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A NEW RECORD OF *Cyrtodactylus soni* Le, Nguyen, Le & Ziegler, 2016 (Reptilia: Squamata: Gekkonidae) FROM HOA BINH PROVINCE AND THREAT ASSESSMENT

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ABSTRACT

A new population of the Son's Bent–toed Gecko (*Cyrtodactylus soni*), an endemic species of Vietnam, is reported for the first time from Hoa Binh province based on three adult male specimens collected in June 2018 in a karst cave of Dong Tam commune, Lac Thuy district. The population of this species in Hoa Binh province is threatened by habitat loss through converting forest to agriculture and quarrying of limestone. Assessment of population status in the study area is urgently needed to provide baseline data for conservation measures.

Keywords: *Cyrtodactylus soni*, distribution, new record, threat assessment.

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INTRODUCTION

Cyrtodactylus soni Le, Nguyen, Le & Ziegler, 2016 is currently known as an endemic species in Vietnam. The species was originally described from the limestone karst forest of the Van Long Nature Reserve, Ninh Binh province by Le et al. (2016). Luu et al. (2018) recently expanded the species distribution from the limestone forest of Thanh Son commune, Kim Bang district, Ha Nam province.

Pursuing our on–going research on taxonomy and zoogeography of the genus *Cyrtodactylus* from Vietnam (Luu et al., 2011, 2017, 2018; Nguyen et al., 2018), we investigated diverse localities in Hoa Binh province along the border with Ninh Binh province, with a special emphasis on karst formations and related limestone forests. Based on morphological examination of these specimens, they matched with morphological characters of *Cyrtodactylus soni*. Thus, we herein provide a new record of *Cyrtodactylus soni* from Hoa Binh province.

MATERIALS AND METHODS

Sampling

Field surveys were carried out in June 2018 in the limestone forest of Dong Moi village, Dong Tam commune, Lac Thuy district, Hoa Binh province. Specimens were euthanized in a closed vessel with a piece of cotton wool containing ethyl acetate (Simmons, 2002) and fixed in approximately 85% ethanol, then later transferred to 70% ethanol for permanent storage. Specimens (VNUF RHB.2018.01, VNUF RHB.2018.02, and VNUF RHB.2018.03) were subsequently deposited in the collection of the Vietnam National University of Forestry (VNUF), Ha Noi, Vietnam.

Morphological characters

Measurements were taken following Luu et al. (2017) with a digital calliper to the nearest 0.1 mm. Abbreviations are as follows: snout–vent length (SVL), from tip of snout to anterior margin of cloaca; m ± SD: SVL mean ± standard deviation; tail length (TaL), from posterior margin of cloaca to tip of tail; from posterior edge of forelimb insertion to anterior edge of

hindlimb insertion; maximum head height (HH), from occiput to underside of jaws; head length (HL), from tip of snout to the posterior margin of the retroarticular; maximum head width (HW); greatest diameter of orbit (OD); snout to eye distance (SE), from tip of snout to anterior corner of eye; scale counts were taken as follows: supralabials (SL); infralabials (IL); granular scales surrounding dorsal tubercles (GST); ventral scales in longitudinal rows at midbody (V); number of scales along the midbody from mental to anterior edge of cloaca (SLB); precloacal pores (PP); postcloacal tubercles (PAT); subdigital lamellae on fourth finger (LD4); subdigital lamellae on fourth toe (LT4). Bilateral scale counts were given as left/right.

RESULTS AND DISCUSSION

Cyrtodactylus soni from Hoa Binh province, Vietnam (Fig. 1 A-C)

Specimens examined (*n = 3*). Three adult males (VNUF RHB.2018.01, VNUF RHB.2018.02, and VNUF RHB.2018.03) were collected on 9 June 2018 by Luu Q. Vinh & Lo V. Oanh inside of a karst cave (20°25.574'N, 105°51.153'E, elevation 24 m a.s.l.) of Dong Moi village, Dong Tam commune, Lac Thuy district, Hoa Binh province, Vietnam.

