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# A new cave-dwelling species of *Cyrtodactylus* Gray, 1827 (Squamata: Gekkonidae) from Khammouane Province, southern Laos

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## Abstract

A new cave-dwelling bent-toed gecko, *Cyrtodactylus lomyenensis* **sp. nov.** is described from a karst forest in Gnommalath District, Khammouane Province, southern Laos. It differs from all other species of Indochinese-Thai *Cyrtodactylus* in the following combination of characters: maximum SVL of at least 71.2 mm; head dorsum yellowish with irregular brown blotches; presence of a brown nuchal loop reaching the posterior edge of the orbit; four narrow yellowish–cream transversal bands with irregular anterior and posterior black edges on a brown background between limb insertions; no precloacal groove; 39–40 precloacal-femoral pores in males, arranged in a continuous row; females with 32 precloacal–femoral pores in a continuous row, smaller than those of males; five postanal tubercles on each side; 16–18 subdigital lamellae on first toe; 19–23 subdigital lamellae on fourth toe; no tubercles on tail dorsum; and a median row of enlarged subcaudal scales.

**Key words:** *Cyrtodactylus*, Gekkonidae, description, new species, Khammouane, Laos, cave-dwelling

## Introduction

Stuart (1999) reported that the gecko fauna of Laos consisted of ten species, including two *Cyrtodactylus*, *C. interdigitalis* Ulber and *C. jarujini* Ulber. David *et al.* (2004) described an additional species, *Cyrtodactylus buchardi*, based on a single juvenile specimen collected in Xepian National Biodiversity and Conservation Area in Champasak Province, Southern Laos. Grismer (2010) added a new genus to the Lao gecko fauna while describing *Cnemaspis laoensis* from Dong Phu Vieng National Protected Area in Savannakhet Province. Nguyen *et al.* (2010) also added a new species, *Cyrtodactylus wayakonei*, from Northern Laos. This gives a current total of only 13 gecko species recorded for the whole country. The low *Cyrtodactylus* diversity reported so far from Laos, adjacent to Thailand and Vietnam which harbor a comparatively rich gecko fauna (respectively 19 and 20 species, see e.g., Bauer *et al.* 2010, Ngo *et al.* 2010), is most probably an artifact due to a lack of field surveys.

In April 2010, one of us (NVT) conducted dedicated field surveys, especially in karst areas known elsewhere to harbor many geographically restricted gecko taxa. Numerous karst hills scattered from the Vietnam—Laos border to Thakhek town running northwestwards in Khammouane Province contain an abundance of caves. Four specimens of a medium-sized slender gecko taxon were collected from Lomyen Cave, on a forested karst outcrop in the Gnommalath District, Khammouane Province, southern Laos. This gecko species, with its vertical pupils and bent toes, belongs to the genus *Cyrtodactylus* Gray, 1827 but shows a distinct combination of characteristics and cannot be assigned to any previously described species; we consequently describe it herein as new.

## Material and methods

Field work took place on 26–30 April 2010. Geographical coordinates were taken with a Garmin III GPS. Specimens were photographed using a LINUX DMC – FZ30 digital camera. Liver tissue was taken prior to preservation

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and stored in 95% ethanol for future studies. Specimens were then fixed with 10% formalin and subsequently stored in 70% ethanol. All specimens have been deposited at the Zoological Collection of the Faculty of Biology, University of Natural Sciences (UNS), Hochiminh City, Vietnam.

Measurements used follow Bauer (2003) and Grismer (2005). Measurements were taken with a dial caliper (to the nearest 0.1 mm): snout–vent length (SVL: from tip of snout to vent); internarial distance (Internar: distance between nares); interorbital distance (Interorb: shortest distance between left and right supracilliary scale rows); head length (HeadL: distance between retroarticular process of jaw and snout-tip); head width (HeadW: maximum width of head); head height (HeadH: maximum height of head, from occiput to underside of jaws); ear length (EarL: longest dimension of ear); orbital diameter (OrbD: greatest diameter of orbit); nares to eye distance (NarEye: distance between anteriormost point of eye to posterior point of nostril); snout to eye distance (SnEye: distance between anteriormost point of eye and tip of snout); eye to ear distance (EyeEar: distance from anterior edge of ear opening to posterior corner of eye); trunk length (TrunkL: distance from axilla to groin measured from posterior edge of forelimb insertion to anterior edge of hindlimb insertion); forearm length (ForeaL: from base of palm to tip of elbow); crus length (CrusL: from base of heel to knee); tail length (TailL: from vent to tip of tail); tail width (TailW: measured at widest point of tail). Measurements and scale counts were made on the right side of specimens unless otherwise stated.

