: tail length (from posterior margin of cloaca to tip of tail); TD: maximum tympanum diameter; TiL: tibia length; TiW: tibia width; uEL: width of upper eyelid.

RESULTS

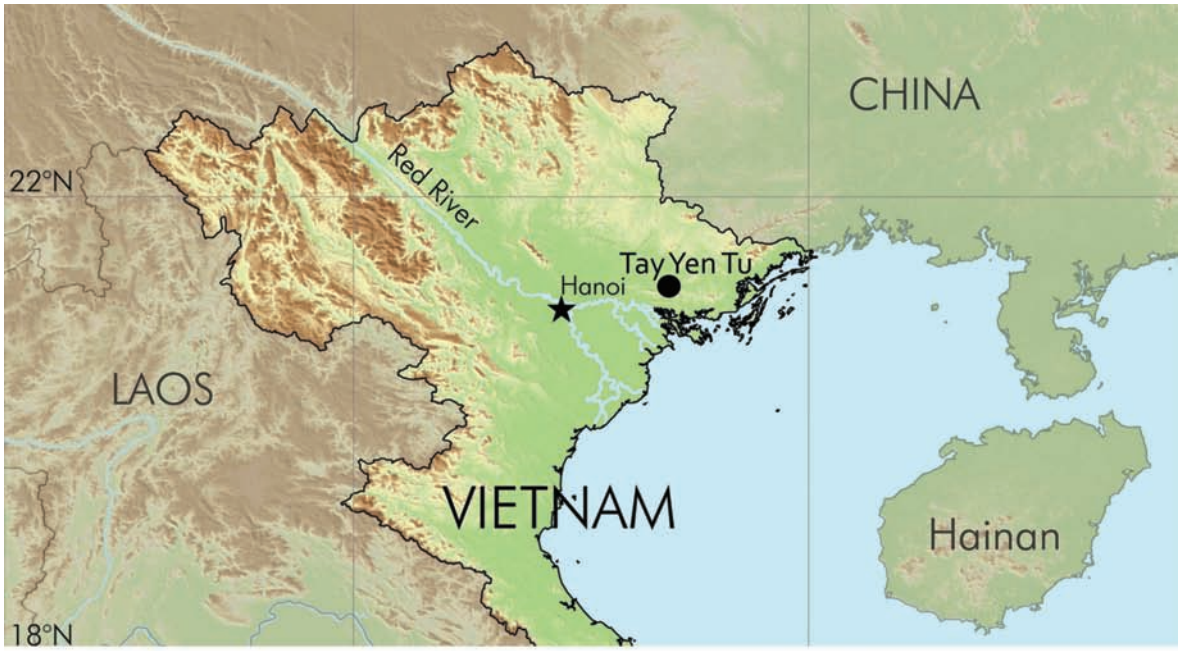
SYSTEMATICS

AMPHIBIA
GYMNOPHIONA
ICHTHYOPHIIDAE

Ichthyophis bannanicus Yang, 1984

EXAMINED MATERIAL. One adult male VNMN 1359 (SVL 233 mm), collected by NTT, 10 July 2010, 450 m asl (Fig. 6).

MORPHOLOGICAL CHARACTERS. Tail length 2.42 mm, tail width 2.98 mm, tail tip pointed; number of annuli: total annuli 365, annuli interrupted by vent 4, post-vent annuli 5. Colouration in life: dorsal surface of head, body and tail lilac; lateral stripe bright yellow, broad, interrupted posteriorly, extending from behind tentacle on upper jaw to posterior end

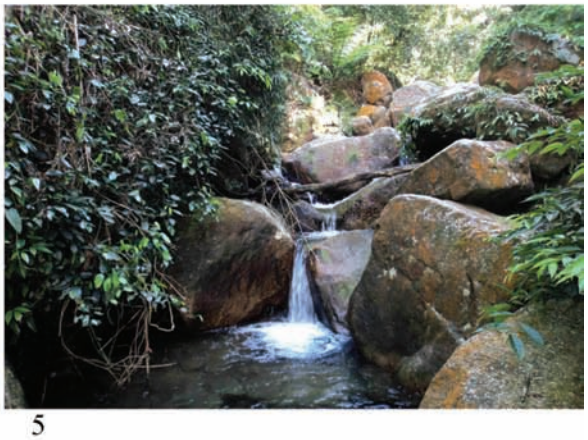


1

2

3

4



5

Figure 1. Map showing the Tay Yen Tu Nature Reserve in Bac Giang Province, Northern Vietnam. Figure 2. Vegetation type of the Tay Yen Tu Nature Reserve. Figures 3-5. Habitat types in Tay Yen Tu Nature Reserve. Photos by T. Ziegler and C.T. Pham.

of vent; ventral surface bright lilac (determination after Nishikawa et al., 2012).

DISTRIBUTION. This is a widespread species in northern Vietnam, from Cao Bang and Tuyen Quang provinces southwards to Hoa Binh Province. *I. bannanicus* was previously recorded from the eastern side of the Yen Tu Mountain in Hai Duong Province (Nguyen et al., 2009). Our finding represents the first record of this species from Tay Yen Tu NR and from Bac Giang Province. Elsewhere, the species has been recorded from China and Laos (Nguyen et al., 2009; Nishikawa et al., 2012).

REMARKS. The specimen was found at night on the forest path near Ba Bep Stream in a bamboo forest near Mau Village.

CAUDATA

SALAMANDRIDAE

Tylototriton vietnamensis Böhme, Schöttler, Nguyen et Köhler, 2005

EXAMINED MATERIAL. Two adult males IEBR A.2013.57 (SVL 53 mm, TaL 55 mm), IEBR A.2013.58 (SVL 62 mm, TaL 65 mm) collected by PTC, June 2010 and July 2012, 200–500 m asl (Figs. 7, 8).

MORPHOLOGICAL CHARACTERS. Habitus moderately stout; head broader than body, slightly sloping in profile; snout short, truncate in dorsal view, rounded in profile and protruding beyond lower jaw; nostrils close to snout tip; upper lips thick, fleshy and overlapping lower lip under eye region; vomeropalatine teeth in two rows; tongue with poorly developed tongue pad, lacking a free posterior margin; a low vertebral tubercular ridge, extending from top of head to base of tail; two lateral rows of larger warts, extending from insertion of fore arms to base of tail; glands and warts relatively small, covering most of dorsal surfaces; venter almost smooth; parotoids greatly enlarged, slightly projecting backwards; gular fold absent; fingers without webbing, toes with basal webbing; tail laterally compressed; dorsal and ventral tail fin moderately developed; tail tip acuminate in profile. Colouration in life: dorsal and ventral surfaces brownish tan; finger and toe tips cream coloured; tail brownish tan with ventral tail fin creamy yellow; cloacal region bordered with cream-yellow (determination after Böhme et al., 2005; Nishikawa et al., 2013).

DISTRIBUTION. This species is currently known only from Lang Son, Bac Giang, and Phu Tho provinces in northern Vietnam (Nguyen et al., 2009; Nishikawa et al., 2013).

REMARKS. Eggs, larvae, subadults and adults were found in and around diverse ponds during day and night in secondary forests (Bernardes et al., 2013).

ANURA

BUFONIDAE

Duttaphrynus melanosticus (Schneider, 1799)

EXAMINED MATERIAL. Identification was based on direct observation in the field and photographs (Fig. 9): cranial crests conspicuous, black and more distinct on supraorbital region; parietal crest absent; parotoid gland prominent, elongated; tympanum distinct, rounded; dorsum and upper surface of limbs with conical, spiny warts; warts more rounded and smaller on flanks; ventral surface granular; fingers free of webbing, toes with webbing at base. Colouration in life: upper head and dorsum yellowish grey to dark brown with black spines; ventral cream (determination after Bourret, 1942; Ziegler, 2002).

DISTRIBUTION. This is a common species in Vietnam as well as in Asia (Nguyen et al., 2009). Therefore, we did not collect any voucher specimens.

REMARKS. Several individuals were found during the day and in the evening in the grassland near the Dong Thong Ranger Station.

Ingerophrynus galeatus (Günther, 1864)

EXAMINED MATERIAL. One subadult female ZMFK 92837 (SVL 39.04 mm), collected by TZ and NTT, October 2009, ca. 400 m asl (Fig. 10).

MORPHOLOGICAL CHARACTERS. Snout short, obtuse, protruding in profile; pupil horizontal; vomerine teeth absent; canthus rostralis with well developed bone-crest, continuing on supraorbital and parietal region, parietal crest absent; interorbital

distance narrower than upper eyelid width (IntOrb 3.23 mm, uEL 3.67 mm); a well-developed bone crest beyond eye above tympanum, reaching oval parotoid gland; tympanum distinct, smaller than eye length (TD 1.85 mm, ED 4.04 mm); dorsal skin with warts, ventral skin granular; finger I longer than II; toes 1/3-1/2 webbed; two metatarsal tubercles present; tarsal fold absent; tibio-tarsal articulation reaching eye. Colouration in life: dorsum grey with reddish warts and brown to dark grey marbling; lips with some bars; limbs with dark transverse bands, ventral surface pale yellowish grey with some dark markings (determination after Bourret, 1942; Inger et al., 1999; Ziegler, 2002; Tran et al., 2010).

Distribution. In Vietnam, this species has been recorded from Lao Cai in the North to Dak Lak, Lam Dong, and Dong Nai provinces in the South. This is the first record of *I. galeatus* from Tay Yen Tu NR as well as from Bac Giang Province. Elsewhere, the species has been reported from China, Laos, and Cambodia (Nguyen et al., 2009).

Remarks. A single specimen was found in the late afternoon on the forest ground near Suoi Tuyen I. Another juvenile was encountered on the forest ground near Ba Bep Pond in the afternoon on 3 June 2010.

MEGOPHRYIDAE

Leptobrachium cf. ***chapaense*** (Bourret, 1937)

Examined material. One adult female ZFMK 92838 (SVL 76.55 mm), collected by TZ and NQT, 27 May 2009, ca. 350 m asl (Fig. 11).

Morphological characters. Head large, flattened; snout round; pupil vertical; upper part of iris white; vomerine teeth absent; supratympanic fold distinct; tympanum indistinct (TD 4.69 mm); fore limbs long and slender, fingers free of webbing; webbing of toes rudimental; inner metatarsal tubercle present, outer metatarsal tubercle absent; tibio-tarsal articulation reaching tympanum; tibia length 26.72 mm; dorsal and ventral skin smooth. Colouration in life: dorsum reddish to greenish brown with some irregular black spots and marbling, flanks dark brown with white spots, upper surface of limbs lighter with dark bars; throat light reddish-brown, finely speckled with white, venter blackish grey with white spots (determination after Bourret, 1942; Ziegler, 2002; Bain & Nguyen, 2004a).

Distribution. This species has been recorded from northern and central Vietnam. This is the first record of *L. chapaense* from Tay Yen Tu NR as well as from Bac Giang Province. Elsewhere, the species is known from China, Myanmar, Laos, and Thailand (Nguyen et al., 2009).

Remarks. ZFMK 92838 was found on the path in the bamboo forest near Vung Tron Ranger Station. In October 2009, a tadpole of *L.* cf. *chapaense* was collected in the shallow part of a small stream.

Leptolalax nyx Ohler, Wollenberg, Grosjean, Hendrix, Vences, Ziegler et Dubois, 2011

Examined material. One adult female IEBR 3659 (SVL 33.94 mm), collected by NQT, 10 April 2008, ca. 350 m asl (Fig. 12).

Morphological characters. Head longer than wide (HL 11.27 mm, HW 10.71 mm); vomerine teeth present; snout longer than eye (SL 5.75 mm, ED 4.61 mm); interorbital distance slightly wider than upper eyelid width (IntOrb 4.09 mm, uEL 3.91 mm); nostrils oval, closer to tip of snout than to eye (NtoS 2.49 mm, EN 3.26 mm); tympanum distinct round, greater than distance between tympanum and eye (TD 3.32 mm, ET 2.44 mm); supratympanic fold distinct; small webbing on feet and narrow fringes on toes; dermal ridges under toes poorly developed; finger tips slightly enlarged; dorsum with glandular warts and short elongate ridges. Colouration in life: dorsal pattern distinct including dark outlines on warts and folding, a light W-shaped brown marking in the shoulder region; dark spots on flanks present; ventral surface whitish (determination after Ohler et al., 2011).

Distribution. This species was previously known only from the type locality in Ha Giang Province, Vietnam (Ohler et al., 2011). This is the first record of the species from Tay Yen Tu NR as well as from Bac Giang Province.

Remarks. Specimen was collected at night on a tussock grass in a rocky stream near Dong Ri Ranger Station.

Ophryophryne microstoma Boulenger, 1903

EXAMINED MATERIAL. Two adult males ZFMK 92839 and ZFMK 93906, collected by TZ and NQT, 26 May 2009, elevation 250 m asl; one adult female ZFMK 92840, collected by TZ and NTT, October 2009, 250–370 m asl; two adult males VNMN 1320 (SVL 34.72 mm) and VNMN 1340 (SVL 33.99 mm), collected by TZ and NTT, June 2010, 400–600 m asl (Fig. 13).

MORPHOLOGICAL CHARACTERS. Relatively large *Ophryophryne*, SVL 33.99–46.3 mm; head small; snout shorter than eye (SL 2.90–3.64 mm, ED 3.69–4.49 mm), obliquely obtuse, strongly pronounced; loreal region vertical, concave; nostril closer to tip of snout than to eye (EN 1.79–2.15 mm, NtoS 1.16–1.6 mm); interorbital distance as broad as upper eyelid; conical dermal appendix on upper eyelid present; eye larger than tympanum (ED 3.69–4.49 mm, TD 2.04–2.37 mm); tympanum distinct; arms and legs slender; palmar tubercle indistinct; subarticular tubercles indistinct; finger I shorter than II; tibio-tarsal articulation reaching eye or at least armpit; tibia about four times longer than wide (TiL 15.77–22.05 mm, TiW 3.48–4.81 mm); toe webbing rudimental; dorsal skin with small warts, with symmetric glandular ridges; males without externally visible vocal sacs. Colouration in life: dorsum greyish or light brown, upper surface of limbs with transverse bars; a light bar present below the eye; flanks with some small black spots; ventral surface cream with dark marbling (determination after Bourret, 1942; Ohler, 2003).

DISTRIBUTION. In Vietnam, this species has been recorded from Lao Cai and Ha Giang in the North southwards to Dak Lak and Lam Dong provinces. This is the first record of *O. microstoma* from Tay Yen Tu NR as well as from Bac Giang Province. Elsewhere, the species is known from China, Laos, Thailand, and Cambodia (Nguyen et al., 2009).

REMARKS. All five specimens were found at night on branches, ferns or stones near rocky streams. Ohler (2003) stated that vocal sacs are visible in the males of *O. microstoma*, however, they are indistinct in our specimens.

Xenophrys major (Boulenger, 1908)

EXAMINED MATERIAL. One adult male VNMN 1345 (SVL 77.23 mm), collected by TZ and NTT, 24 June 2010, 300 m asl.

MORPHOLOGICAL CHARACTERS. Head flat, slightly wider than long (HL 27.81 mm, HW 28.75 mm); snout obliquely obtuse, strongly pronounced; pupil vertical; tympanum distinct, approximately half of eye diameter (TD 3.52 mm, ED 8.23 mm); supratympanic fold distinct; nostrils closer to eye than to tip of snout (EN 4.61 mm, NtoS 5.10 mm); interorbital distance a bit narrower than upper eyelid width (IntOrb 6.93 mm, uEL 7.17 mm); tips of fingers and toes swollen; finger I longer than II; toes 1/4 webbed; tibio-tarsal articulation reaching the position between eye and tympanum; tibia length (TiL 39.27 mm), half of snout-vent length; dorsal skin nearly smooth, partly granular, glandular ridges on back and upper surface of limbs present; supratympanic fold present. Colouration in life: dorsal head and body brown, a dark brown triangular pattern present between the eyes; lateral sides of head dark brown; upper lip with a white stripe, running from nostril backward to shoulder; supratympanic fold edged in white; dorsal surface of limbs with dark bars; ventral surface white (determination after Bourret, 1942; Tran et al., 2010).

DISTRIBUTION. This is a widespread species in Vietnam, from Lao Cai and Ha Giang provinces southwards to Dak Lak and Dong Nai provinces. Elsewhere, the species has been reported from India, Bangladesh, China, Myanmar, Laos, and Thailand (Nguyen et al., 2009).

REMARKS. The single specimen was found at night on a dry and loamy forest path.

MICROHYLIDAE

Kalophrynus interlineatus (Blyth, 1854)

EXAMINED MATERIAL. One adult female ZFMK 92841 (SVL 46.61 mm), collected by TZ and NTT, October 2009, 160–180 m asl (Fig. 14).

MORPHOLOGICAL CHARACTERS. Snout pointed, slightly pronounced, somewhat longer than eye (SL 5.30 mm, ED 4.11 mm); vomerine teeth absent;

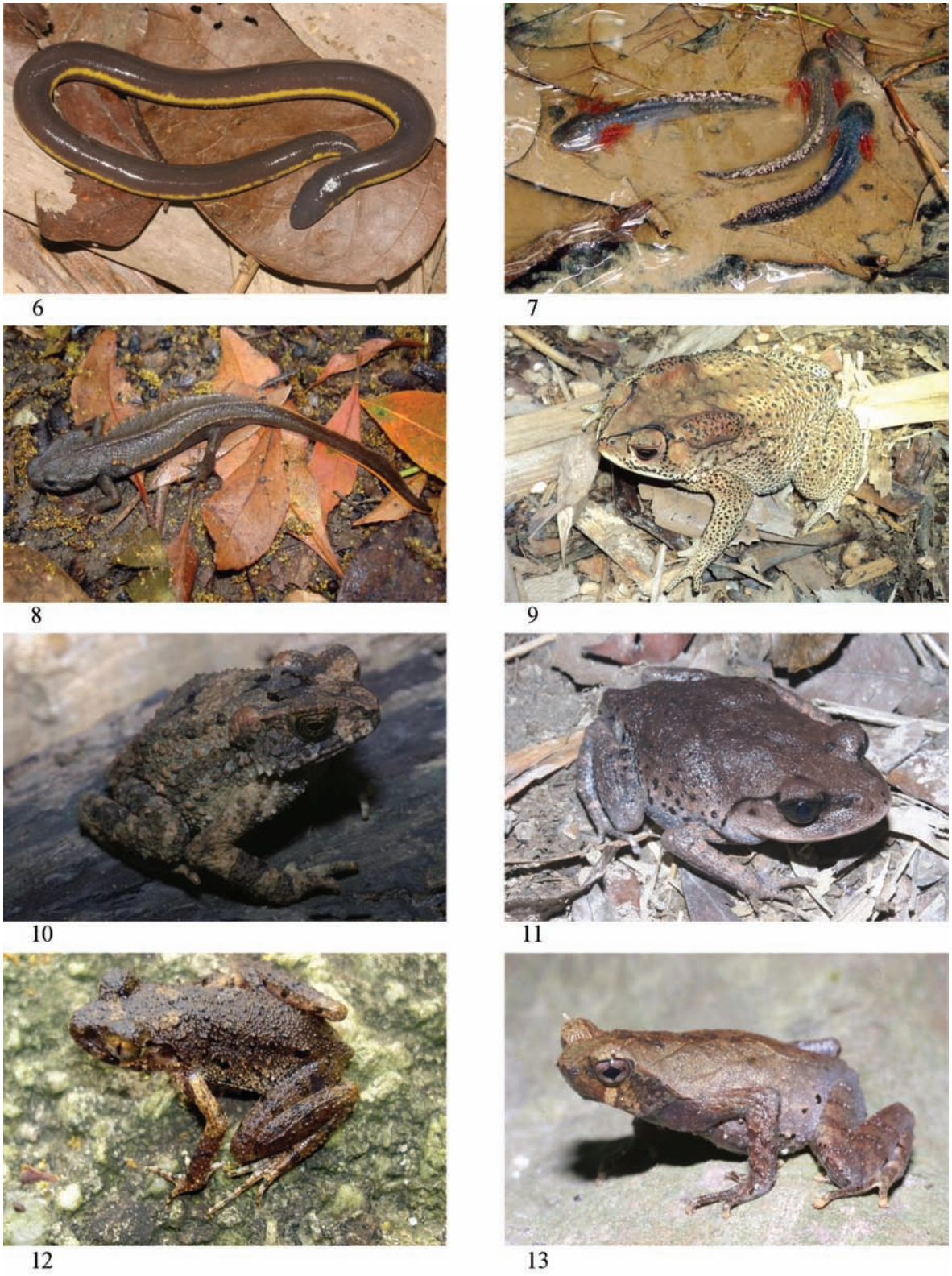


Figure 6. *Ichthyophis bannanicus*. Figures 7, 8. Larvae and adult of *Tylototriton vietnamensis*. Figure 9. *Duttaphrynus melanostictus*. Figure 10. *Ingerophrynus galeatus*. Figure 11. *Leptobrachium* cf. *chapaense*. Figure 12. *Leptolalax nyx*. Figure 13. *Ophryophryne microstoma*. Photos by T. Ziegler and T.Q. Nguyen.

pupil horizontal; interorbital distance broader than upper eyelid (IntOrb 4.42 mm, uEL 2.99 mm); tympanum distinct, about 2/3 of eye length (TD 2.59 mm, ED 4.11 mm); fingers free of webbing; toes rudimentally webbed; subarticular tubercles distinct; inner and outer metatarsal tubercles present; tibio-tarsal articulation reaching to the middle position between axilla and groin; dorsal skin with tubercles, larger in size on belly and on upper surface of thighs; supratympanic fold indistinct; dorsolateral fold narrow and granular. Colouration in life: dorsal head and body light brown, one black spot present on each side of the hips; flanks dark brown; ventral surface whitish (determination after Bourret, 1942).