Morphological characters of the specimens from Hoa Binh province agreed with the description of *Cyrtodactylus soni* by Le et al. (2016). Medium–size **(**SVL) 86.1–92.5 mm (mean ± SD: 88.4 ± 3.6 mm); tail length (TaL) 101.2–108.6 mm (mean ± SD: 105 ± 3.7mm); head elongated, depressed (mean HW/mean HL 0.67), distinct from neck; loreal region concave; snout long (mean SE/mean HL 0.41), longer than diameter of the orbit (mean OD/mean SE 0.51); snout scales small, granular; eye large (mean OD/mean HL 0.21), pupils vertical; ear oval shaped, small; rostral wider than high, rostral bordered by nostril, and first supranasal on each side; nares round, surrounded by supranasal, rostral, first supralabial, and three postnasals; mental triangular; postmentals two, enlarged, in broad contact posteriorly, bordered by mental anteriorly, first infralabial laterally, and an enlarged chin scale posteriorly; supralabials 10–11; infralabials 9–10. Dorsal scales granular; dorsal tubercles round, conical, present on occiput and back, each surrounded by 9 granular scales; ventral scales smooth, medial scales 2 or 3 times larger than dorsal scales, round, in 39–41 longitudinal rows at midbody; lateral skin folds distinct without tubercles; gular region with homogeneous smooth scales; 173–179 ventral scales between mental and cloacal slit; precloacal groove absent; enlarged femoral scales present; precloacal pores 6–8, in a continuous row; femoral pores 6–8 on each side in males; postcloacal tubercles 3; subcaudals enlarged; dorsal surface of fore and hind limbs with tubercles; fingers and toes without distinct webbing; lamellae under fourth finger 18–19, under fourth toe 20–22.

Coloration in life. Head dorsally greyish brown with dark spots, enlarged posteriorly; distinct dark brown nuchal loop, interrupted in the adult male (VNUF RHB.2018.02); neck with dark brown bands or blotches; dorsum with four to five dark brown transverse body bands between limb insertions, somewhat irregular; dorsal tubercles yellowish brown; dorsal surface of fore– and hind–limbs with dark bars; upper surface of tail dark grey with five to eight light transverse annuli not entirely encircling the tail; ventral surface of head, venter, limbs uniformly cream, ventral surface of tail uniformly yellowish grey.

Remarks. Specimens from Hoa Binh province slightly differ from the original description of Le et al. (2016) by having fewer number of scales (175–184 *versus* 186–212 in type series) along the midbody from mental to anterior edge of cloaca, slightly more precloacal pore counts in males (6–8 *versus* 6–7 in type series), more regularly arranged dark transverse bands on body (*versus* irregularly arranged ones in type series), and also less dark markings in the interior parts of dorsal head of two specimens.

Distribution. *Cyrtodactylus soni* was originally described from the type locality in the Van Long Nature Reserve, Ninh Binh province. This species is found for the first time from the neighboring Hoa Binh province. The record (20°25.574'N, 105°51.153'E) in Hoa Binh province is about 2 km far from the type locality of *C. soni* in Ninh Binh province (20°25.067'N, 105°51.467'E) (Fig. 2).

Ecological notes. Specimens were collected between 21:15 and 21:22 in a karst cave, approximately 1.0–1.5 m above the ground, at an

elevation of 24 m a.s.l. The air temperature was 26.9°C and the relative humidity at the time of collection was 88% (Fig. 3). The surrounding habitat was agricultural farms.

