

## CONTRIBUTION TO THE FAUNA OF LANGBIAN PLATEAU, SOUTHERN VIETNAM: AMPHIBIANS AND REPTILES OF HON BA NATURE RESERVE (KHANH HOA PROVINCE)

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### 1. Introduction

During the recent years, the Plateau Langbian (Da Lat Plateau), which is located at the southernmost extremity of the Truong Son mountain ridge, became an important ground for herpetological studies. This exceptional mountainous plateau encloses several conservation areas, such as Bidoup-Nui Ba National Park, Chu Yang Sin National Park (NP) and Hon Ba Nature Reserve (NR), represented by vast massifs of montane forests which refuge a very rich fauna. A number of new species of frogs and one new gecko were described from Langbian Plateau recently. However, while more or less comprehensive herpetofaunistic reports are available for Bidoup-Nui Ba NP (Paiarkov, Vasilieva, 2011) and Chu Yang Sin NP (Orlov et al., 2008; BirdLife International, 2010), the data on amphibians and reptiles of Hon Ba NR remain very fragmentary. Namely, they include the detailed inventory of lizard fauna with some comments on snakes and turtles (Bobrov, 2006) and records of some frog species (Nguyen et al., 2014; Vassilieva et al., 2014). At the same time, the amphibian fauna of the Reserve deserves more attention because of its potential richness and peculiarity: at least one species (*Kalophrynus honbaensis*) described from Hon Ba (Vassilieva et al., 2014) can be currently considered as local endemic, and several species are known to date only from Langbian Plateau.

Herein the preliminary data on amphibian and reptile fauna of Hon Ba Nature Reserve are presented.

### 2. Study site and methods

The range Hon Ba (elevations up to 1,570 m a.s.l.) forms the eastern edge of the Plateau Langbian relatively close to the Eastern Sea coast. This closeness and the influence of marine air masses ensure a rather specific local climate with increased humidity, which determines the singularity of Hon Ba forests (Kuznetsov et al., 2006).

The field survey was conducted from 14 to 19 June 2013 in two forested areas: in the environs of the Yersin station (N 12° 07' 16"; E 108° 56' 55", approximate elevations 1,400-1,500 m a.s.l.) and on the slopes of Hon Ba ridge (N 12° 06' 45"; E 108° 58' 45", approximate elevations 700-800 m a.s.l.). Both areas represent almost undamaged massifs of primary montane polydominant evergreen forest with the predominance of Fagaceae (*Lithocarpus*, *Quercus*), Elaeocarpaceae (*Elaeocarpus*), Fabaceae (*Archidendron*), Theaceae, Lauraceae, Illiciaceae, Dilleniaceae, Ebenaceae, Magnoliaceae, Sapotaceae, Rubiaceae and Ericaceae (Kuznetsov et al., 2006) and abundance of epiphytes and mosses. The rich hydrographic net is formed by rocky rivers, small cascade streams and temporary watercourses. Large granite rocks are abundant in some areas.

During the survey the temperature varied from 18 (at night) to 20-24°C (at day). The weather was rainy, with dense fogs.

The inventory of amphibian and reptile fauna as well as anuran larvae was conducted during the day and night surveys. All collected specimens were photographed in life and then preserved in ethanol (for adult specimens) or formalin (for larvae) after the sampling for genetic analysis. While collecting the larvae of hollow-breeding anurans, some parameters of the tree hollows were recorded (height above the ground, diameter of hole, approximate water capacity).

### 3. Results and discussion

In our survey we registered 29 species of amphibians and reptiles (16 and 13, respectively). To give more detailed insight of the herpetofauna of the Reserve, we supplemented our findings by the previously published data of Bobrov (2006) obtained during the field survey of the Joint Vietnam-Russian Tropical Research and Technological Center in 2003. The compiled list of amphibian and reptile species recorded in Hon Ba Nature Reserve is given in the Table 1.

**Table 1.** Provisional list of amphibians and reptiles found in Hon Ba Nature Reserve during the surveys of Joint Vietnam-Russian Tropical Research and Technological Center in 2003 and 2013

Nº	Species	Our data 2013	Bobrov, 2006
<b>Class AMPHIBIA</b>			
<b>Order Anura</b>			
<b>Fam. Bufonidae</b>			
1.	<i>Ingerophrynus galeatus</i> (Günther, 1864)	+	
<b>Fam. Megophryidae</b>			
2.	<i>Brachytarsophrys intermedia</i> (Smith, 1921)	+	
3.	<i>Leptobrachium leucops</i> Stuart, Rowley, Tran, Le & Hoang, 2011	+	
4.	<i>Leptobrachium pullum</i> (Smith, 1921) (larvae)	+	
5.	<i>Ophryophryne gerti</i> Ohler, 2003	+	
6.	<i>Xenophrys major</i> (Boulenger, 1908)	+	
<b>Fam. Rhacophoridae</b>			
7.	<i>Polypedates megacephalus</i> Hallowell, 1861	+	
8.	<i>Raorchestes gryllus</i> (Smith, 1924)	+	
9.	<i>Rhacophorus vampyrus</i> Rowley, Duong, Dao, Stuart & Huy, 2010 (clutch)	+	
10.	<i>Theloderma truongsongense</i> (Orlov & Ho, 2005)	+	