DISTRIBUTION. In Vietnam, this species has been reported from Lang Son, Phu Tho, Bac Giang, Ninh Binh, Quang Binh, Dong Nai, and Kien Giang provinces. Elsewhere, the species is known from India, China, Myanmar, Laos, Thailand, Cambodia, and Indonesia (Nguyen et al., 2009).

REMARKS. The female specimen was found in the late afternoon, on the ground near pond Khe Cam 1 in a bamboo forest. Our specimen differs from Bourret's (1942) description by its longer snout (versus a snout as long as eye) and the absence of black marking in the loreal region, under the dorsolateral fold, in the cloacal region and at the back of thigh.

Microhyla butleri Boulenger, 1900

EXAMINED MATERIAL. One adult male VNMN 1326 (SVL 22.39 mm), collected by TZ and NTT, July 2010, ca. 400 m asl; one adult female IEBR A.2013.59 (SVL 25.55 mm), collected by VH, 3 July 2010, 450 m asl (Fig. 15).

MORPHOLOGICAL CHARACTERS. Snout rounded, pronounced, longer than eye (SL 3.14–3.55 mm, ED 1.68–2.02 mm); vomerine teeth absent; pupil horizontal; interorbital distance 1.9–2.6 times broader than upper eyelid (IntOrb 2.48–2.85 mm, uEL 0.96–1.47 mm); tympanum invisible; fingers free of webbing, with slightly developed discs; toes with small discs, webbed at base; subarticular tubercle prominent; inner and outer metatarsal tubercles present; tibio-tarsal articulation reaching between eye and tip of snout; dorsal skin smooth; supratympanic fold present; ventral skin smooth, cloacal region granular; males with visible vocal sacs. Colouration in life: dorsal head and body grey with brownish and reddish markings; one whitish stripe from eye to beginning of arm; limbs with dark transverse bars; ventral surface whitish, throat and chest mottled with dark brown (determination after Bourret, 1942; Manthey & Grossmann, 1997; Ziegler, 2002; Bain & Nguyen, 2004b).

DISTRIBUTION. This is a widespread species in Vietnam. Elsewhere, the species has been reported from China, Myanmar, Laos, Thailand, Cambodia, Malaysia, and Singapore (Nguyen et al., 2009).

REMARKS. VNMN 1326 was found on a stone covered by moss in Suoi Tuyen I at night while IEBR A.2013.59 was collected on the ground of the bamboo forest near Lai Am Pond in the evening.

Microhyla heymonsi Vogt, 1911

EXAMINED MATERIAL. One adult male VNMN 1327 (SVL 20.23 mm) collected by TZ and NTT, 4 June 2010, 440 m asl; one adult male IEBR A.2013.60 (SVL 21.21 mm) collected by VH, 7 June 2010, ca. 400 m asl (Fig. 16).

MORPHOLOGICAL CHARACTERS. Snout obtusely pointed, pronounced, somewhat longer than eye (SL 2.84–2.90 mm, ED 2.08–2.30 mm); vomerine teeth absent; interorbital distance 1.2–1.5 times broader than upper eyelid (IntOrb 2.06–2.30 mm, uEL 1.54–1.72 mm); tympanum hidden; fingers free of webbing, with small discs; finger I shorter than II; palmar tubercle present; toes webbed rudimentally; subarticular tubercles well developed; inner and outer metatarsal tubercles small; tibio-tarsal articulation reaching between eye and tip of snout; dorsal and ventral skin smooth; supratympanic fold indistinct. Colouration in life: dorsal head and body grey or light brown, with a white stripe from tip of snout to cloaca, and a small dark spot in the center of the back; lateral sides of head and flanks dark brown to black; anterior part of thighs, cloacal region and lower parts of feet black; limbs with thin transverse bars; ventral surface white to grey; males with black vocal sacs (determination after Bourret, 1942; Manthey & Grossmann, 1997).

DISTRIBUTION. This is a widespread species in Vietnam. However, this is the first record of *M. heymonsi* from Tay Yen Tu NR as well as from Bac Giang Province. Elsewhere, the species has been recorded from India, China, Laos, Thailand, Cambodia, Malaysia, and Indonesia (Nguyen et al., 2009).

Remarks. Specimens were found during the day time or at night on the ground near small ponds in the bamboo forest.

Microhyla pulchra (Hallowell, 1861)

Examined material. One subadult ZFMK 93905 (SVL 17.58 mm), collected by VH, 8 June 2010, 75 m asl (Fig. 17).

Morphological characters. Snout obtusely pointed, slightly pronounced, longer than eye (SL 2.52 mm, ED 2.04 mm); vomerine teeth absent; pupil round; interorbital distance broader than upper eyelid (IntOrb 1.84 mm, uEL 1.41 mm); tympanum indistinct; tips of fingers not enlarged; fingers free of webbing, finger I shorter than II; toes almost 1/2 webbed; subarticular tubercles well developed; metatarsal tubercle large; tibio-tarsal articulation reaching between eye and tip of snout; dorsal skin smooth; a distinct fold present between posterior edges of the eyes; ventral skin smooth; cloacal region granular. Colouration in life: dorsum light brown, with a dark brown Λ-shaped pattern on the back, containing several dark and light lines, outer part bordered by several light lines; canthus rostralis and flanks dark brown; limbs with transverse bars; groin and anterior part of thigh yellow; ventral surface whitish yellow, chin and throat with black marbling (determination after Bourret, 1942; Ziegler, 2002; Bain & Nguyen, 2004b).

Distribution. This is a common species in Vietnam. Elsewhere, the species is known from India, China, Laos, Thailand, and Cambodia (Nguyen et al., 2009).

Remarks. A single specimen was found in the morning on grassland near the Dong Thong Ranger Station. Our specimen well matched the descriptions of Bourret (1942) and Ziegler (2002), but it differs in having only one metatarsal tubercle instead of two small ones.

DICROGLOSSIDAE

Fejervarya limnocharis (Gravenhorst, 1829)

Examined material. One adult male ZFMK 93908 (SVL 46.05 mm), collected by TZ and NQT, 27 May 2009; one subadult ZFMK 93907 (SVL 24.73 mm), collected by Marta Bernardes, 7 June 2010, 75–90 m asl (Fig. 18).

Morphological characters. Head long, narrow; snout pointed, longer than eye (SL 4.44–7.40 mm, ED 3.34–5.53 mm); tongue bifid; vomerine teeth present; canthus rostralis obtuse; loreal region oblique; internostril and upper eyelid broader than interorbital distance (IN 2.52–2.93 mm, uEL 2.27–3.77 mm, IntOrb 1.66–2.29 mm); tympanum distinct (TD 1.72–2.48 mm); supratympanic fold distinct; tips of fingers and toes pointed; finger I longer than II; toes half webbed; outer metatarsal tubercle very small; tibio-tarsal articulation reaching eye; tibia 3–4 times longer than broad (TiL 13.08–23.99 mm, TiW 3.17–7.44 mm); dorsal skin granular, with several irregular dermal folds; nuptial pad present in males. Colouration in life: dorsal head and body greyish green with camouflage-pattern; light vertebral stripe present or absent; lips with dark vertical bars; limbs with transverse bars or spots; ventral surface white; throat marbled with black in males (determination after Bourret, 1942; Manthey & Grossmann, 1997; Ziegler, 2002; Goodall & Faithfull, 2010).

Distribution. This is a common species not only in Vietnam but also in Asia, from Afghanistan, Pakistan, India eastwards to China and Japan, southwards to Malaysia, Indonesia, and the Philippines (Nguyen et al., 2009).

Remarks. The adult male was found on a stone in a stream and the subadult was found on grassland about 30 m away from a small stream at night.

Limnonectes bannaensis Fitzinger, 1843

Examined material. One adult female IEBR A.2013.61 (SVL 47.43 mm), collected by PTC, June 2010, ca. 350 m asl (Fig. 19).

Morphological characters. Head large, flattened, wider than long (HL 19.70 mm, HW 20.9 mm); snout rounded, longer than eye diameter (SL 7.64 mm, ED 6.96 mm); canthus rostralis absent; loreal region oblique and slightly concave; vomerine teeth present; tongue bifurcated posteriorly; lower jaw with two tooth-like, bony structures; tympanum hidden; supratympanic fold present; arms short, fingers without webbing, tips of fingers obtuse or slightly swollen, finger I as long as finger

II, finger II and III with lateral skin-ridges; subarticular tubercles on fingers and toes large; hind limbs short; tibio-tarsal articulation reaches tympanum or eye; toes short, nearly full-webbed tips of toes dilated into small discs; subarticular tubercles fairly large; inner metatarsal tubercle large, outer metatarsal tubercle absent; specimen with smooth skin above. Colouration in life: dorsal head and back greenish brown with small dark blotches; limbs with dark brown bars; a short, dark transverse line present between eyes; upper and lower lip with vertical dark stripes; ventral surface whitish or yellowish and with numerous light grey or brownish blotches on throat, chest and limbs (determination after Ye et al., 2007; McLeod, 2010).

DISTRIBUTION. In Vietnam, this species has been recorded from Lao Cai Province in the North to Dong Nai and Kien Giang provinces in the South. Elsewhere, it is known from China, presumably to be found in Myanmar, and Laos (Nguyen et al., 2009; McLeod, 2010).

REMARKS. The specimen was found on stone in the stream Suoi Tuyen II in the evening. McLeod (2010) stated that *Limnonectes kuhlii* (Tschudi, 1838) is a complex of cryptic species. The "true" *L. kuhlii* is known only from the type locality in Java, Indonesia, and specimens identified as *L. kuhlii* from China and Vietnam should be assigned to *L. bannaensis*.

Quasipaa acanthophora Dubois et Ohler, 2009

EXAMINED MATERIAL. One male IEBR A.2013.62 (SVL 102.23 mm), two females IEBR A.2013.63 (SVL 87.26 mm), IEBR A.2013.64 (SVL 89.59 mm) collected by PTC, June 2010, 300–500 m asl; one subadult ZFMK 92843 (SVL 57.46 mm) collected by TZ and NTT, October 2009, ca. 350 m asl (Fig. 20).

MORPHOLOGICAL CHARACTERS. Head wider than long (HW 32.16–39.93 mm, HL 29.77–36.5 mm); snout rounded, slightly protruding, longer than eye diameter (SL 12.28–15.10 mm, ED 8.44–11.46 mm); vomerine teeth present; canthus rostralis indistinct; loreal region concave; nostrils oval, with flap of skin laterally; nostrils closer to eyes than to tip of snout (EN 5.08–5.93 mm, NtoS 4.50–4.76 mm); interorbital distance narrower than internarial distance and upper eyelid (IN 7.14–8.54 mm, IntOrb 5.08–5.93 mm, uEL 7.32–9.08 mm); tympanum indistinct; supratympanic fold prominent; pineal ocellus present, between anterior borders of eyes; arm short; fingers free of webbing; finger I longer than II; tips of fingers rounded, slightly enlarged, without discs; toes short and thin; tips of toes rounded, distinctly enlarged, without discs; toes fully webbed; dorsal head, body and limbs shagreened with regularly disposed glandular warts; upper part of flanks shagreened with elongated glandular warts, lower part with foldings; dorsolateral folds absent; thigh shagreened with thin foldings; legs shagreened with thin foldings and horny spinules; tarsus smooth; ventral surface smooth; belly with transversal foldings. Colouration in life: dorsal surface light brown, with grey spots; dorsal surface of limbs with transverse bars; supratympanic fold darker; lips with vertical bars ventral surface yellowish white, gular region with black marbling (determination after Dubois & Ohler, 2009). The males are larger in size, black nuptial spines present on prepollex and finger I (two separated pads).

DISTRIBUTION. This species was previously known only from the type locality in Lang Son Province, Vietnam (Dubois & Ohler, 2009). This is the first record of this species from Tay Yen Tu NR as well as from Bac Giang Province.

REMARKS. The specimens were found on stones in the stream Suoi Tuyen I and Suoi Tuyen II in the evening.

Occidozyga martensii (Peters, 1867)

EXAMINED MATERIAL. One adult female ZFMK 92844 (SVL 24.95 mm), collected by TZ, 29 May 2009, 200 m asl (Fig. 21).

MORPHOLOGICAL CHARACTERS. Head longer than wide (HL 9.37 mm, HW 7.88 mm); vomerine teeth absent; tongue rounded posteriorly; eyes directing laterally; tympanum hidden; supratympanic fold weakly developed; fingers and toes with small discs; finger I longer than II; tibio-tarsal articulation reaching eye; toes fully webbed, except toes IV and V; intercalary cartilage tubercles absent; inner metatarsal tubercle present; dorsal skin smooth anteriorly with some tubercles on the posterior part of back; ventral skin smooth. Colouration in life: dorsum beige grey, with a darker stripe between eyes; one light vertical bar from eye to snout; limbs with

Figure 14. *Kalophrynus interlineatus*. Figure 15. *Microhyla butleri*. Figure 16. *M. heymonsi*. Figure 17. *M. pulchra*. Figure 18. *Fejervarya limnocharis*. Figure 19. *Limnonectes bannaensis*. Figure 20. *Quasipaa acanthophora*. Figure 21. *Occidozyga martensii*. Photos by T. Ziegler and C.T. Pham.

transverse bars; ventral surface white, gular region marbled with black (determination after Bourret, 1942; Manthey & Grossmann, 1997; Ziegler, 2002).

DISTRIBUTION. This is a widespread species in Vietnam, from Lao Cai Province in the North to Dong Nai and Ba Ria-Vung Tau provinces in the South. However, this is the first record of *O. martensii* from Tay Yen Tu NR and from Bac Giang Province. Elsewhere, the species is known from China, Laos, Thailand, and Cambodia (Nguyen et al., 2009).

REMARKS. The specimen was found in the stream. Some other individuals were sighted in the water or the riverine of ponds during the day time.

RANIDAE

Amolops ricketti (Boulenger, 1899)

EXAMINED MATERIAL. One subadult female ZFMK 92845 (SVL 33.75 mm), collected by TZ and NQT, 25–29 May 2009, 300–400 m asl (Figs. 22, 23).

MORPHOLOGICAL CHARACTERS. Head somewhat longer than broad (HL 12.58 mm, HW 11.91 mm); snout round, pronounced, longer than eye length (SL 5.28 mm, ED 4.07 mm); vomerine teeth present; canthus rostralis distinct; loreal region concave; nostril at the midway between eye and tip of snout (EN 2.89 mm, NtoS 2.62 mm); interorbital distance narrower than internarial distance, but broader than upper eyelid (IN 4.41 mm, IntOrb 3.21 mm, uEL 2.91 mm); tympanum indistinct, about 1/3 of eye length (TD 1.17 mm); finger short, with lateral dermal fringe, with enlarged discs, discs with circummarginal groove as wide as tympanum diameter; finger I shorter than II; subarticular tubercles small; tibio-tarsal articulation reaching to tip of snout; heels overlapping; tibia four times longer than wide, about 2/3 of SVL (TiL 20.44 mm, TiW 5.00 mm); toes fully webbed, without tarsal fold; intercalary cartilage tubercles absent; toe discs with circummarginal groove, smaller than finger discs; inner metatarsal tubercle oval; outer metatarsal tubercle absent; dorsal skin with flattened granules; supratympanic fold distinct; ventral surface granular. Colouration in life: dorsum yellowish grey with larger reddish spots; upper surface of limbs with darker transverse bars; ventral surface yellowish white, gular region marbled (determination after Bourret, 1942).

DISTRIBUTION. In Vietnam, this species has been recorded from Lao Cai and Ha Giang provinces southwards to Hoa Binh Province (Nguyen et al., 2009). Records of this species in northwestern and central Vietnam must be confirmed, as it looks similar to *A. cremnobatus* Inger et Kottelat, 1998 and *A. spinapectoralis* Inger, Orlov et Darevsky, 1999. This is the first record of *A. ricketti* from Tay Yen Tu NR and from Bac Giang Province. Elsewhere, this species is known from China (Nguyen et al., 2009).

REMARKS. The specimen was found near a rocky stream near Vung Tron Ranger Station. Further individuals were observed on branches and stones inside and nearby streams and cascades. The specimen matched the description of Bourret (1942) well, but its snout is longer than the eye length instead of being shorter than the eye length.

Babina chapaensis (Bourret, 1937)

EXAMINED MATERIAL. Four adult males ZFMK 92846, VNMN 1318, ZFMK 92847 and VNMN 1321, collected by TZ, 25 July 2010, 450–500 asl (Fig. 24).