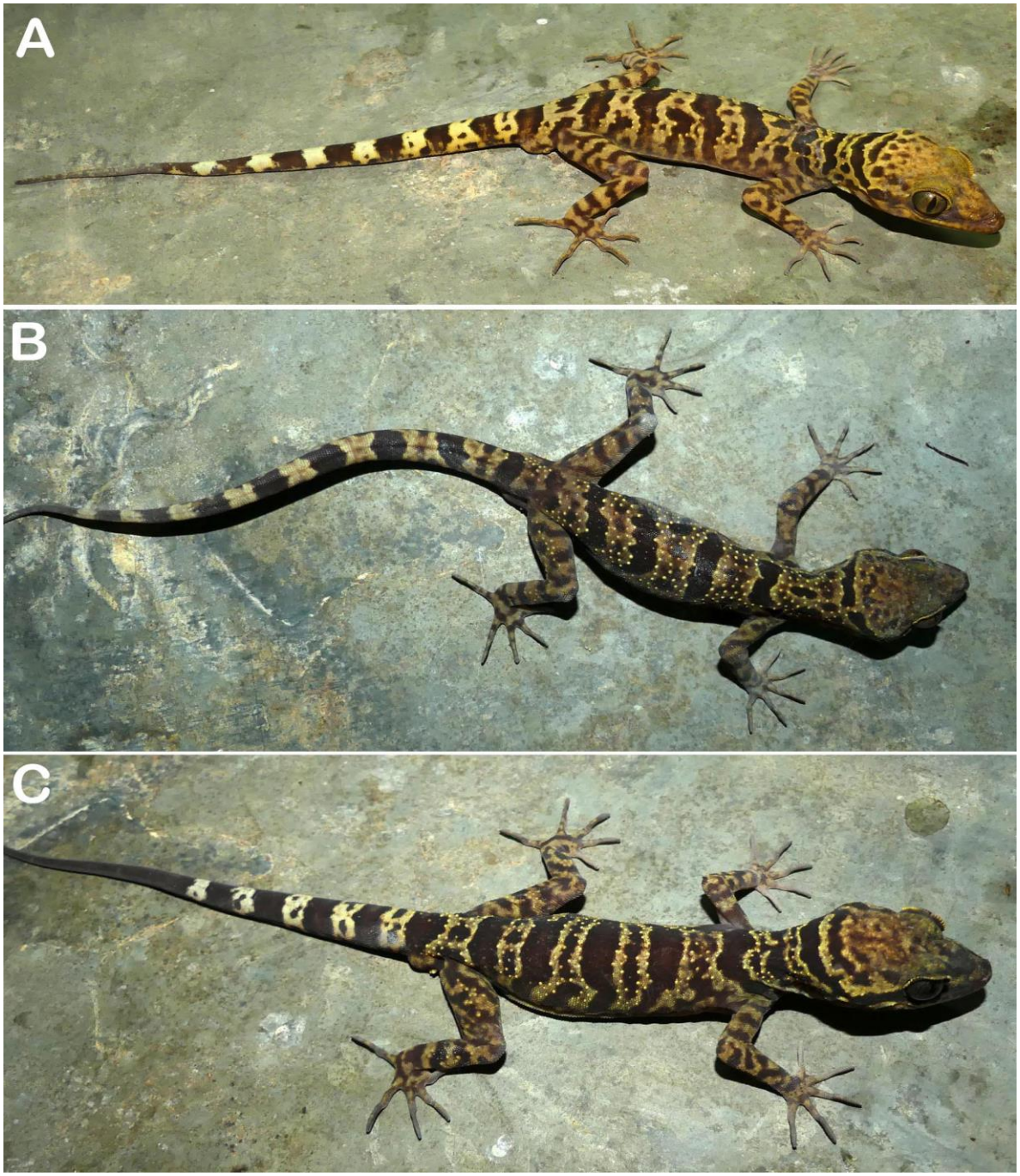

Figure 1. Dorsal view of the *Cyrtodactylus soni* in life from Hoa Binh province: (A) Adult male (VNUF RHB.2018.01); (B) Adult male (VNUF RHB.2018.02), (C) Adult male (VNUF RHB.2018.03)