<b>Fam. Ranidae</b>			
11.	<i>Hylarana attigua</i> (Inger, Orlov & Darevsky, 1999)	+	
12.	<i>Hylarana montivaga</i> (Smith, 1921)	+	
<b>Fam. Dicroglossidae</b>			
13.	<i>Limnonectes poilani</i> (Bourret, 1942)	+	
14.	<i>Limnonectes</i> sp.	+	
<b>Fam. Microhylidae</b>			
15.	<i>Kalophrynus honbaensis</i> Vassilieva, Galoyan, Gogoleva & Poyarkov, 2014	+	
16.	<i>Microhyla arboricola</i> Poyarkov, Vassilieva, Orlov, Galoyan, Dao, Le, Kretova & Geissler, 2014	+	
<b>Class REPTILIA</b>			
<b>Order Squamata - Sauria</b>			
<b>Fam. Agamidae</b>			
17.	<i>Acanthosaura coronata</i> Günther, 1861	+	
18.	<i>Acanthosaura crucigera</i> Boulenger, 1885		+
19.	<i>Calotes bachae</i> Hartmann, Geissler, Poyarkov, Ihlow, Galoyan, Rödder, & Böhme, 2012	+	( <i>C. mystaceus</i> )
20.	<i>Calotes versicolor</i> (Daudin, 1802)	+	+
21.	<i>Draco indochinensis</i> Smith, 1928		+
22.	<i>Draco</i> sp.	+	+
23.	<i>Physignathus cocincinus</i> Cuvier, 1829		+
<b>Fam. Gekkonidae</b>			
24.	<i>Cyrtodactylus</i> sp. ( <i>irregularis</i> group)	+	( <i>Gonydactylus irregularis</i> )
25.	<i>Gekko gekko</i> (Linnaeus, 1758)	+	+
26.	<i>Hemidactylus frenatus</i> Schlegel, 1836	+	+
27.	<i>Hemidactylus platyurus</i> (Schneider, 1792)	+	+
<b>Fam. Lacertidae</b>			
28.	<i>Takydromus sexlineatus</i> Daudin, 1802	+	+

<b>Fam. Scincidae</b>			
29.	<i>Eutropis macularia</i> (Blyth, 1853)	+	
30.	<i>Eutropis multifasciata</i> (Kuhl, 1820)	+	
31.	<i>Lipinia vittigera</i> (Boulenger, 1894)	+	
32.	<i>Lygosoma corpulentum</i> Smith, 1921	+	
33.	<i>Sphenomorphus</i> sp.	+	
<b>Order Squamata - Serpentes</b>			
<b>Fam. Colubridae</b>			
34.	<i>Boiga</i> sp.	+	
35.	<i>Calamaria</i> sp.	+	
36.	<i>Dendrelaphis pictus</i> (Gmelin, 1789)	+	
37.	<i>Lycodon subcinctus</i> Boie, 1827	+	
38.	<i>Rhadinophis prasinus</i> (Blyth, 1854)	+	
<b>Fam. Natricidae</b>			
39.	<i>Rhabdophis chrysargos</i> (Schlegel, 1837)	+	+
40.	<i>Rhabdophis subminiatus</i> (Schlegel, 1837)	+	
41.	<i>Xenochrophis trianguligerus</i> (Boie, 1827)		+
<b>Fam. Pareasidae</b>			
42.	<i>Pareas carinatus</i> (Boie, 1828)		+
43.	<i>Pareas hamptoni</i> (Boulenger, 1905)	+	
<b>Fam. Pseudoxenodontidae</b>			
44.	<i>Pseudoxenodon macrops</i> (Blyth, 1854)	+	
<b>Fam. Elapidae</b>			
45.	<i>Ophiophagus hannah</i> (Cantor, 1836)		+
<b>Fam. Viperidae</b>			
46.	<i>Trimeresurus albolabris</i> Gray, 1842	+	+
<b>Order Testudines</b>			
<b>Fam. Testudinidae</b>			
47.	<i>Manouria impressa</i> (Günther, 1882)		+

Thus, the herpetofauna of Hon Ba Nature Reserve has numbers at least 47 species, including 16 amphibians and 31 reptiles. Undoubtedly, this list is not complete, which is caused by short periods of field surveys and their locality. Since the Langbian Plateau and neighboring mountain ridges are characterized by an extremely high herpetodiversity and endemism (Orlov, Ananjeva, 2007; Nguyen et al., 2009; Paiarkov, Vasilieva, 2011), the massif Hon Ba also may refuge a very rich fauna with locally endemic taxa.