MORPHOLOGICAL CHARACTERS. SVL 36.78–42.58 mm; head flattened, as long as or longer than wide (HL 13.22–16.16 mm, HW 13.14–15.50 mm); snout obtuse, round, longer than eye length (SL 6.28–6.89 mm, ED 4.18–4.70 mm); vomerine teeth present; canthus rostralis distinct; loreal region concave; nostrils at the midway between eye and tip of snout (EN 2.71–3.10 mm, NtoS 2.78–3.27 mm); internarial distance as broad as or broader than interorbital distance and wider than upper eyelid (IN 4.78–5.31 mm, IntOrb 3.58–4.55 mm, uEL 2.99–3.18 mm); tympanum distinct, smaller than eye (TD 3.14–3.86 mm, TD/ED 0.73–0.90); tip of fingers with small discs; tibiotarsal articulation reaching tip of snout; heels overlapping; tibia 3.84–4.30 times longer than wide (TiL 21.56–24.83 mm, TiW 5.40–6.26 mm); toe tips with small discs, with circummarginal groove; toes half webbed; inner metatarsal tubercle present; outer metatarsal tubercle small; dorsal skin smooth, with fine granular pattern on back, thigh and cloacal region; dorsolateral fold distinct; upper lip with a fold from below the nostril to anterior axilla, ending in a small wart. Colouration

in life: dorsum brown, with a light vertebral stripe from interorbital region to cloaca; a narrow black line from nostrils to groin, bordering dorsolateral fold; loreal region and tympanum dark brown; flanks yellowish green or grey, with some black spots; upper surface of limbs reddish brown with transverse dark bars; back of thigh with brown marbling; dermal fold on upper lip white; ventral surface white, yellow in posterior part; lower surface of arms with grey or black spots (determination after Bourret, 1942).

Distribution. In Vietnam, this species has been recorded from Lao Cai, Bac Giang, Ha Tinh, Kon Tum, Gia Lai, and Dak Lak provinces. Elsewhere, the species is known from Laos and Thailand (Nguyen et al., 2009).

Remarks. Specimens were found at night on the ground in the bamboo forest near Da Lua Pond.

Hylarana guentheri (Boulenger, 1882)

Examined material. Two adult males IEBR A.2013.65 (SVL 71.31 mm), IEBR A.2013.66 (SVL 72.85 mm) collected by PTC, June 2010; one adult female IEBR A.3013.67 (SVL 73.10 mm) collected by PTC, October 2011, 100–300 m asl (Fig. 25).

Morphological characters. Head wider than long (HL 19.71–20.11 mm, HW 25.59–26.75 mm); vomerine teeth present; internarial distance broader than upper eyelid (IntOrb 6.32–6.63 mm, uEL 4.50–5.30 mm); tip of snout pointed, strongly projecting; canthus rostralis distinct; loreal region moderately oblique, concave; nostril closer to tip of snout than to eye (EN 6.10–7.95 mm, NtoS 3.10–5.91 mm); tympanum distinct (TD 6.14–6.50 mm); supratympanic fold prominent; fingers slender and rather long, free of weebing, finger tips swollen, finger I longer than finger II, subarticular tubercles large; toes 3/4 webbed, tips of toes dilated into small discs, with a median groove, subarticular tubercles rather small, tarsal fold absent; inner metatarsal tubercle present, outer metatarsal tubercle very small; skin above and below smooth; dorsolateral fold distinct. Colouration in life: dorsal surface of head and body grey, light brown, golden to reddish brown, uniform or with dark brown spots; lateral head and flanks with a dark line or band, bordering the dorsolateral fold; tympanum dark brown or reddish; limbs with brown crossbars, back of thighs yellow with black mottling; ventral surface white or yellow, throat or chest speckled with brown (determination after Bourret, 1942; Ziegler, 2002).

Distribution. This is a common species in lowland areas of Vietnam. Elsewhere, the species has been reported from China, Taiwan, Myanmar, and Laos (Nguyen et al., 2009).

Remarks. The specimens were found in a small stream near Mau village.

Hylarana maosonensis Bourret, 1937

Examined material. One adult male ZFMK 92850 (SVL 40.43 mm), collected by TZ and NTT, October 2009, ca. 500 m asl (Fig. 26).

Morphological characters. Head longer than wide (HL 15.40 mm, HW 14.24 mm); vomerine teeth present; snout round, slightly pronounced, shorter than eye length (SL 6.05 mm, ED 6.14 mm); loreal region oblique, concave; nostril closer to tip of snout than to eye (EN 3.50 mm, NtoS 2.60 mm); interorbital distance narrower than internarial distance and upper eyelid (IN 4.17 mm, IntOrb 3.33 mm, uEL 3.90 mm); tongue notched posteriorly; pupil rounded; tympanum distinct, half of eye length (TD 3.04 mm); fingers free of webbing, with small discs; subarticular tubercle round, distinct; tibiotarsal articulation reaching between eye and tip of snout; discs of toes larger than discs of fingers; toes 3/4 webbed; intercalary cartilage tubercles absent; tibia 4 times longer than wide (TiL 22.65 mm, TiW 5.23 mm); subarticular tubercles small, round; inner metatarsal tubercle small, elongated; outer metatarsal tubercle small; tarsal fold absent; dorsolateral fold distinct, interrupted posteriorly; tubercles present on dorsal surface of body and thighs and upper part of flanks; supratympanic fold prominent; a large tubercle in posterior corner of the mouth; flanks with elongated warts below dorsolateral fold; two rows of elongated warts on each thigh; ventral surface smooth. Colouration in life: dorsum yellowish brown, flanks lighter with black spots; limbs with dark transverse bars; tympanum brown; lips white with small black spots; ventral surface whitish, chin mottled with dark brown (determination after Bourret, 1942; Inger et al., 1999).

Distribution. This species has been recored in northern and central Vietnam, from Lao Cai and Ha Giang provinces southwards to Quang Tri and Thua

Thien-Hue provinces. Elsewhere, the species is known from Laos (Nguyen et al., 2009).

REMARKS.The specimen was found at night in Suoi Tuyen I.

Hylarana cf. ***nigrovitatta*** (Blyth, 1856)

EXAMINED MATERIAL. One adult female IEBR A.2013.68 (SVL 46.43 mm), collected by TZ and NQT, 28 May 2009, 200 m asl (Fig. 27).

MORPHOLOGICAL CHARACTERS. Head longer than wide (HL 18.26 mm, HW 15.91 mm); vomerine teeth present; snout round, longer than eye (SL 6.70 mm, ED 5.93 mm); loreal region oblique, concave; nostril closer to tip of snout than to eye (EN 3.57 mm, NtoS 3.13 mm); internarial distance broader than interorbital distance and upper eyelid (IN 4.60 mm, IntOrb 4.17 mm, uEL 3.66 mm); tongue notched posteriorly; pupil rounded; tympanum distinct (TD 3.70 mm); fingers free of webbing, tips of fingers swollen; toes 3/4 webbed; subarticular tubercles small; inner metatarsal tubercle small, elongated; outer metatarsal tubercle small; dorsolateral fold distinct; skin above and below smooth. Colouration in life: dorsal head and body greyish brown, a dark stripe present on each side of head and upper part of flanks, bordering the dorsolateral fold; tympanum brown; limbs with dark crossbars, back of thighs yellow with black mottling; ventral surface whitish (determination after Bourret, 1942; Inger et al., 1999).

DISTRIBUTION. In Vietnam, this species complex has been recorded from Cao Bang and Lang Son provinces in the North to Dong Nai and Kien Giang provinces in the South. This is the first record of *H.* cf. *nigrovittata* from Tay Yen Tu NR and from Bac Giang Province. Elsewhere, the species is known from India, Nepal, China, Myanmar, Laos, Thailand, Cambodia, and Malaysia (Nguyen et al., 2009).

REMARKS. The specimen was found at night in a rocky stream near Vung Tron Ranger Station. *H. nigrovittata* represents a so far only partly understood complex of cryptic species (e.g., Gawor et al., 2009).

Hylarana taipehensis (Van Denburgh, 1909)

EXAMINED MATERIAL. Three adult males IEBR A.2013.69 (SVL 27.27 mm), IEBR A.2013.70 (SVL 28.56 mm), IEBR A.2013.71 (SVL 25.14 mm); one adult female IEBR A. 2013.72 (SVL 37.71 mm) collected by PTC, October 2011, 200–300 m asl (Fig. 28).

MORPHOLOGICAL CHARACTERS. Head longer than wide (HL 10.19–14.42 mm, HW 7.80–10.15 mm); vomerine teeth present; nostril closer to tip of snout than to eye (EN 2.76–4.20 mm, NtoS 1.96–2.32 mm); interorbital distance wider than upper eyelid (IntOrb 3.45–5.17 mm, uEL 2.32–3.56 mm); tympanum distinct, about 2/3 of eye diameter (TD 2.13–2.80 mm, ED 2.83–3.47 mm); fingers small, free of webbing, tips of fingers swollen; toes 3/4 webbed; dorsolateral fold distinct; skin above and below smooth. Colouration in life: dorsum green, with two stripes from behind the eyes to groins; ventral surface white or yellow (determination after Bourret, 1942; Inger et al., 1999).

DISTRIBUTION. This is a widespread species in Vietnam, from Lao Cai and Ha Giang provinces southwards to Dong Nai and Kien Giang provinces. Elsewhere, the species has been reported from India, Nepal, Bangladesh, China, Taiwan, Myanmar, Laos, Thailand, and Cambodia (Nguyen et al., 2009).

REMARKS. The specimens were found at night in Ba Bep.

Odorrana bacboensis Bain, Lathrop, Murphy, Orlov et Ho, 2003

EXAMINED MATERIAL. Two adult females IEBR A.2013.73 (SVL 106.19 mm) and ZFMK 92848 (SVL 108.44 mm), collected by TZ and NQT, 26–27 May 2009, 300–500 m asl (Fig. 29).

MORPHOLOGICAL CHARACTERS. Head longer than wide (HL 37.27–39.46 mm, HW 35.65–36.00 mm); vomerine teeth present; tongue notched posteriorly; snout round, slightly prominent, longer than eye (SL 15.58–16.72 mm, ED 10.14–11.80 mm); canthus rostralis distinct; interorbital distance narrower than internarial distance but broader than upper eyelid (IntOrb 9.00–10.24 mm, IN 10.37–10.92 mm, uEL 7.55–8.90 mm); pupil round; tympanum distinct, half of eye diameter (TD 4.83–5.08 mm, ED 10.14–11.80 mm); supratympanic fold distinct; fingers free of webbing; finger discs larger than those of toes, with circummarginal groove; tibiotarsal articulation reaching tip of snout; tibia 4 times longer than wide (TiL 60.90–61.45 mm, TiW 15.55–15.60 mm); toes fully webbed; outer metatarsal tubercle absent; inner

22

23

24

25

26

27

Figures 22, 23. *Amolops ricketti*. Figure 24. *Babina chapaensis*. Figure 25. *Hylarana guentheri*. Figure 26. *H. maosonensis*. Figure 27. *H.* cf. *nigrovitatta*. Photos by T. Ziegler and C.T. Pham.

metatarsal tubercle large, flat; tarsal fold absent; dorsal skin smooth; dorsolateral fold distinct. Colouration in life: dorsum brown to dark brown, with tiny, irregular, black blotches; flanks brown, with some large black spots; throat and chest region white (determination after Bain et al., 2003).

DISTRIBUTION. In Vietnam, this species has been recorded in Lao Cai, Tuyen Quang, Bac Kan, and Nghe An provinces (Nguyen et al., 2009). This is the first record of *O. bacboensis* from Tay Yen Tu NR and from Bac Giang Province.

REMARKS. The specimens were found on the rock in a small cascade stream (Suoi Tuyen I).

Odorrana graminea (Boulenger, 1900)

EXAMINED MATERIAL. One adult female VNMN 1346 (106.68 mm), collected by TZ and NTT, June 2010; one adult female ZFMK 92849 (SVL 80.37 mm), collected by TZ and NTT, October 2009, 300–500 m asl (Fig. 30).

MORPHOLOGICAL CHARACTERS. Head longer than wide (HL 30.47–35.14 mm, HW 26.89–32.93 mm); vomerine teeth present; tongue notched posteriorly; snout round, longer than eye (SL 12.72–16.40 mm, ED 7.40–9.67 mm); canthus rostralis distinct; interorbital distance wider than internarial distance and upper eyelid (IntOrb 8.08–11.45 mm, IN 7.44–10.11 mm, uEL 6.84–7.14 mm); pupil round; tympanum distinct, approximately half of eye diameter (TD 4.17–4.22 mm, ED 7.40–9.67 mm); supratympanic fold distinct; fingers free of webbing; finger discs larger than discs of toes, with circummarginal groove; tibiotarsal articulation reaching beyond tip of snout; tibia about 4.64–5.91 times longer than wide (TiL 52.27–65.11 mm, TiW 8.85–14.02 mm); toes fully webbed; outer metatarsal tubercle absent; inner metatarsal tubercle elongate; dorsal skin smooth, flank with tubercles; dorsolateral fold absent. Colouration in life: dorsum green with black spots; sides of head and flanks brownish grey; lips white; hind limbs with distinct dark bars; webbing dark grey; ventral surface whitish (determination after Bourret, 1942; Bain et al., 2003).

DISTRIBUTION. In Vietnam, this species has been recorded from Bac Kan, Lang Son, and Lam Dong provinces. This is the first record of *O. graminea* from Tay Yen Tu NR and from Bac Giang Province. Elsewhere, the species is known from China (Nguyen et al., 2009).

REMARKS. The specimens were collected at night time in a small cascade stream.

Odorrana nasica (Boulenger, 1903)

EXAMINED MATERIAL. One adult male IEBR A.2013.74 (SVL 73.45 mm), collected by TZ and NTT, October 2009, 300–500 m asl (Fig. 31).

MORPHOLOGICAL CHARACTERS. Head longer than wide (HL 27.04 mm, HW 23.77 mm); vomerine teeth present; snout obtusely pointed, prominent, longer than eye (SL 12.75 mm, ED 8.22 mm); canthus rostralis distinct; internarial distance broader than interorbital distance and upper eyelid (IN 8.41 mm, IntOrb 6.14 mm, uEL 5.17 mm); tympanum distinct, half of eye diameter (TD 4.52 mm, ED 8.22 mm); supratympanic fold absent; fingers free of webbing; finger I longer than II; finger discs larger than those of toes, with circummarginal groove; tibiotarsal articulation reaching beyond tip of snout; tibia 4.48 times longer than wide (TiL 44.48 mm, TiW 9.92 mm); toes fully webbed; outer metatarsal tubercle absent; inner metatarsal tubercle elongate; dorsal skin smooth; dorsolateral fold present; external gular sacs absent; nuptial pads present. Colouration in life: dorsum dark green; dorsolateral fold and canthus rostralis white; sides of head and flanks brownish grey; lips whitish; tympanum dark brown; limbs with dark bars; ventral surface white (determination after Bourret, 1942; Bain et al., 2003).

DISTRIBUTION. In Vietnam, this species has been recorded from Lao Cai and Cao Bang provinces southwards to Ha Tinh and Thua Thien-Hue provinces. This is the first record of *O. nasica* from Tay Yen Tu NR and from Bac Giang Province. Elsewhere, this species is known from China, Laos, and Thailand (Nguyen et al., 2009).

REMARKS. IEBR A.2013.74 was found at night in a broad, deep part of a rocky stream near the Dong Thong Ranger Station.

Odorrana yentuensis Tran, Orlov et Nguyen, 2008

EXAMINED MATERIAL. One adult male ZFMK 92851 (SVL 43.14 mm) and two adult females ZFMK 92852 (SVL 63.01 mm) and IEBR

A.2013.76 (SVL 59.29 mm) collected by TZ and NTT, October 2009, 400–600 m asl; two adult males VNMN 1320 (SVL 46.00 mm) and VNMN 1344 (SVL 45.72 mm) collected by TZ and NTT, June 2010, 350–600 m asl (Fig. 32).

Morphological characters. Males smaller than females (SVL males 43.14–46.00 mm, females 59.29–63.1 mm); head longer than wide (HL 16.21–22.83 mm, HW 13.43–20.45 mm); snout long, rounded anteriorly; vomerine teeth present; eye larger than tympanum (TD/ED 0.47–0.72); fingers free of webbing, with small discs, with circummarginal groove; finger I longer than II; subarticular tubercles round, prominent; toes almost fully webbed; subarticular tubercles distinct, rounded; dorsal skin rough, posterior part of back with small tubercles; ventral skin smooth; dorsolateral fold distinct; supratympanic fold distinct; males with nuptial pad and external vocal sacs. Colouration in life: dorsum brownish grey, with several irregular brown and/or green spots; lips white; dorsolateral fold bordered by a black line, discontinuous posteriorly; limbs with transverse bars; webbing grey; belly and ventral surface of limbs immaculate yellowish white (determination after Tran et al., 2008).

Distribution. This species is currently known only from Bac Giang Province, Vietnam (Tran et al., 2008; Nguyen et al., 2009).

Remarks. Four specimens were found on rocks at night in Suoi Tuyen I and II or at the shore of Suoi Tuyen I. The specimens matched the description of Tran et al. (2008) well but differ in a lower ratio of tympanum diameter to eye diameter (0.47–0.72 instead of 0.81–0.84).

Rana johnsi Smith, 1921

Examined material. One adult male ZFMK 92853 (SVL 45.76 mm), collected by TZ and NTT, October 2009, 250-300 m asl (Fig. 33).

Morphological characters. Head as broad as long (HW 15.48 mm, HL 15.70 mm), flattened; snout obtusely pointed, pronounced, longer than eye (SL 6.97 mm, ED 5.61 mm); tympanum distinct, about 3/4 of ED (TD 4.09 mm); interorbital distance broader than internostril distance and upper eyelid (IntOrb 4.00 mm, IN 3.60 mm, uEL 3.04 mm); pupil horizontal; vomerine teeth present; fingers free of webbing without discs; subarticular tubercles prominent; tibio-tarsal articulation reaching beyond tip of snout; heels overlapping; tibia five times longer than wide (TiL 30.22 mm, TiW 5.63 mm); toes with small discs, almost fully webbed; tarsal fold absent; subarticular tubercles distinct; inner metatarsal tubercle oval, prominent; outer metatarsal tubercle absent; dorsal skin smooth, with some small tubercles; some short, oblique dermal folds on limbs; a Λ-shaped fold between shoulders; supratympanic fold present; dorsolateral fold distinct anteriorly, interrupted on hip. Colouration in life: dorsum light brown, upper surface of limbs with greyish transverse bars; flanks whitish brown; a small black stripe from nostril to eye; tympanum covered by a black lozenge; sides of limbs with dark pattern; ventral surface white or cream; gular region marbled with grey; thigh yellow (determination after Bourret, 1942).

Distribution. This is a widespread species in Vietnam, from Lao Cai and Ha Giang provinces southwards to Lam Dong and Dong Nai provinces. Elsewhere, this species is known from China, Taiwan, Laos, Thailand, and Cambodia (Nguyen et al., 2009).

Remarks.The specimen was found on the ground of broad leaved forest. Another, most likely a female, was observed at Ba Bep Pond during the day time.

RHACOPHORIDAE

Chiromantis vittatus (Boulenger, 1887)

Examined material. Two adult males VNMN 1341–1342, collected by TZ and NTT, June 2010, 350–400 m asl; one adult male IEBR A.2013.77, collected by VH, 7 June 2010, 400 m asl (Fig. 34).