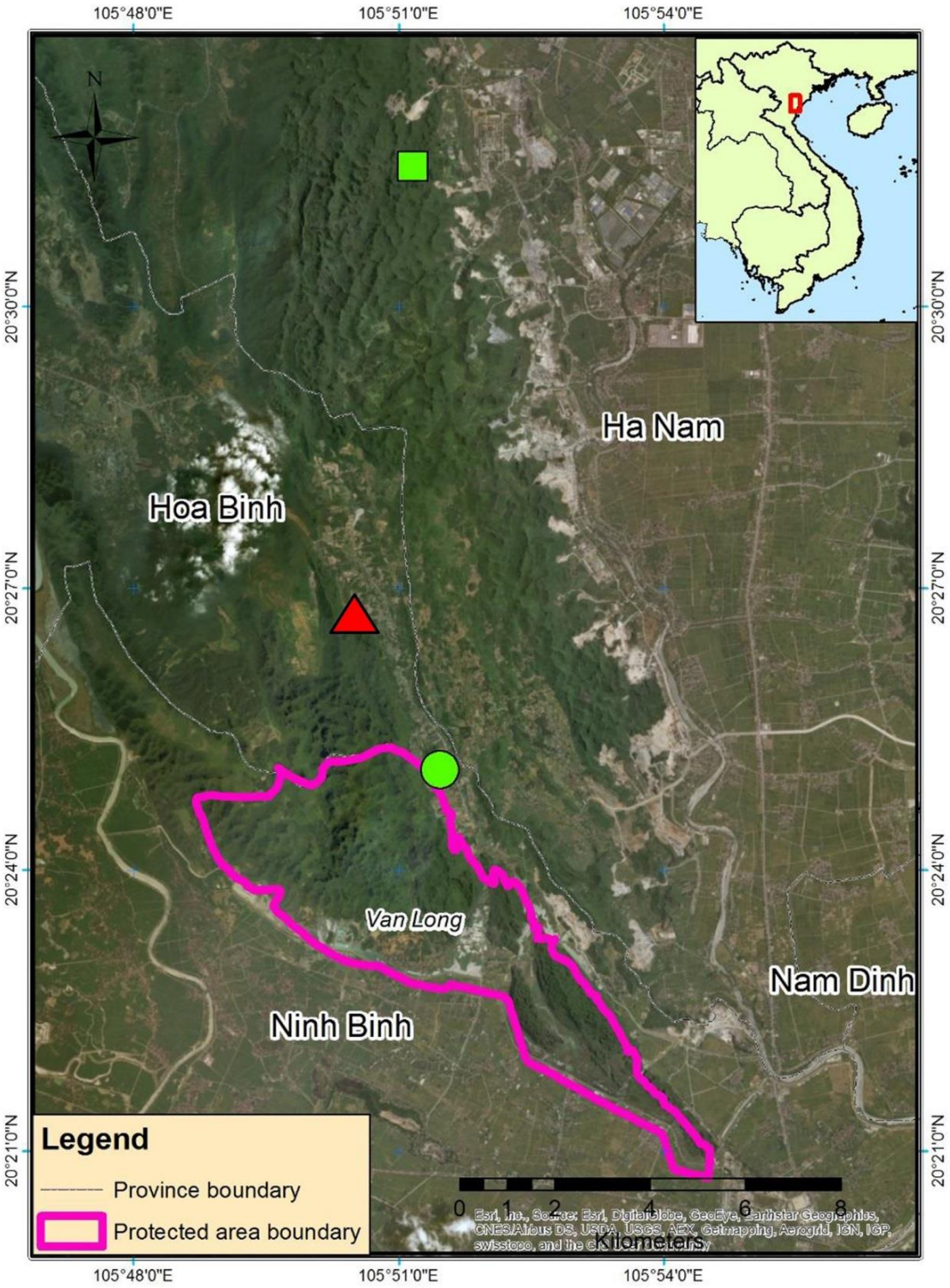

Figure 2. Updated distribution map of *Cyrtodactylus soni*: new record from Hoa Binh province (red triangle), recorded location from Ha Nam province (green square) and the type locality from Ninh Binh province (green circle)

Figure 3. Microhabitat of *Cyrtodactylus soni* in a karst cave of Dong Moi village, Dong Tam commune, Lac Thuy district, Hoa Binh province

DISCUSSION

The limestone karst cave, where *Cyrtodactylussoni* was collected, is located in orange and corn farms in Hoa Binh province. Surrounding forest has been converted into agricultural land and quarrying is another threat to the habitat of this species (Fig. 4).

Since only three adult males of the species were collected in a short period of surveys, it is questionable whether this population of the species can survive long term in the study area. Further studies on population status are crucially required to provide baseline data for conservation measures.

Figure 4. Threats to the population of *Cyrtodactylus soni*: A) habitat disturbance and B) quarrying site

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