At least one endemic species is known to date from Hon Ba Nature Reserve - the Hon Ba sticky frog *Kalophrynus honbaensis* (Microhylidae) (figure 1a). It was described recently (Vassilieva et al., 2014) on the basis of specimens collected during our field survey. Another microhylid frog, *Microhyla arboricola* described in 2014, is known currently only from Hon Ba Nature Reserve and Chu Yang Sin National Park (Poyarkov et al., 2014) (figure 1b).



**Figure 1.** *Kalophrynus honbaensis* (a) and *Microhyla arboricola* (b)  
(photo by V. Trounov).

Some of our findings represent certain interest in respect to amphibian and reptile species distribution. On the whole, the forests of Hon Ba at the elevations from 1,300 to over 1,500 m are inhabited by the representatives of montane faunistic complex common with the rest of Langbian Plateau: a range of species found in Hon Ba are common with Bidoup-Nui Ba and Chu Yang Sin forest massifs. For example, among anurans those are the megophryid frog *Leptobrachium leucops* previously known only from Bidoup and Hon Giao mountains (Bidoup-Nui Ba NP) (figure 2a); the rhacophorids *Raorchestes gryllus* and *Rhacophorus vampyrus* (figure 2b) (also known previously only from Bidoup-Nui Ba NP and Chu Yang Sin NP), the ranids *Hylarana attigua* and *H. montivaga*, etc. Our findings widen the known distribution of these species by adding the Khanh Hoa Province.



**Figure 2.** *Leptobrachium leucops* (photo by V. Trounov) (a) and *Rhacophorus vampyrus* (photo by A. Vassilieva) (b)

The reptiles of the Reserve fauna are represented by both widely distributed species like the synanthropic geckos *Hemidactylus* spp. or agamids *Calotes* spp. and *Physignathus cocincinus*, and species typical mostly for Truong Son Mountains forested areas like the gecko *Cyrtodactylus* sp. *irregularis* compl., the agamid *Acanthosaura* cf. *coronata* or the snakes *Pseudoxenodon macrops* and *Pareas hamptoni*.

Due to its location on the mountain ridge and slopes from about 200 to 1,500 m a.s.l., the Hon Ba Nature Reserve represents a great potential interest for the study of the altitudinal distribution of various amphibian and reptile species. For example, the montane species *Leptobrachium leucops* was observed only on the top of the ridge, whereas the widely distributed up to lowlands *L. pullum* was found at elevations 800 m a.s.l.; the rather montane slug snake *Pareas hamptoni* is replaced in the lower part of the slopes by its rather lowland congeneric *P. carinatus*, etc.

Also, the specific feature of the amphibian community inhabiting Hon Ba Nature Reserve is a remarkable diversity and high number of hollow-breeding frogs. During our survey we recorded in total almost 30 water-filled tree hollows containing frog eggs and/or larvae: 24 tree hollows with clutches and/or tadpoles of *Microhyla arboricola*, 4 tree hollows with clutches or tadpoles of *Theloderma truongsongense* and 1 tree hollow with a clutch of *Rhacophorus vampyrus*. The number of tree hollows suitable for reproduction is a factor of competition in the local tree-dwelling amphibians, because we observed twice the use of tree hollows by two species simultaneously, and several clutches of *M. arboricola* were observed in decidedly unsuitable tree hollows (too small or dry).

We conclude that the Hon Ba Nature Reserve represents an extremely promising area in respect to its herpetodiversity and is very perspective for the herpetological studies in the field of taxonomy, ecology and reproductive biology.

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## TÓM TẮT

### KHU HỆ ĐỘNG VẬT CAO NGUYÊN LANGBIAN, MIỀN NAM VIỆT NAM: CÁC LOÀI LƯỠNG CƯ VÀ BÒ SÁT CỦA KHU BẢO TỒN THIÊN NHIÊN HÒN BÀ

Việc khảo sát thực địa tại Khu Bảo tồn thiên nhiên Hòn Bà đã được tiến hành vào tháng 6 năm 2013; 16 loài lưỡng cư và 13 loài bò sát được ghi nhận ở các sinh cảnh rừng trên địa hình đỉnh núi (1.400 - 1.500 m) và trên địa hình sườn núi (700 - 800 m). Tổng cộng, đã phát hiện và ghi nhận 16 loài lưỡng cư và 31 bò sát cho Khu Bảo tồn, trong đó có một loài đặc hữu *Kalophrynus honbaensis*. Mặc dù một số loài có phân bố rộng được ghi nhận cho Khu hệ bò sát - lưỡng cư của Khu Bảo tồn thiên nhiên Hòn Bà, song các đại diện thường là những loài sống trên núi thuộc cao nguyên Langbian. Rõ ràng, sự phân bố theo độ cao của các loài xảy ra giữa đỉnh núi và những phần dưới của sườn núi. Đã ghi nhận được sự đa dạng cao và độ phong phú của các loài ếch cây sống trong hốc (*Microhyla arboricola*, *Rhacophorus vampyrus*, *Theloderma truongsonense*).

*Từ khóa:* Fauna, Hon Ba Nature Reserve, herpetofauna, amphibians, reptiles.

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