Morphological characters. SVL 19.52–25.91 mm; vomerine teeth absent; tongue bifid; pupil horizontal; tympanum indistinct, 0.34–0.60 times of ED (TD 1.05–2.21 mm, ED 3.06–3.69 mm); snout pointed, as long as diameter (SL 3.38–3.94 mm); canthus rostralis obtuse; loreal region slightly oblique; nostrils closer to tip of snout than to eye (EN 1.85–2.41 mm, NtoS 1.58–1.91 mm); interorbital distance as broad as or broader than upper eyelid (IntOrb 2.67–3.25 mm, uEL 1.90–2.85 mm); fingers free of webbing, tips of fingers with enlarged discs; finger I shorter than II; tibio-tarsal articulation

28

29

30

31

32

33

Figure 28. *Hylarana taipehensis*. Figure 29. *Odorrana bacboensis*. Figure 30. *Odorrana graminea*. Figure 31. *Odorrana nasica*. Figure 32. *Odorrana yentuensis*. Figure 33. *Rana johnsi*. Photos by C.T. Pham, T. Ziegler, and T.Q. Nguyen.

reaching eye or beyond but not to tip of snout; limbs without fringes; toes 3/4 webbed, discs well developed; cloacal fold absent; inner metatarsal tubercle tiny; skin smooth; gular region, posterior part of ventral surface and posterior parts of femur granular; nuptial pads absent. Colouration in life: dorsum yellow or brown with light yellow stripes from nostril over eye to groin; flanks yellowish; ventral surface whitish (determination after Bourret, 1942; Ziegler, 2002).

Distribution. This is a widespread species in Vietnam, from Lang Son Province southwards to Dong Nai and Ba Ria-Vung Tau provinces. Elsewhere, this species is known from India, China, Myanmar, Laos, Thailand, and Cambodia (Nguyen et al., 2009).

Remarks. All three specimens were found at night on plants about 1–2 m above the ground near the ponds.

Kurixalus bisacculus (Taylor, 1962)

Examined material. Two adult males IEBR A.2013.78 (SVL 29.13 mm) IEBR A. 2013.79 (SVL 29.75 mm) collected by PTC, June 2010, 300–500 m asl (Figs. 35, 36).

Morphological characters. Head longer than wide (HL 10.66–12.80 mm, HW 9.62–11.66 mm); snout pointed anteriorly; tympanum distinct, smaller than eye (ED 4.21–4.49 mm, TD 2.41–2.75 mm); internarial distance narrower than interorbital distance (IN 3.30–3.39 mm, IntOrb 4.07–4.41 mm); vomerine teeth in two low ridges, arising near inner edges of choanae; fingers free of webbing, tips of fingers with enlarged discs; toes 3/4 webbed, discs well developed; dermal fringes along outer edges of fore arm and tarsus present; some scattered flat tubercle present on head, eyelids, and occiput, sparse on dorsum, more dense and larger on flanks, finely granuler on rump; chin granular, chest nearly smooth; venter and lower part of sides granular; vocal sacs present in males. Colouration in life: dorsal head and body light or reddish brown with green marking, occiput with a dark green marking in triangular shape; tympanum brownish; chin cream with dark spots; throat, chest, venter, and underside of limbs cream (determination after Taylor, 1962; Yu et al., 2010).

Distribution. This species has been reported from Lao Cai and Ha Giang provinces in the North to Gia Lai Province in the South. However, the extent of this species in Central Vietnam needs to be confirmed, as it looks similar to *K. banaensis* (Bourret, 1939). Elsewhere, the species is known from China, Myanmar, Laos, Thailand, and Cambodia (Nguyen et al., 2009).

Remarks. Specimens were found at night on the tree branches and shrubs near ponds or streams. Yu et al. (2010) regarded the previous records of *K. verrucosus* (Boulenger, 1893) in Vietnam as *K. bissaculus*.

Polypedates megacephalus Hallowell, 1861

Examined material. One adult female VNMN 1322 (SVL 70.15 mm), collected by TZ and NTT, 26 June 2010, ca. 350 m asl (Fig. 39).

Morphological characters. Head slightly longer than wide (HL 26.30 mm, HW 25.12 mm); vomerine teeth present; snout obtusely rounded, longer than eye (SL 11.93 mm, ED 6.61 mm); canthus rostralis distinct; loreal region vertical; nostrils closer to tip of snout than to eye (EN 7.45 mm, NtoS 3.66 mm); interorbital distance wider than internarial distance and upper eyelid (IntOrb 9.57 mm, IN 5.27 mm, uEL 4.93 mm); tympanum distinct, as large as eye (TD 5.04 mm); fingers free of webbing; disc of finger III half of TD (disc of finger III 2.00 mm); toes almost fully webbed; lateral dermal fringes present; subarticular tubercles present; outer metatarsal tubercle present; tibio-tarsal articulation reaching tip of snout; skin smooth; supratympanic fold distinct; vocal sacs absent. Colouration in life: dorsum orange brown, with some black blotches and sometimes with a X-shaped pattern on neck; upper surface of limbs orange brown with transverse bars; flanks and posterior side of thigh with distinct dark reticulation; throat and chest mottled in brown; ventral surface white (determination after Bourret, 1942; Manthey & Grossmann, 1997; Kuraishi et al., 2012).

Distribution. In Vietnam, this species has been recorded from Cao Bang, Vinh Phuc, and Hai Duong provinces. Kuraishi et al. (2012) suggested that the populations of the *P. leucomystax* complex in southern China and northern Vietnam contain at least two species, *P. megacephalus* and *P. mutus*. Elsewhere, the species is known from India, China, Myanmar, Taiwan, Laos, Thailand, and Japan (Nguyen et al., 2009).

Remarks. A single specimen was found at night on a tree branch in Suoi Tuyen II.

Polypedates mutus (Smith, 1940)

EXAMINED MATERIAL. One female VNMN A.2013.14 (SVL 89.44 mm), two males IEBR A.2013.80 (SVL 62.92 mm), ZFMK 92854 (SVL 65.36 mm), collected by TZ and NQT, 27 May 2009, 200–500 m asl (Figs. 37, 38).

MORPHOLOGICAL CHARACTERS. SVL 62.92–89.44 mm; head longer than wide (HL 21.51–30.89 mm, HW 19.36–29.13 mm); vomerine teeth present; snout pointed, longer than eye (SL 10.10–14.03 mm, ED 6.31–10.29 mm); canthus rostralis distinct, slightly concave; loreal region vertical; nostrils closer to tip of snout than to eye (EN 6.46–9.42 mm, NtoS 2.75–3.90 mm); interorbital distance wider than internarial distance and upper eyelid (IntOrb 5.52–8.14 mm, IN 3.90–5.73 mm, uEL 5.51–7.73 mm); tympanum distinct, approximately half of eye diameter (TD 3.44–5.36 mm); fingers free of webbing; disc of finger III as large as tympanum (disc of finger III 2.6–5.2 mm); toes almost fully webbed; toe discs smaller than finger discs; lateral dermal fringe present; subarticular tubercles present; outer metatarsal tubercle present; tibio-tarsal articulation reaching tip of snout; dorsal skin smooth; upper surface of limb granular; ventral surface smooth; supratympanic fold present; vocal sacs absent. Colouration in life: dorsum beige yellow or brown, with or without dark blotches; a X-shaped pattern present on neck; limbs with dark transverse bars; dark brown stripe bordering supratympanic fold from eye beyond arm; flanks sometimes with few dark brown spots; back of thigh with large white spots; belly yellowish white; throat finely mottled or spottet (determination after Ziegler, 2002; Ziegler et al., 2006; Kuraishi et al., 2012).

DISTRIBUTION. This is a widespread species in Vietnam. Elsewhere, this species is known from China, Myanmar, Laos, and Thailand (Nguyen et al., 2009).

REMARKS. All three specimens were found at night on tree branches in about 1.5–2 m above a stream. A couple of *P. mutus* in amplexus was photographed on the forest path in June 2010. Further individuals were sighted on tree trunks or leaves between 0.5 and 3 m above the streams or around ponds during the day and at night time.

Rhacophorus maximus Inger, 1966

EXAMINED MATERIAL. Two adult males IEBR 3653, IEBR 3680, collected by NQT, 10–13 May 2008; one adult male VNMN 1535 and one adult female VNMN 1538, collected by NTT, June 2009, 250–500 m asl (Fig. 40).

MORPHOLOGICAL CHARACTERS. SVL 74.34–131.0 mm; head broader than long (HW 28.1–36.74 mm, HL 26.4–34.48 mm); vomerine teeth present; nostril oval, closer to tip of snout than to eye; tympanum round, smaller than eye diameter (TD 4.4–5.64 mm, ED 7.16–9.41 mm); interorbital distance wider than internarial distance (IntOrb 9.5–11.97 mm, IN 7.9–10.72 mm); supratympanic fold distinct; fingers and toes completely webbed; metacarpal tubercle well developed in males; males with vocal sacs. Colouration in life: dorsal surface of head and body uniformly green; a narrow white stripe present along the flanks; ventral surface cream (determination after Anders & Rai, 2002; Nguyen et al., 2008).

DISTRIBUTION. In Vietnam, this species has been recorded from Bac Giang and Nghe An provinces. Elsewhere, the species is known from India, Nepal, China, and Thailand (Nguyen et al., 2009).

REMARKS. Specimens were found on trees and shrubs (ca. 1–3 m above the ground) near Ao Cua pond or streams in secondary forests near Dong Ri Ranger Station.

Rhacophorus rhodopus (Liu et Hu, 1960)

EXAMINED MATERIAL. Two adult males ZFMK 92855, IEBR A.2013.81 (VH28) collected by TZ and NQT, 27 May 2009, 400 m asl; one adult male VNMN A.2013.15, collected by VH, 7 June 2010, ca. 430 m asl (Fig. 41).

MORPHOLOGICAL CHARACTERS. SVL 39.89–40.17 mm; head as long as or longer than wide (HL 14.41–14.81 mm, HW 13.18–14.63 m); vomerine teeth present; tongue notched posteriorly; snout pointed, longer than eye diameter (SL 6.44–6.69 mm, ED 4.53–5.57 mm); pupil rounded; nostril closer to eye than to tip of snout (EN 2.65–3.27 mm, NtoS 3.00–3.11 mm); interorbital distance broader than internarial distance and upper eyelid (IntOrb 6.44–6.69 m, IN 3.87–4.17 mm, uEL 3.60–4.46 mm); tympanum distinct, about

half of eye diamter (TD 1.79–2.45 mm); fingers almost fully webbed; finger I shorter than II; subarticular tubercles distinct; toes fully webbed; tarsal fold present; inner metatarsal tubercle present, outer metatarsal tubercle absent; subarticular tubercles small, distinct; tibio-tarsal articulation reaching between eye and tip of snout; tibia about five times longer than wide (TiL 19.09–19.63 mm, TiW 3.52–3.74 mm); cloacal dermal fringe present; skin smooth. Colouration in life: dorsum reddish brown with or without small black spots; large black blotches on axilla and flanks present or absent; transverse bands on hind limbs absent or indistinct; ventral yellowish white; webbing of fingers and toes reddish orange (determination after Bourret, 1942; Lui & Hu, 1960).

Distribution. In Vietnam, this species has been recorded from Lao Cai Province southwards to Lam Dong and Dong Nai provinces. The first record of *R. rhodopus* from Tay Yen Tu NR was reported by Nguyen et al. (2008). Elsewhere, the species is known from India, China, Myanmar, Laos, Thailand, and Cambodia (Nguyen et al., 2009).

Remarks. All specimens were found at night on trees and bushes, ca. 0.5–1.5 m above the ground, around ponds in secondary forest. The female is bigger than the male. The female has yellowish orange flanks with some black blotches. Our specimens match the descriptions of Bourret (1942) and Lui & Hu (1960), but show some differences: toes not fully webbed, transverse bands on hind limbs indistinct and black blotches on axilla and flanks absent in some individuals.

Theloderma asperum (Boulenger, 1886)

Examined material. Two adult males IEBR A.2013.82 (SVL 31.92 mm, IEBR A.2013.83 (SVL 32.32 mm), collected by PTC, 8 July 2012, elevations 300–500 m asl (Fig. 42).

Morphological characters. Head broader than long (HW 11.73–12.01 mm, HL 10.59–11.81 mm); snout rounded, as long as the eye (SL 3.66–4.20 mm, ED 3.63–3.79 mm); canthus rostralis indistinct; loreal region slightly concave; nostril closer to tip of snout than to eye (NtoS 1.05–1.48 mm, EN 2.61–2.71 mm); interorbital distance wider than upper eyelid (IntOrb 4.69–4.81 mm, uEL 2.3–2.4 mm); tympanum distinct (TD 2.45–3.20 mm); vomerine teeth absent; tongue notched behind; fingers free of webbing, tips of fingers with enlarged discs; toes 3/4 webbed, tips of toes with large discs; inner metatarsal tubercle present, small; tibiotarsal articulation reaching tip of snout; skin on dorsum and flanks with granular tubercles; throat smooth; venter granular. Colouration in life: dorsal surface blackish or greyish brown with large white blotches covering head, loreal regions, anterior parts of dorsum, upper part of flanks and hip; dark transverse bars on hind limbs present; head with short transverse brown line between eyes; ventrally body and limbs blackish with whitish marbling; iris pinkish brown (determination after Bourret, 1942; Taylor, 1962; Neang & Holden, 2008).

Distribution. This is a widespread species in Vietnam, from Lai Chau, Lao Cai, and Ha Giang provinces in the North to Lam Dong and Dong Nai provinces in the South. *T. asperum* was previously known from the eastern side of the Yen Tu Mountain in Hai Duong Province (Nguyen et al., 2009). Our finding represents the first record of this species from Tay Yen Tu NR and from Bac Giang Province. Elsewhere, this species is known from India, China, Myanmar, Laos, Thailand, Cambodia, and Malaysia (Nguyen et al., 2009).

Remarks. Specimens were collected in a tree hole in bamboo forest near Mau village.

Theloderma corticale (Boulenger, 1903)

Examined material. Two adult males IEBR A.2013.84 (SVL 67.68 mm), IEBR A.2013.85 (SVL 57.48 mm) collected by PTC, 10 July 2012, elevations 300–500 m asl (Fig. 43).

Morphological characters. Head wider than long (HL 25.07–26.72 mm, HW 27.5–28.82 mm); snout longer than eye diameter (SL 10.43–12.19 mm; ED 6.37–7.14 mm); canthus rostralis rounded; loreal region concave; interorbital distance wider than internarial distance (IntOrb 7.78–8.87 mm, IN 4.19–4.67 mm); nostril closer to tip of snout than to eye (NtoS 2.21–2.85 mm; EN 9.22–9.34 mm); tympanum oval, greater than tympanum-eye distance (TD 5.29–5.30 mm, ET 3.69–4.32 mm); vomerine teeth present; tongue notched posteriorly; tips of fingers and toes enlarged into round discs; webbing present at base of fingers III and IV; dermal fringe along outer sides of arm and tarsus

present; palmar tubercles distinct; toes almost fully webbed; subarticular tubercles present; inner metatarsal tubercle present; outer metatarsal tubercle absent; dorsal surface of head, body and limbs covered with tubercles or warts of different sizes; ventral skin with small tubercles; nuptial pad present; external vocal sac absent. Colouration in life: dorsal surface green marbled with reddish brown spots; dark brown bars present on upper surface of fore and hind limbs; ventral surface yellow with green marbling (determination after Inger et al., 1999; Orlov et al., 2006).

DISTRIBUTION. This species has been recorded only from Northern Vietnam: Ha Giang, Tuyen Quang, Cao Bang, Lang Son, Vinh Phuc, and Son La provinces (Nguyen et al., 2009). This is a new record for Tay Yen Tu NR and for Bac Giang Province.

REMARKS. Specimens were discovered in a tree hole in secondary forest near Dong Thong Ranger Station.

Theloderma lateriticum Bain, Nguyen et Doan, 2009

EXAMINED MATERIAL. Two adult males VNMN 1215 (SVL 21.8 mm) and VNMN 1216 (SVL 23.1 mm), collected by PTC and NTT, 10 April 2010, elevation ca. 300 m asl (Fig. 44).

MORPHOLOGICAL CHARACTERS. Head longer than wide (HW 7.5–8.4 mm, HL 8.3–9.0 mm); vomerine teeth absent; nostril nearer to tip of snout than to eye; interorbital distance greater than width of upper eyelid; tympanum distinct, with distinct tympanic annulus (TYD 2.0–2.6 mm); fingers free of webbing; toes 1/4 webbed; outer metatarsal tubercle present; dorsal skin granular, bearing keratinized spicules, raised on small, isolated bumps; dermal fringes on the post axial portions of the limbs absent; nuptial pad present on finger I; vocal sacs absent. Colouration in life: dorsum rusty brown with a mid-dorsal black spot; lip with small white spots; upper portion of flanks with black blotches; throat, chest and belly grey-brown with cream spots (identification after Bain et al., 2009).

DISTRIBUTION. This species is known only from the type locality in Lao Cai Province, Vietnam (Bain et al., 2009). This is the first record of *T. lateriticum* from Tay Yen Tu NR as well as from Bac Giang Province.

REMARKS. Two specimens were found at night time on the tree near a rocky stream, surrounded by the mixed secondary forest of small hardwoods and shrubs near Dong Ri Ranger Station.

SQUAMATA
SAURIA
AGAMIDAE

Acanthosaura lepidogaster (Cuvier, 1829)

EXAMINED MATERIAL. One subadult female IEBR 3660 collected by NQT on 10 April 2008, ca. 350 m asl; one juvenile ZFMK 92831, collected by TZ and NQT, 28 May 2009, 200 m asl; and one juvenile VNMN 1348, collected by TZ and NTT, May 2010, ca. 400 m asl (Fig. 45).

MORPHOLOGICAL CHARACTERS. SVL subadult female 69.31 mm, juveniles 29.14–34.31 mm (n = 2), TaL subadult female 114.00 mm, juveniles 43.41–46.99 mm (n = 2); head large; postorbital spine small, shorter than half the diameter of orbit; two spines present above tympanum; nuchal crest spines 8; dorsal crest present, low; supralabials 9–14; infralabials 9–13; tympanum visible; mental small, pentagonal; body compressed, not flattened; dorsal scales heterogeneous, keeled; ventral scales strongly keeled, midbody scales in 114–123 rows; femoral pores absent; lamellae 17–19 under finger IV, 20–22 under toe IV; hind limbs long, reaching up to or over tip of snout. Colouration in life: dorsum green to dark brown, a bright rhombic pattern usually present on the neck; back and tail with dark cross bars (determination after Ziegler, 2002; Bourret, 2009).

DISTRIBUTION. This is a common species in Vietnam, from Lao Cai and Ha Giang provinces southwards to Binh Phuoc and Dong Nai provinces. Elsewhere, the species is known from China, Myanmar, Laos, Thailand, and Cambodia (Nguyen et al., 2009).

REMARKS. Specimens were collected during the day or at night on trees in mixed secondary forests of hardwood, bamboo and shrub.

Draco maculatus (Gray, 1845)

EXAMINED MATERIAL. One adult male IEBR 3671, collected by NQT, 12 April 2008, 150 m asl;

34

35

36

37

38

Figure 34. *Chiromantis vittatus.* Figures 35, 36. *Kurixalus bisacculus*. Figures 37, 38. *Polypedates mutus*. Photos by T. Ziegler and C.T. Pham.

39

40

41

42

43

44

Figure 39. *Polypedates megacephalus*. Figure 40. *Rhacophorus maximus*. Figure 41. *R. rhodopus*. Figure 42. *Theloderma asperum*. Figure 43. *T. corticale*. Figure 44. *T. lateriticum*. Photos by T. Ziegler and C.T. Pham.

one adult female IEBR A.0946, collected by TZ and NQT, 27 May 2009, 150 m asl; and one adult female VNMN 1347, collected by TZ and NTT, May 2010, ca. 350 m asl (Fig. 46).