Scale counts and external morphological observations follow Bauer (2003) and Grismer (2005): Supralabials (SupL) and infralabials (Infra) counted from the first labial scale to the corner of mouth; intersupranasal scales (IntersupS: number of scales in broad contact with the supranasal); enlarged lateral chinshield (Enlar–chin: number of enlarged lateral chinshields in contact with first postmental); frontal scales (FronS: number of scales in a straight line between the right and the left edges of frontal bone); orbit–nostril scales (Orb–nosS: number of scales in a straight line from the anterior edge of orbit to the posterior edge of nostril); tubercle rows (TubR: number of dorsal longitudinal rows of tubercles at midbody between the lateral folds); paravertebral tubercles (Paravert: dorsal tubercles counted in a single paravertebral row between the forelimb and hindlimb insertions); ventral scales (VenS: counted across the belly between the ventrolateral folds at midbody); precloacal pores (Pre–pores: number of precloacal pores); femoral pores (Fem–pores: number of femoral pores beneath each thigh); enlarged femoral scales (EnlfemS: number of enlarged femoral scale beneath each thigh); postcloacal tubercles (PCT: number of tubercles on each side of postanal region); number of subdigital lamellae beneath each finger (NSF I – NSF V: from finger I to V); number of subdigital lamellae beneath each toe (NST I – NST V: from toe I to V).

Comparisons were made with material housed in the Zoological Collection of the University of Natural Sciences, Hochiminh City, as well as with original published descriptions, data, and illustrations provided in broader faunal and taxonomic treatments (e.g., Smith 1935; Taylor 1963; Brown & Parker 1973; Ulber & Grossmann 1991; Ulber 1993; Darevsky & Szczerbak 1997; Das 1997, 2006; Das & Lim 2000; Ziegler *et al*. 2002, 2010; Bauer 2002, 2003; Bauer *et al*. 2002, 2003, 2009, 2010; Günther & Rösler 2003; David *et al*. 2004; Pauwels *et al*. 2004; Batuwita & Bahir 2005; Grismer 2005; Grismer & Leong 2005; Kraus & Allison 2006; Nguyen *et al*. 2006; Youmans & Grismer 2006; Grismer *et al*. 2007, 2008; Heidrich *et al*. 2007; Hoang *et al*. 2007; Orlov *et al*. 2007; Grismer & Ahmad 2008; Hayden *et al*. 2008; Kraus 2007, 2008; Rösler *et al*. 2007, 2008; Linkem *et al*. 2008; Nazarov *et al*. 2008; Rösler & Glaw 2008; Ngo 2008; Ngo & Bauer 2008; Ngo *et al*. 2008 & 2010; Oliver *et al*. 2008, 2009; Geissler *et al*. 2009; Mahony 2009; Welton *et al*. 2009 & 2010; Chan & Ahmad 2010; Lei & Hui 2010; Ngo & Chan 2010; Nguyen *et al*. 2010; Sumontha *et al*. 2010).

## Systematics

### *Cyrtodactylus lomyenensis* sp. nov.

Plates 1–2

**Holotype.** UNS 0534, adult male collected by Ngo Van Tri on 30 April 2010 at the entrance of Lomyen Cave on a karst hill in Gnommalath District, Khammouane Province, southern Laos (17°35.072'N, 105°13.022'E) at 150–200 m elevation.

**Paratypes.** UNS 0527, subadult female, was collected by Ngo Van Tri between 19h00 and 20h00 on 26 April 2010 at the entrance of Lomyen Cave. Paratypes UNS 0532, adult female, and UNS 0533, adult male, were collected from the same locality as the holotype around 20h00 on 28 April 2010.

**Diagnosis.** *Cyrtodactylus lomyenensis* **sp. nov**. differs from all other congeners by the following combination of characters: maximum SVL of at least 71.2 mm; original tail long (TailL/SVL: 121%); head dorsum yellowish with irregular brown blotches; brown nuchal loop reaching the posterior edge of the orbit; dorsal pattern consisting of four narrow yellowish-cream transversal bands with irregular anterior and posterior black edges on a brown background between limb insertions; 0–1 intersupranasals; 3–4 enlarged lateral chinshields in contact with first postmental; 17–18 interorbital scales on the frontal bone; 19–22 scales in a straight line between eye and nostril; 20–24 irregular, longitudinal rows of weakly-keeled, conical tubercles at midbody between the lateral folds; 33–35 paravertebral tubercles between limb insertions; 35–36 rows of ventral scales between weakly-developed ventrolateral folds; 39–40 precloacal-femoral pores in males; 32 smaller precloacal-femoral pores in female; 5 postanal tubercles on each side; 16–18 subdigital lamellae on first toe; 19–23 subdigital lamellae on fourth toe; 12–13 rings on original tail; median row of enlarged subcaudal scales (see Tables 1–2).