Morphological characters. SVL male 71.93 mm, females 75.75–78.97 mm (n = 2), TaL male 116.29 mm, females 113.18–131.51 mm (n = 2); head small; upper head scales heterogeneous, strongly keeled; one spiny scale present on the back of the eyebrow arch; tympanum covered by small scales: two incisors on the upper jaw; nostrils directing laterally outwards; supralabials 7–9, smooth; infralabials 8–9; gular pouch triangular, covered by small scales, very long in males (often twice longer than head length), shorter in females; patagium supported by five ribs; dorsal scales heterogeneous, mostly smooth; lateral scales enlarged; scales on the back edges of thighs and tail base fringe-like; ventral scales smooth or feebly keeled, as large as or slightly smaller than dorsal scales; forelimbs reaching over the tip of the snout, hind limbs reaching to elbow or armpit. Colouration in life: dorsal head and body greyish-brown; patagium with variable markings, varying in form and colour (determination after Boulenger, 1912; Manthey & Grossmann, 1997; Bourret, 2009).

Distribution. This is a widespread species in Vietnam, from Bac Kan Province in the North to Lam Dong and Ba Ria-Vung Tau provinces in the South. This is the first record of *D. maculatus* from Tay Yen Tu NR and also from Bac Giang Province. Elsewhere, the species is known from India, China, Myanmar, Laos, Thailand, Cambodia, and Malaysia (Nguyen et al., 2009).

Remarks. Specimens were collected during the day in the secondary forest.

Physignathus cocincinus Cuvier, 1829

Adult males, females as well as juveniles were observed during our field work in Yen Tu NR (Fig. 47). They can be easily identified due to their characteristic colour pattern, the large sizes, and the long tail, gular pouch and supraorbital spines absent; dorsal crest well developed in males. Colouration in life: dorsal surface green with a touch of rost-brown and several very narrow transverse white stripes on the body and anterior part of the tail of which the first ones on the body directing backwards; wide black rings on tail; throat whitish; belly yellowish green (determination after Ziegler, 2002).

Remarks. Several individuals of *P. cocincinus* were seen on trees, about 1–2 m above the water in Suoi Tuyen I and other large streams in Ba Bep area.

EUBLEPHARIDAE

Goniurosaurus lichtenfelderi (Mocquard, 1897)

Examined material. Three adult males IEBR 3695, ZFMK 89229, IEBR A.0827 and two adult females IEBR 3696, ZFMK 89228, collected by NQT between 12 and 15 April 2008, 250–300 m asl (Fig. 48).

Morphological characters. Body shape robust, SVL 77.1–104.3 mm; external nares bordered by 5–6 nasal scales; supraorbital region with a row of slightly enlarged tubercles; outer surface of upper eyelid composed of granular scales, about one-half the size of those on top of head and without enlarged tubercles; internasals 1−2; supralabials 8–10; preorbital scales 15–19; eyelid fringe scales 51–58; postmentals 2–5; gular region below lower jaws without enlarged tubercles; paravertebral tubercles 21–27; scale rows around midbody 117–130, granular scales surrounding tubercles 11–13; axillary pockets shallow; subdigital lamellae under toe IV 18–22; precloacal pores in males 30–32, in females 17−21. Colouration in life: iris reddish-brown; dorsal ground colour of head, body and limbs brown, without small dark brown blotches; nuchal loop thin, posteriorly rounded (in U-shape); dorsal body bands between limb insertions 2, thin, immaculate yellow; gular region without dark spots (Smith, 1935; Ziegler et al., 2008c; Nguyen, 2011).

Distribution. This species has been recorded only from northeastern Vietnam (Nguyen et al., 2009; Nguyen, 2011).

Remarks. Specimens of *G. lichtenfelderi* were collected on the forest floor, under decayed trees or under rocks near streams. This species is nocturnal and it inhabits the mixed forest of wooden trees, bamboo, and shrubs.

GEKKONIDAE

Hemidactylus frenatus Schlegel, 1836

EXAMINED MATERIAL. Two adult females IEBR A.2013.86 and ZFMK 92832, collected by TZ and NQT, 26 May 2009, 150 m asl (Fig. 49).

MORPHOLOGICAL CHARACTERS. SVL 58.43–59.08 mm (n = 2), tail regenerated; head covered with small scales; snout obtuse, longer than distance between eye and tympanum (SL 7.68–8.30 mm, ET 4.23–4.57 mm); eye covered by transparent membrane, without moveable eyelid; tympanum small, rounded, longer than half of ED (TD 2.25 mm, ED 3.44–3.77 mm); supralabials 10–11 + 5–7; infralabials 8–10 + 3–7; dorsal scales small, grainy; ventral scales imbricate; finger more or less paddle-like, broadened at base, with divided transverse or oblique lamellae under fingers; 5–6 divided lamellae under thumb; 9–10 divided lamellae under finger IV; terminal segments of finger I to V free, with claw; 12–13 broadened lamellae under toe IV; midbody scales in 119–121 rows; 10–12 broadened femoral scales on each side; tail strongly dorsoventrally compressed, with lateral denticulation (determination after Bourret, 2009).

DISTRIBUTION. This is a common species in Vietnam. Elsewhere, the species is known from India, Nepal, Sri Lanka, Maldives, China, Taiwan, Myanmar, Thailand, Malaysia, Indonesia, Philippines, New Guinea, Australia, Japan, Polynesia, Micronesia, Melanesia, Solomon Islands, Somalia, Madagascar, Mauritius, Reunion, Rodrique, Comoro Island, Samoa, and New Caledonia (Nguyen et al., 2009).

REMARKS. Both specimens were found at night on the walls of Vung Tron Ranger Station.

Gekko palmatus Boulenger, 1907

EXAMINED MATERIAL. One adult female IEBR 3638 (SVL 73.53 mm) collected by NQT and PTC on 8 April 2008 and one adult male IEBR A.2013.75 (SVL 64.32 mm) collected by TZ, NTT and PTC in October 2009, ca. 300 m asl (Fig. 50).

MORPHOLOGICAL CHARACTERS. Moderate-sized gecko (SVL < 80 mm); nares in contact with rostral; internasal single, smaller than supranasal; postmentals enlarged; interorbital scales between anterior corners of the eyes 30 and 36; dorsal tubercle rows 9 and 11; ventral scales between mental and cloacal slit 163 and 183; midbody scale rows 123 and 142; ventral scale rows 40 and 44; subdigital lamellae under toe I 11 or 12, under toe IV 12 or 13; finger and toe webbing present at base; tubercles absent on upper surface of fore and hind limbs; precloacal pores 24 in the male, absent in the female; postcloacal tubercle single; tubercles present on dorsal surface of tail base; subcaudals enlarged. Colouration in life: dorsal surface of head and body grey with a small light blotch on neck and four larger blotches between shoulder and sacrum; flanks with some small light spots between limb insertions; limbs with light spots and bars; dorsal tail with 8 or 9 light bands; throat, venter, and precloacal region yellowish cream with dark dots (identification after Nguyen et al., 2013).

DISTRIBUTION. In Vietnam, this species has been recorded from Yen Bai, Lang Son, Vinh Phuc, Quang Ninh, and Quang Binh provinces. The record of *G. palmatus* from Bac Giang Province was previously confused with *G. chinensis* Gray, 1842 (Nguyen et al., 2009, 2013). Elsewhere, the species is known from China (Nguyen et al., 2009).

REMARKS. Both specimens were found at night on rocky walls along a stream near Dong Ri Ranger Station.

LACERTIDAE

Takydromus kuehnei Van Denbourgh, 1909

EXAMINED MATERIAL. One adult male VNMN 1330, collected by TZ and NTT, May 2010, ca. 200 m asl (Fig. 51).

MORPHOLOGICAL CHARACTERS. SVL 52.95 mm, TaL 167.32 mm; supralabials 7; infralabials 6–7; chin shields in 4 pairs; dorsal scales in 6 rows at midbody, without a non-contiguous vertebral row of smaller scales; ventral scales widened, in 6 rows at midbody; lateral scales in 12 rows at midbody on each sides, smaller in size than dorsal and ventral scales; femoral pores 4 on each side; subdigital lamellae broadened. Colouration in life: upper surface of head and body brown, ventral surface whitish-cream, dorsal surface of limbs and tail base with black spots; upper part of flanks black with numerous yellowish spots, upper part of flanks light brown; head dark brown with

some black spots (determination after Ziegler & Bischoff, 1999; Ziegler, 2002).

DISTRIBUTION. In Vietnam, this species has been recorded from Quang Ninh, Son La, Hoa Binh, Ninh Binh, Thanh Hoa, Nghe An, and Ha Tinh provinces. This is the first record of *T. kuehnei* from Tay Yen Tu NR and from Bac Giang Province. Elsewhere, the species has been reported from China (Nguyen et al., 2009).

REMARKS. The specimen was collected in the evening, on a ferny leaf in the secondary forest.

SHINISAURIDAE

Shinisaurus crocodilurus Ahl, 1930

During our night excursions in summer 2010, several individuals of crocodile lizards have been found and susequently released after taking measurements and photographs. Maximum SVL was 167.97 mm, maximum TaL was 208.91 mm. The morphological characters accorded with the descriptions provided by Le & Ziegler (2003) and Ziegler et al. (2008a) (Fig. 52).

DISTRIBUTION. This species is only known from southern China and northeastern Vietnam (Nguyen et al., 2009).

REMARKS. Most specimens of *S. crocodilurus* were found on branches or palm tree leaves above rocky streams in the evergreen forest at elevations between 364–450 m asl, only one was seen hiding under a rock. Further ecological data of this species from Tay Yen Tu NR will be published elsewhere.

SCINCIDAE

Ateuchosaurus chinensis Gray, 1845

EXAMINED MATERIAL. One juvenile female IEBR A.0947, collected by TZ and NTT, October 2009, 150 m asl (Fig. 53).

MORPHOLOGICAL CHARACTERS. SVL 43.14 mm, tail lost; supranasals absent; prefrontals small, separated, touching both loreals laterally; frontal anteriorly truncated, approximately three times longer than wide, twice longer than frontoparietal and interparietal together, twice longer than its distance to tip of snout; frontoparietals separated from each other, as long as interparietal; a small transparent spot present on interparietal; parietals small, in contact; nuchals absent; nostril in a single nasal; supraoculars 4; supralabials 6; infralabials 7; postmental undivided; chin shields in 2 pairs; lower eyelid scaly; tympanum deeply sunken; ventral scales in 30 rows at midbody; paravertebral scales 53; limbs with short lamellae, 17–18 under toe IV. Colouration in life: dorsum brown, each scale with a darker spot in the center; flanks mottled with black and white spots; ventral surface cream (determination after Nguyen et al., 2008; Bourret, 2009).

DISTRIBUTION. In Vietnam, this species has been recorded from Ha Giang, Lang Son, Bac Giang, and Nghe An provinces. Elsewhere, the species is known from China (Nguyen et al., 2009).

REMARKS. The juvenile female was found at night (22:00), under leaf litter in the bamboo forest near Pond Khe Cam 1. The number of paravertebral scales is somewhat higher than in Nguyen et al. (2008) (53 vs. 48–51).

Eutropis longicaudatus (Hallowell, 1856)

EXAMINED MATERIAL. One adult male IEBR A.2010.13, collected by NQT, August 2001, 200–300 m asl.

MORPHOLOGICAL CHARACTERS. SVL 79.56 mm; supranasals in contact; frontonasal broader than long; postnasal single; prefrontals touching each other; lower eyelid scaly; supraoculars 4; supraciliaries 6; supralabials 7; infralabials 5; parietals separated; nuchals in 1 pair; tympanum deeply sunken; dorsal scales bicarinate; midbody scales in 27 rows; limbs overlapping when adpressed along the body; lamellae under toe IV 26–27; precloacal shields 4, enlarged. Colouration in alcohol: dorsal head and body brown; lateral sides dark brown to black; ventral surface cream (determination after Manthey & Grossmann, 1997; Ziegler, 2002; Bourret, 2009; Nguyen et al., 2011b).

DISTRIBUTION. This is one of the most common species in Vietnam. Elsewhere, the species has been reported from China, Taiwan, Laos, Thailand, Cambodia, and Malaysia (Nguyen et al., 2009).

45

46

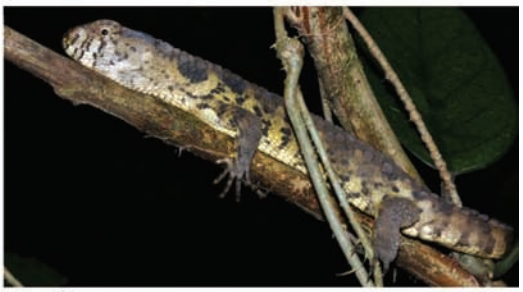
47

48

49

50

51



52

Figure 45. *Acanthosaura lepidogaster*. Figure 46. *Draco maculatus*. Figure 47. *Physignathus cocincinus*. Figure 48. *Goniurosaurus lichtenfelderi*. Figure 49. *Hemidactylus frenatus*. Figure 50. *Gekko palmatus*. Figure 51. *Takydromus kuehnei.* Figure 52. *Shinisaurus crocodilurus*. Photos by T.Q. Nguyen, T. Ziegler and C.T. Pham.

REMARKS. The adult male was found in the morning in a plantation forest near Dong Thong Village.

Eutropis multifasciatus (Kuhl, 1820)

MORPHOLOGICAL CHARACTERS. The identification was based on direct observations and photographs (Fig. 54): head covered with large shields, prefrontals in broad contact; tympanum deeply sunken; supranasals present, separated from each other; lower eyelid scaly; one single postnasal; limbs well developed, dorsal scales tri-carinate; midbody scales in 30 rows; dark lateral band present (determination after Smith, 1935; Ziegler, 2002; Bourret, 2009).

DISTRIBUTION. This is a common species in Vietnam (Nguyen et al., 2009). Elsewhere, the species has been reported from India, throughout China, Indochina southwards to the Philippines and New Guinea (Nguyen et al., 2009).

REMARKS. One subadult specimen was observed in the evening of 8 June 2010 near the Dong Thong Ranger Station.

Plestiodon tamdaoensis (Bourret, 1937)

EXAMINED MATERIAL. One adult VNMN 1351, collected by TZ and NTT, June 2010; one adult female IEBR A.2010.06, collected by NQT, August 2001, ca. 300 m asl (Fig. 55).

MORPHOLOGICAL CHARACTERS. SVL male 120.2 mm, female 87.6 mm, tail of the male regenerated (TaL 108.7 mm), of the female lost; supranasals large, in contact with each other; postnasal single; postmentals 2; prefrontals in contact with each other; loreals 3; lower eyelid scaly; supraoculars 4; supraciliaries 8–9; frontoparietals in contact with each other; interparietal larger than frontoparietals; parietals separated; nuchals in 2 pairs; supralabials 8–9; infralabials 7; tympanum deeply sunken, with 3 small lobules on the anterior edge; dorsal scales smooth; midbody scales in 24 rows; paravertebral scales 42; lamellae under toe IV 19; precloacal shields 2, enlarged; limbs overlapping when adpressed along body. Colouration in alcohol: dorsal head and body brown; lateral band black-brown; ventral surface cream (determination after Hikida et al., 2001; Bourret, 2009).

DISTRIBUTION. In Vietnam, this species has been recorded from Ha Giang, Cao Bang, Bac Kan, Vinh Phuc, Bac Giang, Hai Duong, Hoa Binh, and Nghe An provinces. Elsewhere, the species is known from China (Nguyen et al., 2009).

REMARKS. Both specimens were found at night in the mixed secondary forest.

Sphenomorphus cryptotis Darevsky, Orlov et Ho, 2004

EXAMINED MATERIAL. Two adult males ZFMK 92833 and VNMN A.2013.16, collected by TZ and NTT, October 2009, ca. 500 m asl (Fig. 56).

MORPHOLOGICAL CHARACTERS. SVL 70.50–78.06 mm, TaL 127.67 mm; supranasals absent; rostral touching frontonasal; prefrontals in contact with each other; parietals in contact posteriorly; supraoculars 4; supralabials 7–8; infralabials 7; postmental undivided; primary temporal single; external ear present, without lobules, tympanum superficial; dorsals larger than laterals and ventrals; midbody scales in 34–36 rows; paravertebral scales 75; ventrals 80; limbs well developed, overlapping when adpressed along body; lamellae under toe IV 18–19. Colouration in life: dorsum and tail base bronze brown with a vertebral row of large black blotches; upper lateral zone with a dark grey stripe, in width of 4–5 scales, from behind eye to tail base, paler on distal tail; two rows of light spots on upper and lower margins of the dark stripe; lower lateral zone light grey (determination after Darevsky et al., 2004; Nguyen, 2011; Nguyen et al., 2011a).

DISTRIBUTION. This species is known only from Vietnam, in Lao Cai, Quang Ninh, Bac Giang, and Nghe An provinces (Nguyen et al., 2009; Nguyen, 2011).

REMARKS. Both specimens were found at night on leaves, ca. 0.2–0.5 m above the stream and on the rock in Suoi Tuyen I.

Sphenomorphus incognitus (Thompson, 1912)

EXAMINED MATERIAL. Two subadults TYT 62, 150, three adult females TYT 644, 675, 676, collected by TTT in May 2006; one adult male IEBR A.0823, two sudadults IEBR A.0825–A.0826 collected by NQT and NVS in August 2001; one subadult female IEBR 3637, two adult females IEBR 3687–3688, collected by NQT between 9 and

13 April 2008, 200–400 m asl; one subadult ZFMK 92834, collected by TZ and NTT, October 2009, ca. 350 m asl (Fig. 57).

MORPHOLOGICAL CHARACTERS. Size (SVL 79.6–103.9 mm, n = 6); prefrontals separated from each other; supralabials 7; primary temporals 2; external ear present, without lobules, tympanum deeply sunken; midbody scales in 36–44 rows; dorsal scales smooth, paravertebral scales 67–80, not widened; limbs well developed; subdigital lamellae under toe IV 19–24. Colouration in life: dorsum and tail base greyish brown or brown with irregular black dots; dorsolateral area with white spots; upper lateral zone with a black stripe, not clearly defined, in width of 3–4 scales, from behind eye to tail base, interrupted by light spots; lower lateral zone light grey with dark marbling or spots (determination after Nguyen et al., 2012).

DISTRIBUTION. *S. incognitus* was recorded for the first time from Vietnam by Nguyen et al. (2012). Elsewhere, the species is known from China and Taiwan (Nguyen et al., 2012).

REMARKS. *S. incognitus* inhabits the mixed forest of small wooden trees, bamboo, and shrub, at elevation between 200–400 m. Specimens were found both on the forest floor and in streams.

Sphenomorphus indicus (Gray, 1853)

EXAMINED MATERIAL. One adult VNMN 1329, collected by TZ and NTT, 26 June 2010, ca. 300 m asl (Fig. 58).

MORPHOLOGICAL CHARACTERS. SVL 75.91 mm, tail lost; supranasals absent; prefrontals in contact with each other; parietals slightly in contact; nuchals absent; lower eyelid scaly; supraoculars 4; supraciliaries 8; supralabials 7; infralabials 7; primary temporals 1/2; external ear present, with 1–3 very small lobules or without lobules, tympanum deeply sunk; postmental undivided; midbody scales in 36 rows; limbs overlapping when adpressed along body; lamellae under toe IV 17–18. Colouration in life: dorsum and tail base bronze brown with irregular black dots; light dorsolateral stripe present on neck and shoulder; upper lateral zone with a dark stripe, in width of 2–3 scales, from behind eye to tail base, paler on distal tail, light bars sometimes present on lower lateral zone; ventral surface whitish (determination after Smith, 1935; Manthey & Grossmann, 1997; Ziegler, 2002; Nguyen, 2011; Nguyen et al., 2011a).

DISTRIBUTION. *S. indicus* is a common species in Vietnam. However, this is the first record of the species from Tay Yen Tu NR and from Bac Giang Province. Elsewhere, the species is known from India, Bhutan, China, Taiwan, Myanmar, Laos, Thailand, Cambodia, Malaysia, and Indonesia (Nguyen et al., 2009).

REMARKS. A single specimen was found in the evening on the forest ground near Suoi Tuyen I.

Sphenomorphus tonkinensis Nguyen, Schmitz, Nguyen, Orlov, Böhme et Ziegler, 2011

EXAMINED MATERIAL. One adult male VNMN 1331, collected by TZ and NTT, 26 June 2010, ca. 400 m asl (Fig. 59).

MORPHOLOGICAL CHARACTERS. SVL 42.82 mm, TaL 51.43 mm; head longer than wide; supranasals absent; prefrontals in contact with each other; supralabials 7; infralabials 6; nuchals absent; primary temporals 2; external ear present, without lobules, tympanum slightly sunken; limbs overlapping when adpressed along body; midbody scales in 34 rows; dorsal scales smooth; paravertebrals 74; lamellae under toe IV 15. Colouration in life: dorsum and tail base bronze brown with black, discontinuous vertebral line reaching to first third of tail; upper part of flanks with black bars, interrupted by small, light spots in the neck; tail orange brown; ventral surface cream (determination after Nguyen et al., 2011a).

DISTRIBUTION. In Vietnam, this species has been recorded from Vinh Phuc, Quang Ninh, and Hai Phong provinces. This is the first record of *S. tonkinensis* from Tay Yen Tu NR as well as from Bac Giang Province. Elsewhere, the species is known from China (Nguyen et al., 2011).

REMARKS. The specimen was found at night in forest near Suoi Tuyen II.

Tropidophorus hainanus Smith, 1923

EXAMINED MATERIAL. One adult male ZFMK 92835, collected by TZ and NTT, October 2009, ca. 400 m asl; one adult male VNMN 1343, collected by TZ and NTT, June 2010, 440 m asl (Fig. 60).

MORPHOLOGICAL CHARACTERS. SVL 37.77–42.31 mm (n = 2), TaL: 46.86 mm; head longer than wide; head shields striated; supranasals absent; frontonasal undivided; prefrontals separated from each other; tympanum superficial; supralabials 6–7; infralabials 5; postmental undivided; nuchals absent; limbs overlapping when adpressed along body; dorsals and laterals keeled; midbody scales in 30–32 rows; ventrals 43–44, cycloid; paravertebral scales 44; lamellae under toe IV 16–18; precloacal shields 2, enlarged. Colouration in life: dorsal head and body brown, with bright, narrow, transverse bars bordered with black, the first two V-shaped; flanks cream, upper part of flanks with large whitish dark bordered spots; ventral surface white; throat with dark longitudinal lines (determination after Bourret, 2009 and Nguyen et al., 2010b).

DISTRIBUTION. In Vietnam, this species has been recorded from Lai Chau, Lao Cai, and Ha Giang provinces southwards to Dak Lak and Dak Nong provinces. Elsewhere, the species is known from China (Nguyen et al., 2009).

REMARKS. One specimen (ZFMK 92835) was found at night on a rock in Suoi Tuyen I and another specimen (VNMN 1343) was collected on the forest ground near Ba Bep Pond in the late morning (11:40).

Tropidophorus sinicus Boettger, 1886

EXAMINED MATERIAL. One adult female VNMN A.2013.17 and one adult male ZFMK 92836, collected by TZ and NTT, October 2009, 400–600 m asl (Fig. 61).

MORPHOLOGICAL CHARACTERS. SVL male 53.12 mm, female 60.74 mm, TaL male 66.69 mm, female 76.24 mm; head longer than wide; head shields striated; supranasals absent; frontonasal divided; prefrontals in contact; loreal single; tympanum distinct, superficial; supralabials 5; infralabials 5; postmental divided; midbody scales in 32 rows; dorsal scales keeled; paravertebral scales 43–45; lamellae under toe IV 17–21. Colouration in life: dorsal head and body dark brown, with large, transverse pale yellow bars; flanks with smaller light spots; ventral surface white (determination after Bourret, 2009; Nguyen et al., 2010b; Nguyen, 2011).

DISTRIBUTION. In Vietnam, this species has been recorded from Cao Bang, Bac Kan, Lang Son, Bac Giang, Hai Duong, and Quang Ninh provinces. Elsewhere, the species is known from China (Nguyen et al., 2009).

REMARKS. Both specimens were found on rocks in Suoi Tuyen I.

SERPENTES
CALAMARIIDAE

Calamaria pavimentata Duméril et Bibron, 1854

EXAMINED MATERIAL. One juvenile VNMN 1349 (SVL 134.78 mm, TaL 10.33 mm), collected by TZ and NTT, June 2010, ca. 250 m asl (Fig. 62).

MORPHOLOGICAL CHARACTERS. Head not distinct from neck; internasals absent; rostral as wide as high, clearly visible from above; frontal longer than wide but shorter than parietals, approximately two times wider than supraocular; pupil round; loreal absent; preocular single; postocular single; temporals absent; supralabials 4, second and third touching the eye, fourth largest; infralabials 5, first touching mental; mental groove present; chin shields in 2 pairs, in contact medially; dorsal scales smooth, in 13:13:13 rows; ventrals 160; cloacal shield undivided; subcaudals 24, divided; tail with pointed tip. Colouration in life: dorsum brown, dark collar in nuchal region, outermost dorsal scale rows with dark line; neck with orange transverse band; ventral surface yellowish; tail with 2 yellow spots at base and 2 other ones close to the tip, ventral surface with a thin dark median line (determination after Smith, 1943; Ziegler et al., 2008b; Nguyen et al., 2009).

DISTRIBUTION. In Vietnam, this species has been recorded from Lao Cai and Cao Bang provinces southwards to Quang Nam and Lam Dong provinces. This is the first record of *C. pavimentata* from Tay Yen Tu NR and from Bac Giang Province. Elsewhere, the species is known from China, Myanmar, Laos, Cambodia, Thailand, Malaysia, Indonesia, and Japan (Nguyen et al., 2009).

REMARKS. The specimen was found at night in the mixed forest of bamboo and small hardwood.

Calamaria septentrionalis Boulenger, 1890

EXAMINED MATERIAL. One adult male IEBR 3713 (SVL 287.36 mm, TaL 28.45 mm), collected

53

54

55

56

57

58

59

60

61

Figure 53. *Ateuchosaurus chinensis*. Figure 54. *Eutropis multifasciatus*. Figure 55. *Plestiodon tamdaoensis*. Figure 56. *Sphenomorphus cryptotis*. Figure 57. *S. incognitus*. Figure 58. *S. indicus*. Figure 59. *S. tonkinensis*. Figure 60. *Tropidophorus hainanus*. Figure 61. *T. sinicus*. Photos by T. Ziegler, T.Q. Nguyen, and C.T. Pham.

by NQT, NTT and PTC, 18 June 2009, ca. 350 m asl (Fig. 63).

Morphological characters. Head not distinct from neck; internasals absent; rostral as wide as high, barely visible from above; frontal longer than wide but shorter than parietals, 2.5 times wider than supraocular; pupil round; loreal absent; preocular single; postocular single; temporals absent; supralabials 4, second and third touching the eye, fourth largest; infralabials 5, first touching mental; mental groove present; chin shields in 2 pairs, in contact medially; dorsal scales smooth, in 13:13:13 rows; ventrals 157; cloacal shield undivided; subcaudals 17, divided; tail tapering with rounded end. Colouration in life: dorsum dark brown; outermost dorsal scale rows yellow, edged in black below; neck with two large orange blotches; ventral surface yellowish; ventral scales with dark outermost corners; tail with 2 yellow spots at base and 2 other ones close to the tip, ventral surface with a thin dark median stripe (determination after Smith, 1943; Ziegler et al., 2008b; Nguyen et al., 2009).

Distribution. In Vietnam, this species has been recorded from Lao Cai and Ha Giang southwards to Ha Tinh and Quang Binh provinces. Elsewhere, the species is known from China (Nguyen et al., 2009).

Remarks. The specimen was found at night in the bamboo forest near Mau Village.

COLUBRIDAE

Ahaetulla prasina (Boie, 1827)

This is a widespread species in Vietnam (Fig. 64). Elsewhere, the species is known from India throughout China and Indochina, southwards to Indonesia and the Philippines (Nguyen et al., 2009).

One specimen was seen during the day time in June 2010 in the bamboo forest near Mau Village. Species identification was based on photographs: Head very long, with a very long, pointed snout; canthus rostralis very sharp; pupil horizontal; body green, with interstitial white and black stripes (determination after Smith, 1943; Ziegler, 2002).

Cyclophiops multicinctus (Roux, 1907)

This is a widespread species in Vietnam (Fig. 65). However, this is the first record of *C. multicinctus* from Tay Yen Tu NR and from Bac Giang Province. Elsewhere, the species is known from China and Laos (Nguyen et al., 2009).

One individual was seen at night in October 2009 in branches above a forest stream near Dong Ri Ranger Station. Identification was based on photographs: head and anterior part of body green, posterior part of body and tail brown with some pale black and white spots forming interrupted bars on body; ventral surface yellow (determination after Smith, 1943; Ziegler et al., 2007).

Lycodon futsingensis (Pope, 1928)

Examined material. One adult male IEBR A 2013.87, collected by TZ and NTT, October 2009, ca. 350 m asl; one adult male VNMN 1350, collected by TZ and NTT, June 2010, ca. 450 m asl (Fig. 66).

Morphological characters. SVL 512.52–527.51 mm (n = 2), TaL 145.02–147.76 mm (n = 2); head distinct from neck; snout long, prominent; pupil vertically elliptic; rostral large; internasals wider than long, not touching loreal and preocular; frontal hexagonal; parietals longer than wide; nasal divided; loreal single, not entering orbit; preocular single; postoculars 2; temporals 2+3; supralabials 8, third to fifth or fourth and fifth entering orbit; infralabials 8–9; mental groove present; dorsal scales smooth, in 17:17:15 rows; vertebrals not enlarged; ventrals 3–4 + 198–200, laterally distinctly angulated; cloacal shield undivided; subcaudals 76–81, divided. Colouration in life: back brownish grey to dark brown, with 23–24 light brown bands on body, 12 bands on tail; first band starting at ventrals 15–20; some bands in Y-shape, more distinct in posterior part of body; head grey with a lighter band, from eye to neck; belly cream, posterior part mottled; lower surface of tail dark brown (determination after Bourret, 1936; Vogel et al., 2009).

Distribution. In Vietnam, this species has been recorded from Lao Cai and Cao Bang provinces southwards to Quang Binh and Da Nang provinces. Elsewhere, the species is known from China (Nguyen et al., 2009).

Remarks. Both specimens were found at night in Suoi Tuyen I Stream. One was found on a root near the water and the other specimen was collected on a tree branch, about 2 m above the ground.

Lycodon meridionalis Bourret, 1936

EXAMINED MATERIAL. One adult female VNMN 1333, collected by TZ and NTT, 24 June 2010, ca. 360 m asl (Fig. 67).

MORPHOLOGICAL CHARACTERS. SVL 632.13 mm, TaL 164.23 mm; head distinct from neck; rostral twice as wide as high; internasals wider than long; prefrontals wider than long; frontal small, narrowing posteriorly, shorter than parietals; posterior nasal longer than anterior one; pupil vertically elliptic; loreal single, entering orbit at a point, not touching internasals; preocular single; postoculars 2; temporals 2+2/3; supralabials 8/9, third to fifth or fourth and fifth touching the eye; infralabials 9/10; chin shields in 2 pairs; mental groove present; dorsal scale rows 17:17:15; outer dorsal scale rows not keeled; vertebral scales not enlarged; ventrals 2+231ventrals; cloacal shield undivided; subcaudals 98, divided. Colouration in life: dorsum black, with 93 yellow transverse bands on body and 24 on tail; upper surface of head black with yellow sutures; flanks yellow with irregular black spots; ventral surface yellow; subcaudals dark brown to black with light sutures (determination after Bourret, 1936; Smith, 1943).

DISTRIBUTION. In Vietnam, this species has been recorded from Lao Cai and Ha Giang provinces southwards to Ninh Binh Province. Elsewhere, the species is known from China and Laos (Nguyen et al., 2009).

REMARKS. The specimen was found in the evening (ca. 19:00) on a branch, about 1.6 m above the water in Suoi Tuyen I Stream. Some other individuals were seen on branches about 1–2 m above the ground.

Oligodon chinensis (Günther, 1888)

EXAMINED MATERIAL. One adult male IEBR 3708, collected by NQT, NTT and PTC, 17 June 2009, ca. 300 m asl; one adult female VNMN 1352, collected by TZ and NTT, June 2010, ca. 250 m asl (Fig. 68).

MORPHOLOGICAL CHARACTERS. SVL male 460.2 mm, female 574.06 mm, TaL male 125.85 mm, female 103.87 mm; head indistinct from neck; internasals 2; prefrontals 2; frontal longer than its distance to tip of snout, as long as parietals; nasal divided or undivided; loreal single; preocular single; postoculars 2; suboculars absent; temporals 1+2; supralabials 8, fourth and fifth touching the eye; infralabials 8–9; mental groove present; dorsal scale rows 17:17:15; ventrals 1-2 + 173–182, slightly laterally angulated; cloacal shield undivided; subcaudals 52–63, divided. Colouration in life: dorsal surface brown to reddish brown with 11–13 distinct dark spots on body and 4 on tail; narrow, interrupted, black bands present between those spots; an inverse V-marking present behind head, distinct; dark spot on temporal region present or absent; belly white, with rectangular blotches (determination after Bourret, 1936; Smith, 1943; David et al., 2008).

DISTRIBUTION. In Vietnam, this species has been recorded from Lao Cai and Lang Son southwards to Gia Lai provinces. This is the first record of *O. chinensis* from Tay Yen Tu NR and from Bac Giang Province. Elsewhere, the species is known from China (Nguyen et al., 2009).

REMARKS. Both specimens were found in the mixed secondary forest of small hardwood and bamboo. Another specimen was observed in the evening (20:30) near the stream close to Khe Cam Pond on 4 July 2010. Our specimens agreed with the descriptions of Bourret, (1936), Smith, (1943) and David et al. (2008), but showed some minor differences: dorsal dark spots cover only two instead of three vertebral scales and nasal of IEBR 3708 divided on one side and undivided on the other side.

Rhadinophis prasinus (Blyth, 1854)

EXAMINED MATERIAL. One adult male VNMN 1335, collected by TZ and NTT, 26 June 2010, ca. 400 m asl (Fig. 69).

MORPHOLOGICAL CHARACTERS. SVL 596.98 mm, TaL 230.71 mm; head distinct from neck; pupil round; internasals in contact with each other, wider than long but shorter than prefrontals; rostral wider than high; prefrontals 2; frontal longer than wide, as long as its distance to tip of snout, shorter than parietals, not touching preocular; loreal single; preocular single; postoculars 2; temporals 2+2/3; supralabials 9, fourth to sixth touching the eye; infralabials 8; mental groove present; dorsal scale rows 19:19:15; ventrals 6+196; cloacal shield di-

62

63

64

65

66

67

68

Figure 62. *Calamaria pavimentata*. Figure 63. *C. septentrionalis*. Figure 64. *Ahaetulla prasina*. Figure 65. *Cyclophiops multicinctus*. Figure 66. *Lycodon futsingensis*. Figure 67. *L. meridionalis*. Figure 68. *Oligodon chinensis*. Photos by T.Q. Nguyen and T. Ziegler.

vided; subcaudals 111, divided. Colouration in life: dorsal surface entirely green; flanks yellowish green; interstitial skin black and white, more distinct in the anterior part of body; belly whitish-green (determination after Bourret, 1936; Smith, 1943; Manthey & Grossmann, 1997).

DISTRIBUTION. In Vietnam, this species has been known from Lao Cai, Bac Kan, Thai Nguyen, Vinh Phuc, Nghe An, Quang Binh, and Gia Lai provinces. This is the first record of *R. prasinus* from Tay Yen Tu NR as well as from Bac Giang Province. Elsewhere, the species is reported from India, China, Myanmar, Laos, Thailand, and Malaysia (Nguyen et al., 2009).

REMARKS. A single specimen was found in the evening (19:00) on a tree branch, approximately 1.60 m above the ground in Suoi Tuyen I. Our specimen differs from the descriptions of Bourret (1936) and Manthey & Grossmann (1997) in having three instead of two posttemporals on the left side.

Rhynchophis boulengeri (Mocquard, 1897)

EXAMINED MATERIAL. One adult male IEBR A.2013.88, collected by TZ and NTT, October 2009, ca. 350 m asl (Fig. 70).

MORPHOLOGICAL CHARACTERS. SVL 645.15 mm, TaL 252.28 mm; head long, distinct from neck; conical appendix present, covered by small scales on upper jaw, directing upwards, somewhat longer than its distance to eye; pupil round; nostril surrounded by 2 nasals; internasals half size of prefrontals; frontal broad anteriorly, shorter than parietals; loreal single, longer than high; preocular single, touching frontal; postoculars 2; temporals 2+2+3; supralabials 9, fourth to sixth touching eye; infralabials 10; dorsal scales smooth, in 19:19:15 rows; mental groove present; ventrals 221; cloacal shield divided; subcaudals 137, divided. Colouration in life: upper surface green; a black line running from nostril to the eye and continuing to neck; ventral surface light green; laterally angulated region of ventrals white (determination after Bourret, 1936; Pope, 1935; Smith, 1943).

DISTRIBUTION. In Vietnam, this species has been recorded from Son La, Thai Nguyen, Vinh Phuc, Hanoi, Quang Ninh, Hai Phong, and Ha Tinh provinces. This is the first record of *R. boulengeri* from Tay Yen Tu NR as well as from Bac Giang Province. Elsewhere, the species is known from China (Nguyen et al., 2009).

REMARKS. The adult male was found in the evening (19:00) on a tree branch, about 1.60 m above the ground at Suoi Tuyen I. A small bird was found in its stomach. The scale counts of IEBR A2013.88 are somewhat higher than in the description of Smith (1943) (221 ventrals instead of 207–216 and 137 subcaudals instead of 123–132).

Sibynophis chinensis (Günther, 1899)

EXAMINED MATERIAL. One adult male VNMN 1353, collected by TZ and NTT, May 2010, ca. 300 m asl (Fig. 71).

MORPHOLOGICAL CHARACTERS. SVL 367.25 mm, TaL 153.31 mm, tail tip broken; rostral wider than high; internasals 2, in contact with each other; prefrontals 2; parietals 2, touching upper postocular; pupil round; loreal single; preocular single, twice as high as loreal; postoculars 2; temporals 2+2; supralabials 9, fourth to sixth touching the eye; infralabials 9; mental groove present; chin shields in 2 pairs; dorsal scales smooth, in 17:17:17 rows; ventrals 164; cloacal shield divided; subcaudals 75, divided. Colouration in alcohol: dorsal head olive grey with two narrow black crossbars behind the eyes and another large one on neck; a dark stripe running from nostril to the eye and continuing to neck; ground colour of body and tail light reddish grey, dorsum with a vertebrally interrupted line of dark spots and two interrupted lines of light spots laterally; ventral surface yellowish-white, darker on ventral tail; each ventral with one dark spot on lateral edge and two dark spots in the center, these spots on subcaudals forming dark lines on ventral tail (determination after Pope, 1935; Bourret, 1936; Smith, 1943).

DISTRIBUTION. In Vietnam, this species has been recorded from Lao Cai, Cao Bang, Bac Kan, Vinh Phuc, Hoa Binh, Ninh Binh, Quang Tri, and Gia Lai provinces. This is the first record of *S. chinensis* from Tay Yen Tu Nature Reserve and from Bac Giang Province. Elsewhere, the species is known from China and Taiwan (Nguyen et al., 2009).

REMARKS. The single specimen was found on the forest floor. The specimen has fewer ventral scales than reported by Smith (1943) (164 instead of 168–183).

LAMPROPHIIDAE

Psammodynastes pulverulentus (Boie,1827)

Only one individual was seen at night in October 2009 on branches next to a forest trail about 1.5 m above the ground (Fig. 72).

Morphological characters. Identification was based on photographs: head elongated, in triangular shape; dorsal surface of head and neck brown with some dark stripes; dorsal body and tail brown with some light spots, edged in black (determination after Smith,1943; Ziegler et al., 2002).

Distribution. Although *P. pulverulentus* is known almost from entire Southeastern Asia and from Vietnam (Nguyen et al., 2009), this is the first record of the species from Tay Yen Tu NR as well as from Bac Giang Province.

NATRICIDAE

Amphiesmoides ornaticeps (Werner, 1924)

Examined material. One subadult male VNMN 1355, collected by TZ and NTT, June 2010, ca. 200 m asl (Fig. 73).

Morphological characters. SVL 284.29 mm, TaL 139.01 mm; head distinct from neck; rostral hexagonal, wider than high; internasals 2, in contact, as long as prefrontals, narrowing anteriorly; prefrontals 2, touching loreal; frontal hexagonal, longer than wide; nostrils laterally; pupil round; loreal single, in contact with nasal; preocular single, postoculars 3; temporals 2+2/3; supralabials 9, fourth to sixth entering orbit; infralabials 8; mental groove present; dorsals strongly keeled, midbody scale rows 19; ventrals 2+160; cloacal shield divided; subcaudals 122, divided. Colouration in alcohol: upper surface of body and tail greyish brown, anterior part of body with white squarrish net; flanks cream, with some brown marbling; head light brown; eye bordered by two vertical white streaks, edged in black, posterior one large; ventral surface cream (determination after Pope, 1935; Nguyen et al., 2010a).

Distribution. In Vietnam, this species has been recorded from Bac Giang, Hoa Binh, and Nghe An provinces. Elsewhere, the species is known from China (Nguyen et al., 2009).

Remarks.A single specimen was found on the forest floor near Mau Village. Another specimen was collected in a small stream in bamboo forest near Mau Village in April 2008.

Opisthotropis lateralis Boulenger, 1903

Examined material. One adult male ZFMK 93904, collected by TZ and NQT, 28 May 2009, 200 m asl (Fig. 74).

Morphological characters. SVL 407.06 mm, TaL 64.61 mm; rostral broader than high; internasals 2, as long as broad, in contact with each other; prefrontal single; frontal longer than wide, shorter than parietals, twice as broad as supraocular; nostrils directing upwards, in the upper part of single nasal; pupil round; loreal single, longer than high, not touching internasals; preoculars 2; postoculars 2; temporals 1+2; supralabials 10, sixth touching the eye; infralabials 9; mental groove present; dorsal scales smooth, in 17:17:17 rows; ventrals 2+184; cloacal shield divided; subcaudals 49, divided. Colouration in life: dorsal surface dark greyish brown, with 7 longitudinal lines on back; one black line on third dorsal scale row; 3 outer rows of dorsal scales orange; ventral surface yellowish white (determination after Pope, 1935; Bourret, 1936; David et al., 2011).

Distribution. In Vietnam, this species has been recorded from Cao Bang, Lang Son, Vinh Phuc, Quang Ninh, Bac Giang, Hai Duong, and Hoa Binh provinces. Elsewhere, the species is known from China (Nguyen et al., 2009).

Remarks. The specimen was found at night (21:00) in a small water pool in a stream near Vung Tron Ranger Station. The specimen matched the descriptions of Pope (1935), Bourret (1936) and David et al. (2011) but showed some differences: more ventral scales (2+184 instead of maximum 173), prefrontal entire instead of semi-divided, a longer total length (471.67 mm instead of maximum 437 mm), and a lower ratio of tail to total length (0.137 instead of 0.25).

69

72

70

73

71

74

Figure 69. *Rhadinophis prasinus*. Figure 70. *Rhynchophis boulengeri*. Figure 71. *Sibynophis chinensis*. Figure 72. *Psammodynastes pulverulentus*. Figure 73. *Amphiesmoides ornaticeps*. Figure 74. *Opisthotropis lateralis*. Photos by T. Ziegler and T.Q. Nguyen.

Rhabdophis subminiatus (Schlegel, 1837)

Identification was based on photographs (Fig. 75): head distinct from neck; eye large, black; upper head bluish; neck with a black blotch, followed by a U-shaped yellow band; a black vertical stripe below the eye, directing backwards; anterior part of body reddish brown, posterior part yellowish brown, with numerous black or dark grey scales forming a regular pattern; tail brown; ventral surface cream (determination after Ziegler, 2002).

DISTRIBUTION. This is a common species in Vietnam. Elsewhere, the species is known from India throughout China and Indochina southwards to Indonesia (Nguyen et al., 2009).

REMARKS. Several individuals were seen during our survey in summer 2010. One was crawling on the ground in the bamboo forest and some were diving in ponds at the forest edge near Mau Village during day time.

Sinonatrix aequifasciata (Barbour, 1908)

EXAMINED MATERIAL. One adult female VNMN 1332, collected by TZ and NTT, 24 June 2010, ca. 400 m asl.

MORPHOLOGICAL CHARACTERS. SVL 360.48 mm, TaL 109.68 mm; head distinct from neck; rostral broader than high; internasals 2, in contact, twice as long as wide; prefrontals 2; frontal longer than wide, shorter than parietals; nostrils lateral; pupil round; loreal single, as long as high; preocular single; postoculars 2; subocular single; temporals 2+3; supralabials 9, fifth touching the eye; infralabials 9; mental groove present; dorsal scales keeled, in 19:19:17 rows; ventrals 5+141, no lateral edges; cloacal shield divided; subcaudals 75, divided. Colouration in life: head brownish above; back olive grey, with 18 black double-bands on body, 10 on tail; flanks with dark markings, in X-shape; ventral surface yellow, with some traces of the black bands (determination after Bourret, 1936; Vogel et al., 2004).

DISTRIBUTION. In Vietnam, this species has been recorded from Lao Cai, Ha Giang, Cao Bang, Lang Son, Vinh Phuc, Bac Giang, Nghe An, and Ha Tinh provinces. Elsewhere, the species is known from China (Nguyen et al., 2009).

REMARKS.The specimen was found in the evening (22:30), on a tree branch in Suoi Tuyen I. The specimen matched the descriptions of Bourret (1936) and Vogel et al. (2004) well, but showed two minor differences: only one subocular on the left side instead of two and 18 bands on body and 10 on tail instead of 20 and 12 bands, respectively.

Sinonatrix percarinata (Boulenger, 1899)

EXAMINED MATERIAL. One juvenile IEBR 3707 (SVL188.09 mm, TaL 62.05 mm), collected by NQT, NTT, PTC, June 2009, elevation ca. 400 m asl; one adult female VNMN 1357, collected by TZ and NTT, 3 June 2010, ca. 400 m asl (Fig. 76).

MORPHOLOGICAL CHARACTERS. SVL female 423.28 mm, TaL female 154.31 mm; head distinct from neck; rostral twice as wide as high; internasals 2, in contact, longer than wide; prefrontals 2; nostrils lateral; pupil round; nasal divided; loreal single; preocular single; postoculars 2–3; suboculars 1–2; temporals 2+3; supralabials 9, fourth and fifth touching the eye; infralabials 9–10; mental groove present; dorsal scales keeled, except for outermost rows, in 17/19:19:17 rows; ventrals 2–3 + 136/140; cloacal shield divided; subcaudals 72 or 75, divided. Colouration in life: dorsal head and back olive greyish; brown body with 28–31 transverse dark lozenge-shaped bands on back, dark bands continuing to belly, forming rings; tail with 13–20 black bands, similar to those on body; ventral surface yellow (determination after Pope, 1935; Bourret, 1936; Smith, 1943; Ziegler, 2002).

DISTRIBUTION. In Vietnam, this species has been recorded from Lao Cai and Ha Giang southwards to Gia Lai and Dong Nai provinces. Elsewhere, the species is known from India, China, Taiwan, Myanmar, Laos, and Thailand (Nguyen et al., 2009).

REMARKS. A juvenile was found in the evening and the female was found during the day time in Lai Am Pond.

PAREATIDAE

Pareas hamptoni (Boulenger, 1905)

EXAMINED MATERIAL. One adult male VNMN 1356, collected by TZ and NTT, 10 July 2010, ca. 400 m asl (Fig. 77).

MORPHOLOGICAL CHARACTERS. SVL 335.38 mm, TaL 113.05 mm; head distinct from neck; body strongly compressed; snout short; rostral not visible from above; internasals in contact, half of prefrontals; nostrils lateral; pupil vertically elliptic; prefrontals touching the eye; frontal shorter than parietals; loreal single, not touching the eye; preocular single, in triangle shape; eyes diameter greater than the distance from eye to tip of snout; postocular single; suboculars 2/3; temporals 2+3; supralabials 7, fourth and fifth touching the eye; infralabials 6/7; mental very small, mental groove absent; chin shields in 3 pairs; dorsals smooth, midbody scale rows 15, vertebral scales slightly enlarged; ventrals 186; cloacal shield undivided; subcaudals 84, divided. Colouration in life: dorsal surface reddish brown, with black bands on the interstitial skin; ventral surface yellow; upper head dark, with two parallel longitudinal stripes on neck, bordered in black (determination after Bourret, 1936; Smith, 1943; Cox, 1991).

DISTRIBUTION. In Vietnam, this species has been recorded from Lao Cai and Ha Giang southwards to Lam Dong and Dong Nai provinces. This is the first record of *P. hamptoni* from Tay Yen Tu NR and from Bac Giang Province. Elsewhere, the species is known from China, Myanmar, Laos, and Cambodia (Nguyen et al., 2009).

REMARKS. Another adult male was seen in the evening (20:00) on a tree branch, 1.5 m above the ground near Ba Bep Stream.

Pareas margaritophorus (Jan, 1866)

EXAMINED MATERIAL. One adult female VNMN 1354, collected by TZ and NTT, 10 July 2010, ca. 400 m asl (Fig. 78).

MORPHOLOGICAL CHARACTERS. SVL 437.00 mm, TaL 83.95 mm; head distinct from neck; body not strongly compressed; eye moderate; internasals in contact, shorter than prefrontals; prefrontals in contact, entering orbit; frontal as long as wide, longer than its distance to tip of snout, shorter than parietals; loreal single; preocular absent; postocular single; supralabials 7, fourth and fifth entering orbit; infralabials 7; temporalia 2+2; mental groove absent; mental very small; chin shields in 3 pairs; dorsal scales smooth, midbody scale rows 15; paravertebral scales not enlarged; ventrals 150, without lateral edges; cloacal shield undivided; subcaudals 39, divided. Colouration in life: dorsum dark grey with transverse rows of spots, spot edged in white anteriorly and in black posteriorly; ventral surface white, with numerous brown spots (determination after Bourret, 1936; Smith, 1943; Manthey & Grossmann, 1997).

DISTRIBUTION. In Vietnam, this species has been recorded from Vinh Phuc and Hai Duong provinces southwards to Kien Giang Province. This is the first record of *P. margarithophorus* from Tay Yen Tu NR and from Bac Giang Province. Elsewhere, the species is known from China, Myanmar, Laos, Thailand, Cambodia, Malaysia (Nguyen et al., 2009).

REMARKS. The female specimen was found at night (22:00) on the forest path near Ba Bep Stream.

TYPHLOPIDAE

Ramphotyphlops braminus (Daudin, 1803)

EXAMINED MATERIAL. One subadult VNMN 1336 (SVL 119.92 mm, TaL 2.76 mm), collected by TZ and NTT, June 2010, elevation ca. 300 m asl.

MORPHOLOGICAL CHARACTERS. Small sized, worm-like snake; nostril sourrounded by 2 nasals; preocular single, touching second and third supralabials; eye rudimental; mental groove present; ventrals as large as lateral scales; dorsal scales smooth, cycloid, in 20 rows; tail cylindrical. Colouration in alcohol: dorsal surface dark brown, ventral surface grey; lower side of head and cloacal region greyish white; throat with 3 white scales forming a line; tip of tail whitish (determination after Pope, 1935; Bourret, 1936; Smith, 1943; Manthey & Grossmann, 1997; Ziegler, 2002).

DISTRIBUTION. This is a widespread species in Vietnam. Elsewhere, the species is known from Sansibar, Tansania, Mosambique, Somalia, Camerun, Benin, Togo, Ivory Coast, Senegal, Gabun, Madagascar, Comores, Nosy Be, Mauritius, Iran, Pakistan, India, Sri Lanka, Nepal, Bangladesh, Bhutan, China, Myanmar, Laos, Thailand, Cambodia, Malaysia, Singapore, Indonesia, New Guinea, Philippines, Japan, Melanesia, Micronesia, Australia, New Caledonia, Solomon Islands, Vanuatu, Saudi Arabia, Guatemala, Mexico, USA, and Hawaii (Nguyen et al., 2009).

REMARKS. A single specimen was found on the forest floor between leaf litter.

XENODERMATIDAE

Achalinus rufescens Boulenger, 1888

EXAMINED MATERIAL. One adult female VNMN 1334, collected by TZ and NTT, 24 June 2010, 320–400 m asl (Fig. 79).

MORPHOLOGICAL CHARACTERS. SVL 424.37 mm, TaL 95.12 mm; head slender; suture between internasals twice as long as suture between prefrontals; frontal wider than long, half as long as parietals, 4 times wider than supraocular; parietals 2; loreal single, entering orbit; preocular and postocular absent; temporals 2+2, anterior upper one touching the eye; supralabials 6, fourth and fifth touching the eye, first very small, sixth very long; infralabials 5; mental wider than long; chin shields in 3 pairs; mental groove present; dorsal scales strongly keeled, tri-carinated, midbody scale rows 23; ventrals 63; cloacal shield undivided; subcaudals 5+152, undivided. Colouration in life: dorsal head and body light brown, iridescent; vertebral zone darker greyish brown; lips yellowish; ventral surface whitish-yellow (determination after Bourret, 1936; Pope, 1935; Smith, 1943; Ziegler, 2002).

DISTRIBUTION. In Vietnam, this species has been recorded from Lao Cai, Cao Bang, Bac Kan, Vinh Phuc, Hai Duong, and Ha Tinh provinces. This is the first record of *A. rufescens* from Tay Yen Tu NR and from Bac Giang Province. Elsewhere, the species is known from China (Nguyen et al., 2009).

REMARKS. The specimen was found at night (ca. 23:00) on a forest path near Suoi Tuyen I.

ELAPIDAE

Bungarus fasciatus (Schneider, 1801)

Identification was based on photographs (Fig. 80): triangular body with a prominent vertebral ridge along the back; tail tip blunt; body and tail alternately banded in black and yellow; a large black mark on nape, continued in a point on head to between the eyes, bordered on each side by yellow (determination after Smith, 1943).

DISTRIBUTION. This is a widespread species in Vietnam and in Asia (Nguyen et al., 2009).

REMARKS. One individual was seen crawling on the ground of the bamboo forest close to a pond during the night of 26 June 2010.

VIPERIDAE

Trimeresurus stejnegeri (Schmidt, 1925)

Identification was based on photographs (Fig. 81): head triangle-shaped; loreal pitches present; body green, with longitudinal parallel bicoloured (white and red) stripe on the outer edge of the ventrals (determination after Smith, 1943; Bain & Nguyen, 2004a).

DISTRIBUTION. This is a widespread species in northern and central Vietnam, from Lao Cai and Ha Giang provinces southwards to Quang Binh Province and Da Nang City. Elsewhere, the species is known from China, Taiwan, and Myanmar (Nguyen et al., 2009).

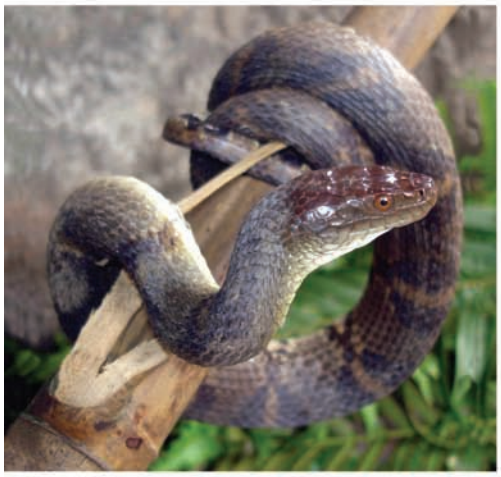
Natural history notes: Three individuals were sighted at night in the bushes and trees besides a forest stream and close to Khe Cam 1 Pond, in October 2009 and in May 2010.

DISCUSSION

Based on our field work during the period from 2008 to 2010, a total of 76 species were recorded from the Tay Yen Tu NR, comprising 36 species of amphibians and 40 species of reptiles. The families with the most diverse species richness are Ranidae (11 species), Rhacophoridae (9 species), Scincidae (10 species), and Colubridae (8 species) (Fig. 82). Because of the lack of convincing diagnostic characters, the identification of several amphibian species is still not clearly solved yet, for example *Leptobrachium* cf. *chapaense*, and *Hylarana* cf. *nigrovittata*, but also *Ichthyophis bannanicus* and *Limnonectes bannaensis* (see Gawor et al., 2009; Nguyen et al., 2009; McLeod, 2010; Nishikawa et al., 2012). Further studies based on additional voucher specimens and molecular comparisons are required to confirm the taxonomic placement of aforementioned species (or species complexes).

75

79



76

80

77

81

78

Figure 75. *Rhabdophis subminiatus*. Figure 76. *Sinonatrix percarinata*. Figure 77. *Pareas hamptoni*. Figure 78. *P. margaritophorus*. Figure 79. *Achalinus rufescens*. Figure 80. *Bungarus fasciatus*. Figure 81. *Trimeresurus stejnegeri*. Photos by C.T. Pham, T. Ziegler, and T.Q. Nguyen.

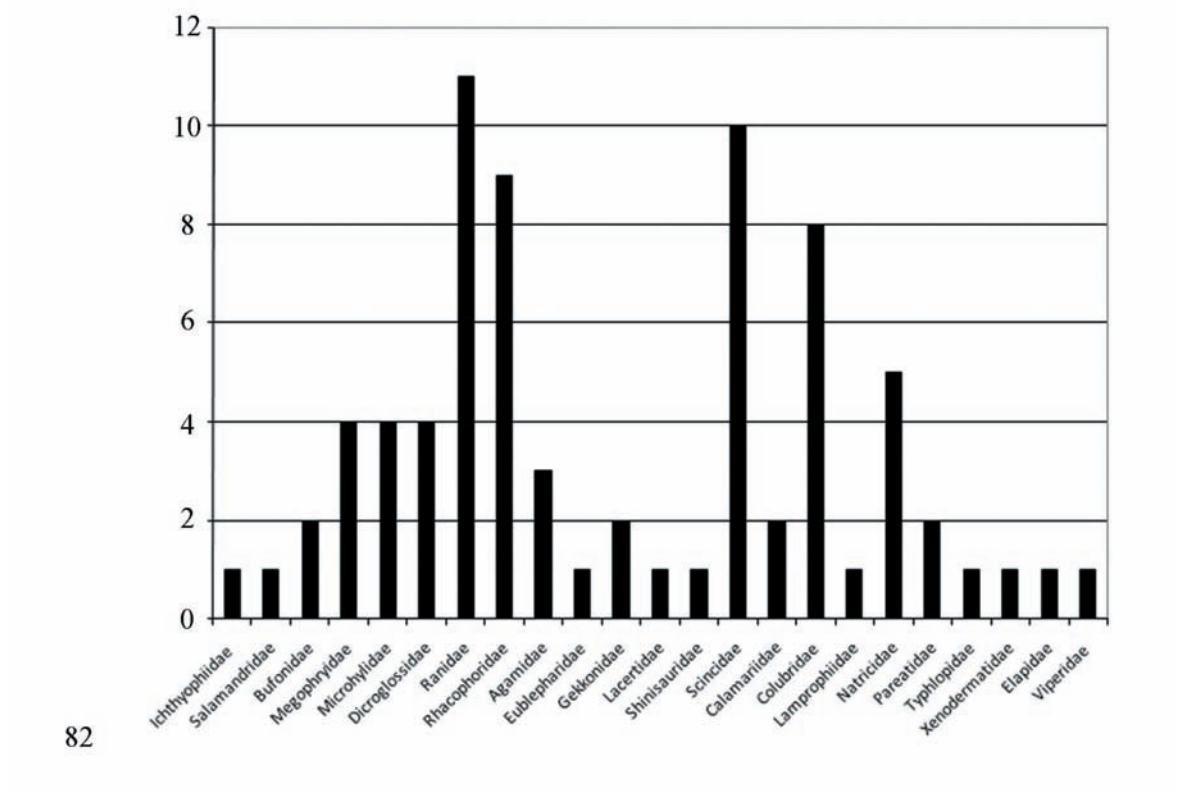


Figure 82. Species richness of amphibian and reptile families from Tay Yen Tu Nature Reserve (y-axis represents species numbers).

Thirty of the recorded species (or 39.5% of the total species number) are new records for Tay Yen Tu Nature Reserve as well as for Bac Giang Province. Remarkably, five of the recorded species are currently known only from Vietnam, namely *Tylototriton vietnamensis*, *Quasipaa acanthophora*, *Odorrana bacboensis*, *O. yentuensis*, and *Goniurosaurus lichtenfelderi*. The high level of species diversity and endemism of the herpetofauna underscores the biodiversity conservation potential of the Tay Yen Tu NR. Although this nature reserve harbors a considerable number of endemic and rare species, its biodiversity is heavily threatened by habitat degradation and over harvesting associated with wildlife trade (Nguyen, 2011). To preserve the unique biodiversity of Yen Tu Mountain (see also Ha et al., 2010), we must not only continue with research, in particular the ecological requirements of the local flora and fauna, but also the protection of the habitat must be improved. Only by doing so, we can guarantee the long-term survival of the unique lowland forest system and its in part endemic diversity.

ACKNOWLEDGEMENTS

We thank the directorate of the Tay Yen Tu Nature Reserve, Forest Protection Department of Bac Giang and Quang Ninh provinces for support of our field work and issuing relevant permits. V.L. Hecht and C.T. Pham are grateful to M. Bernardes and D. Karbe (Cologne), T.T. Tran (Vinh Phuc) for their assistance in the field. For the loan of specimens, we are grateful to C.X. Le and T.H. Tran (Hanoi), W. Böhme and D. Rödder (Bonn). We thank E. Sterling (New York) and K. Koy (Berkeley) for providing the map. Field surveys in Yen Tu Mountains were partially funded by the European Association of Zoos and Aquaria

(EAZA), World Association of Zoos and Aquariums (WAZA), Nagao Natural Environment Foundation, Japan (Small-scale research grant programme for T.T. Nguyen), Vietnam Academy of Science and Technology (Small grant for young researchers for C. T. Pham), and Cologne Zoo. Internship of C.T. Pham in Germany was funded by the Deutsche Foschungsgemeinschaft (DFG) - International Collaboration Grant (BO 1907/ 11-1). Research of T.Q. Nguyen in Germany is funded by the Alexander von Humboldt Foundation (VIE 1143441).

REFERENCES

Anders C. & Rai K. R., 2002. *Rhacophorus maximus* Günther, 1859 "1858". In: Schleich H. H. & Kästle W. (Eds). Amphibians and reptiles of Nepal. Biology, Systematics, Field Guide, A. R. G. Ganter Verlag K. G., pp. 337–340.

Averyanov L.V., Phan L.K., Nguyen H.T. & Harder D.K., 2003. Phytogeographic review of Vietnam and adjacent areas of eastern Indochina. Komarovia, 3: 1–83.

Bain R.H. & Nguyen T.Q., 2004a. Herpetofaunal diversity of Ha Giang Province in northeastern Vietnam, with description of two new species. American Museum Novitates, 3453: 1–42.

Bain R.H. & Nguyen T.Q., 2004b. Three new species of narrow-mouth frog (Genus: *Microhyl*a) from Indochina, with comments on *Microhyla annamensis* and *Microhyla palmipes*. Copeia, 3: 507–524.

Bain R.H., Lathrop A., Murphy R.W., Orlov N. & Ho C.T., 2003. Cryptic species of a cascade frog from Southeast Asia: Taxonomic revisions and descriptions of six new species. American Museum Novitates, 3417: 1–60.

Bain R.H., Nguyen T.Q. & Doan K.V., 2009. A new species of the genus *Theloderma* Tschudi, 1838 (Anura: Rhacophoridae) from northwestern Vietnam. Zootaxa, 219: 58–68.

Bernardes M., Rödder D., Nguyen T.T., Pham T.C., Nguyen T.Q. & Ziegler T., 2013. Habitat characterization and potential distribution of *Tylototriton vietnamensis* in northern Vietnam. Journal of Natural History, 47: 1161–1175.

Böhme W., Schöttler T., Nguyen T.Q. & Köhler J., 2005. A new species of salamander, genus *Tylototriton* (Urodela: Salamandridae), from northern Vietnam. Salamandra, 41: 215–220.

Boulenger G.A., 1912. A vertebrate fauna of the Malay Peninsula from the Isthmus of Kra to Singapore including the adjacent islands - Reptilia and Batrachia. Taylor and Francis, London, 294 pp.

Bourret R., 1936. Les Serpentes de l´Indochine. I. Études sur la Faune. Henri Basuyau & Cie, Vols. 1 & 2, Toulouse, 141+ 505 pp.

Bourret R., 1942. Les Batraciens de l'Indochine. Institute Océanographique de l'Indochine, Hanoi, x + 547 pp., 4 pls.

Bourret R., 2009. Les Lizards de l'Indochine. Edition Chimaira, Frankfurt am Main, 624 pp.

Cox M.J., 1991. The snakes of Thailand and their husbandry. Krieger Publishing Company, Malabar, Florida, 526 pp.

Darevsky I.S., Orlov N.L. & Ho C.T., 2004. Two new lygosomine skinks of the genus *Sphenomorphus* Fitzinger, 1843 (Sauria, Scincidae) from northern Vietnam. Russian Journal of Herpetology, 11: 111–120.

David P., Pham C.T., Nguyen T.Q. & Ziegler T., 2011. A new species of the genus *Opisthotrophis* Günther, 1872 (Squamata: Natricidae) from the highlands of Kon Tum Province, Vietnam. Zootaxa, 2758: 43-56.

David P., Vogel G. & Pauwels O.S.G., 2008. A new species of the genus *Oligodon* Fitzinger, 1826 (Squamata: Colubridae) from Southern Vietnam and Cambodia. Zootaxa, 1939: 19–37.

Dowling H.G., 1951. A proposed standard system of counting ventrals in snakes. British Journal of Herpetology, 1: 97–99.

Dubois A. & Ohler A., 2009. A new species of the genus *Quasipaa* (Anura, Ranidae, Dicroglossinae) from northern Vietnam. Alytes, 27: 49–61.

Gawor A., Hendrix R., Vences M., Böhme W. & Ziegler T., 2009. Larval morphology in four species of *Hylarana* from Vietnam and Thailand with comments on the taxonomy of *H. nigrovittata* sensu latu (Anura: Ranidae). Zootaxa, 2051: 1–25.

Goodall D. & Faithfull S., 2010. U Minh Thuong National Park - Kien Giang Province, Vietnam Amphibian and Reptile Survey 7-21 September 2009. Wildlife At Risk, Vietnam.

Ha Q.M., La C.M., Tran S.N. & Do Q.V., 2010. Tay Yen Tu Nature Reserve: Biodiversity conservation value and development potential. Publishing House for Science and Technology, Hanoi, 35 pp.

Hikida T., Lau M.W.-N. & Ota H., 2001. A new record of the Vietnamese Five-Lined Skink, *Eumeces tamdaoensis* (Reptilia: Scincidae), from Hong Kong, China, with special references to its sexual dimorphism. The Natural History Journal of Chulalongkorn University, 1: 9–13.

Inger R.F., Orlov N. & Darevsky I., 1999. Frogs of Vietnam: A report on new collection. Fieldiana Zoology, 92: 1–46

Kuraishi N., Matsui M., Hamidy A., Belabut D.M., Ahmad N., Panha S., Sudin A., Yong H.-S., Jiang J.-P, Ota H., Ho T.T. & Nishkawa K., 2012. Phyloge-

netic and taxonomic relationships of the *Polypedates leucomystax* complex (Amphibia). Zoologica Scripta, 42: 54–70.

Le Q.K. & Ziegler T., 2003. Fist record of Chinese Crocodile Lizard outside of China: Report on a population of *Shinisaurus crocodilurus* Ahl, 1930 from Northeastern Vietnam. Hamadryad, 27: 193–199.

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].

Manthey U. & Grossmann W., 1997. Amphibien und Reptilien Südostasiens. Natur & Tier Verlag, Münster, 512 pp.

Mcleod D.S., 2010. Of least concern? Systematics of a cryptic species complex: *Limnonectes kuhlii* (Amphibia: Anura: Dicroglossidae). Molecuar Phylogenetics and Evolution, 56: 991–1000.

Neang T. & Holden J., 2008. A field guide to the amphibians of Cambodia. Fauna and Flora Internationnal. Phompenh, 127 pp.

Nguyen S.V., Ho C.T. & Nguyen T.Q., 2009. Herpetofauna of Vietnam. Edition Chimaira, Frankfurt am Main, 768 pp.

Nguyen T.Q., 2011. Systematics, ecology, and conservation of the lizard fauna in northeastern Vietnam, with special focus on *Pseudocalotes* (Agamidae), *Goniurosaurus* (Eublepharidae), *Sphenomorphus* and *Tropidophorus* (Scincidae) from this country. Dissertation, University of Bonn, April, 2011, 229 pp.

Nguyen T.Q., David P., Tran T.T., Luu V.Q., Le Q.K. & Ziegler T., 2010a. *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 T.Q., Koch A. & Ziegler T., 2009. A new species of reed snake *Calamaria* Boi, 1827 (Squamata: Colubridae), from central Vietnam. Hamadryad, 34: 1–8.

Nguyen T.Q., Nguyen S.V., Orlov N., Hoang T.N., Böhme W. & Ziegler T., 2010b. 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., Schmitz A., Nguyen T.T., Orlov N.L., Böhme W. & Ziegler T., 2011a. Review of the genus *Sphenomorphus* Fitzinger, 1843 (Squamata: Sauria: Scincidae) in Vietnam, with description of a new species from northern Vietnam and southern China and the first record of *Sphenomorphus mimicus* Taylor, 1962 from Vietnam. Journal of Herpetology, 45: 145–154.

Nguyen T.Q., Stenke R., Nguyen H.X. & Ziegler T., 2011b. The terrestrial reptile fauna of the Biosphere Reserve Cat Ba Archipelago, Hai Phong, Vietnam. In: Schuchmann K.-L. (Ed.), Tropical Vertebrates in a Changing World. Bonner zoologische Monographien, 57, pp. 99–115.

Nguyen T.Q., Tran T.T., Hoang N.V., Böhme W. & Ziegler T., 2008. Rediscovery and redescription of *Ateuchosaurus chinensis* Grey, 1845 (Squamata: Sauria: Scincidae) from northeastern Vietnam. Herpetology Notes, 1: 17–21.

Nguyen T.Q., Tran T.T., Nguyen T.T., Ziegler T. & Böhme W., 2012. First record of *Sphenomorphus incognitus* (Thompson, 1912) (Squamata: Scincidae) from Vietnam with some notes on natural history. Asian Herpetological Research, 3: 147–150.

Nguyen T.Q., Wang Y-Y., Yang Y-H., Lehmann T., Le M.D., Ziegler T. & Bonkowski M., 2013. A new species of the *Gekko japonicus* group (Squamata: Sauria: Gekkonidae) from the border region between China and Vietnam. Zootaxa, 3652: 501–518.

Nguyen T.T., Tran T.T., Nguyen T.Q. & Pham C.T., 2008. Distribution: *Rhacophorus maximus* (Nepal Flying Frog). Herpetological Review, 39: 364.

Nishikawa K., Matsui M. & Nguyen T.T. 2013. A new species of *Tylototriton* from northern Vietnam (Amphibia: Urodela: Salamandridae). Current Herpetology, 32: 34–49.

Nishikawa K., Matsui M. & Orlov N.L., 2012. A new striped *Ichthyophis* (Amphibia: Gymnophiona: Ichthyophiidae) from Kon Tum Plateau, Vietnam. Current Herpetology, 31: 27–38.

Ohler A., 2003. Revision of the genus *Ophryophryne* Boulenger, 1903 (Megophryidae) with description of two new species. Alytes, 21: 23–44.

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 *Leptolalax*, Megophryidae, Anura). Zootaxa, 3147: 1–83.

Orlov N., Dutta S., Ghate H. & Kent Y., 2006. New species of *Theloderma* from Kon Tum province (Vietnam) and Nagaland state (India) (Anura: Rhacophoridae). Russian Journal of Herpetology, 13: 135–154.

Pope C.H., 1935. The Reptiles of China - Turtles, Crocodiles, Snakes, Lizards. Natural History of central Asia. Vol X. American Museum of Natural History, New York, 604 pp.

Smith M.A., 1935. The fauna of British India including Ceylon and Burma. Reptilia and Amphibia. Vol. II. Sauria. Taylor and Francis, London, 440 pp.

Smith M.A., 1943. The fauna of British India, Ceylon and Burma. Reptilia and Amphibia. Vol. III. Serpentes. Taylor and Francis, London, 525 pp.

Taylor E.H., 1962. The amphibian fauna of Thailand. University of Kansas Science Bulletin, 63: 265-599.

Tordoff A.W., Tran B.Q., Nguyen T.D. & Le H.M. (Eds), 2004. Sourcebook of existing and proposed protected areas in Vietnam. BirdLife International in Indochina and Ministry of Agriculture and Rural Development, second edition, Hanoi.

Tran D.A.T., Le Q.K., Le K.V., Thanh N.V., Nguyen T.Q., Böhme W. & Ziegler T., 2010. First and preliminary frog records (Amphibia: Anura) from Quang Ngai Province, Vietnam. Herpetology Notes, 3: 111–119.

Tran T.T., Orlov N.L. & Nguyen T.T., 2008. A new species of cascade frog of *Odorrana* Fei, Yi et Huang, 1990 genus (Amphibia: Anura: Ranidae) from Bac Giang Province (Yen Tu Mountain Range, Northeastern Vietnam). Russian Journal of Herpetology, 15: 212–224.

Vogel G., David P., Pauwels O.S.G. & Brachtel N., 2004. On the occurance of the Watersnake *Sinonatrix aequifasciata* (BARBOUR, 1908) (Serpentes, Colubridae, Natricinae) in Vietnam. Hamadryad, 29: 110–114.

Vogel G., David P., Pauwels O.S.G., Sumontha M., Norval G., Hendrix R., Vu T.N. & 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.

Ye C.Y., Fei L., Xie F. & Jiang J.P., 2007. A new Ranaidae species from China - *Limnonectes bannanensis* (Ranidae: Anura). Zoological Research, 28: 545–550.

Yu G., Zhang M. & Yang J., 2010. A species boundary within the Chinese *Kurixalus odontotarsus* species group (Anura: Rhacophoridae): new insights from molecular evidence. Molecular Phylogenetics and Evolution, 56: 942–950.

Zaher H., Grazziotin F.G., Cadle J.E., Murphy R.W., Moura-Leite J.C. & Bonatto S.L., 2009. Molecular phylogeny of advanced snakes (Serpentes, Caenophidia) with an emphasis on South America xenodontines: a revised classification and descriptions of new taxa. Papéis Avulsos de Zoologia, 49: 115–153.

Ziegler T., 2002. Die Amphibien und Reptilien eines Tieflandfeuchtwald-Schutzgebiets in Vietnam. Natur & Tier Verlag, Münster, 342 pp.

Ziegler T. & Bischoff W., 1999. *Takydromus (Platyplacopus) kuehnei vietnamensis* ssp. n., eine neue Schnelläufereidechsen-Unterart aus Vietnam (Reptilia: Squamata: Lacertidae). Salamandra, 35: 209–226.

Ziegler T., Hendrix R., Vu T.N., Vogt M., Forster B. & Dang K.N., 2007. The diversity of a snake community in a karst forest ecosystem in the central Truong Son, Vietnam, with an identification key. Zootaxa, 1493: 1–40.

Ziegler T., Le Q.K., Vu T.N., Hendrix R. & Böhme W., 2008a. A comparative study of crocodile lizards (*Shinisaurus crocodilurus* Ahl, 1930) from Vietnam and China. Raffles Bulletin of Zoology, 56: 181–187.

Ziegler T., Nguyen S. V. & Nguyen T. Q., 2008b. A new reed snake of genus *Calamaria* Boie (Squamata: Colubridae) from Vietnam. Current Herpetology, 27: 71–80.

Ziegler T., Nguyen T. Q., Schmitz A., Stenke R. & Rosler H., 2008c. A new species of *Goniurosaurus* from Cat Ba Island, Hai Phong, northern Vietnam (Squamata: Eublepharidae). Zootaxa, 1771: 16–30.

Ziegler, T., Ohler, A., Vu Ngoc Thanh, Le Khac Quyet, Nguyen Xuan Thuan, Dinh Huy Tri & Bui Ngoc Thanh (2006): Review of the amphibian and reptile diversity of Phong Nha – Ke Bang National Park and adjacent areas, central Truong Son, Vietnam. In: Vences, M., Köhler, J., Ziegler, T. & W. Böhme (Hrsg.): Herpetologia Bonnensis II: 247-262. Proceedings of the 13th Ordinary General Meeting of the Societas Europaea Herpetologica, Bonn: 262 pp.