**Description of holotype.** Adult male, SVL 71.2 mm (**Plate 1A**). Head moderately long (HeadL/SVL: 28%), relatively narrow (HeadW/HeadL: 65%), depressed (HeadH/HeadL: 35%), distinct from neck; lores and interorbital region inflated, canthus rostralis not prominent, frontonasal region concave; snout elongate (SnEye/HeadL: 39%), pointed, longer than eye diameter (OrbD/SnEye: 68%); scales on snout small, rounded, granular, homogeneous, larger than those on occipital region. Eye large (OrbD/HeadL: 27%), pupils dark blue with yellow crenulated margins; supraciliaries short, bearing tiny conical spines posteriorly. Ear opening oval, oblique, relatively large (EarL/HeadL: 12%); eye to ear distance greater than diameter of eye (EyeEar/OrbD: 111%). Rostral scale smooth, incompletely divided posteriorly by shallow inverted Y-shaped dorsal groove; two enlarged supranasals in broad contact, followed posteriorly by six smaller scales (**Plate 2A**); rostral in contact with first supralabial and nostril; nostril oval, surrounded by supranasal, rostral, first supralabial, and two enlarged postnasals; 2–3 rows of small scales separate orbit from supralabials. Mental triangular, wider (2.6 mm) than deep (1.9 mm); one pair of enlarged postmentals, in broad contact medially, bordered anteromedially by mental, bordered anterolaterally by first and second infralabials, posterolaterally by three enlarged lateral chinshields (**Plate 2B**). Ten supralabials on both sides to midorbital position; 14 supralabials to the eye angle in both sides; 18 interorbital scale rows on the frontal bone; 22 scales between eye and nostril.

Body slender, elongate (TrunkL/SVL: 40%). Dorsal scales conical; regularly distributed weakly keeled tubercles (3–5 times size of adjacent scales) extend from occipital region to base of tail; tubercles arranged in 20 rows at midbody between weakly developed ventrolateral folds (**Plate 2C**); tubercles are smallest on flanks and occipital region; 33 paravertebral tubercles between limb insertions. Ventral scales larger than dorsals, smooth, relatively round, subimbricate, largest posteriorly; 35 scale rows across belly between ventrolateral folds **(Plate 2D)**; gular region with relatively homogeneous, smooth scales. Precloacal groove absent; precloacal scales enlarged; twelve precloacal pores arranged in a chevron connected with 14 femoral pores in 18 enlarged, femoral scales beneath thigh **(Plate 2E)**. Scales on palm and hind limbs smooth, granular, hind limbs scattered, weakly keeled tubercles which are smaller than those on dorsum, relatively enlarged scales on each heel.

Fore and hindlimbs moderately slender (ForeL/SVL: 15%; CrusL/SVL: 18%); digits moderately slender, strongly inflected at basal interphalangeal joints, all bearing slightly curved claws; basal subdigital lamellae nearly as broad as digit, without scansorial surface: 8–8–9–7–7 (manus); 7–7–9–10–10 (pes); narrow lamellae distal to digital inflection and not including ventral claw sheath: 10–11–11–12–10 (manus), 11–11–12–13–13 (pes); one or two rows of small, non lamellar granules between basal and distal lamellar series; interdigital webbing present but weakly developed. Relative length of digits in mm: IV (6.4) > III (6.3) > V (5.9) > II (5.2) > I (4.7) (manus); V (7.5) > IV (L) (7.2) > III (6.1) > II (5.6) > I (4.1) (pes).

Tail regenerated; tail length 86.1 mm, slender, tapering to a point; longer than snout-vent-length (TailL/SVL: 121%); five smooth, whitish postanal tubercles at base; base of tail with six parasagittal and four longitudinal rows of keeled, paravertebral tubercles on each side of the midline; no tubercles present on tail dorsum; ventral scales smooth, juxtaposed; median row of enlarged subcaudal scales throughout the length of tail.

**Coloration in life (Plate 1A).** Yellowish head dorsum with small irregular brown blotches; eye rings yellowish; brown nuchal loop reaching the posterior edge of the orbit; dorsum background color brown; four yellowish-cream transversal bands on dorsum with irregular dark edges (anterior edges darker than posterior ones) between limb insertions; one similar band immediately posterior to hind limbs, followed by the regenerated tail portion, which is brown, scattered with small darker spots; dorsal side of limbs light brown, with scattered light blotches; ventral side of body whitish.

**Variation.** Color variations of *Cyrtodactylus lomyenensis* are shown in **Plate 1B** – **1C**. Dorsum coloration of paratypes similar to holotype (dark edges of dorsal light bands less irregular in the subadult UNS 0527). Original tail with ca. twelve dark brown and white rings alternating, yellowish in proximal half, whitish in distal half of the tail, in adults and subadults. Tail white in hatchlings (based on the observation *in situ* of a hatchling-size individual that could not be caught). Voucher specimens are lighter in preservation. Meristical and morphometrical variation among types are presented in Table 1.

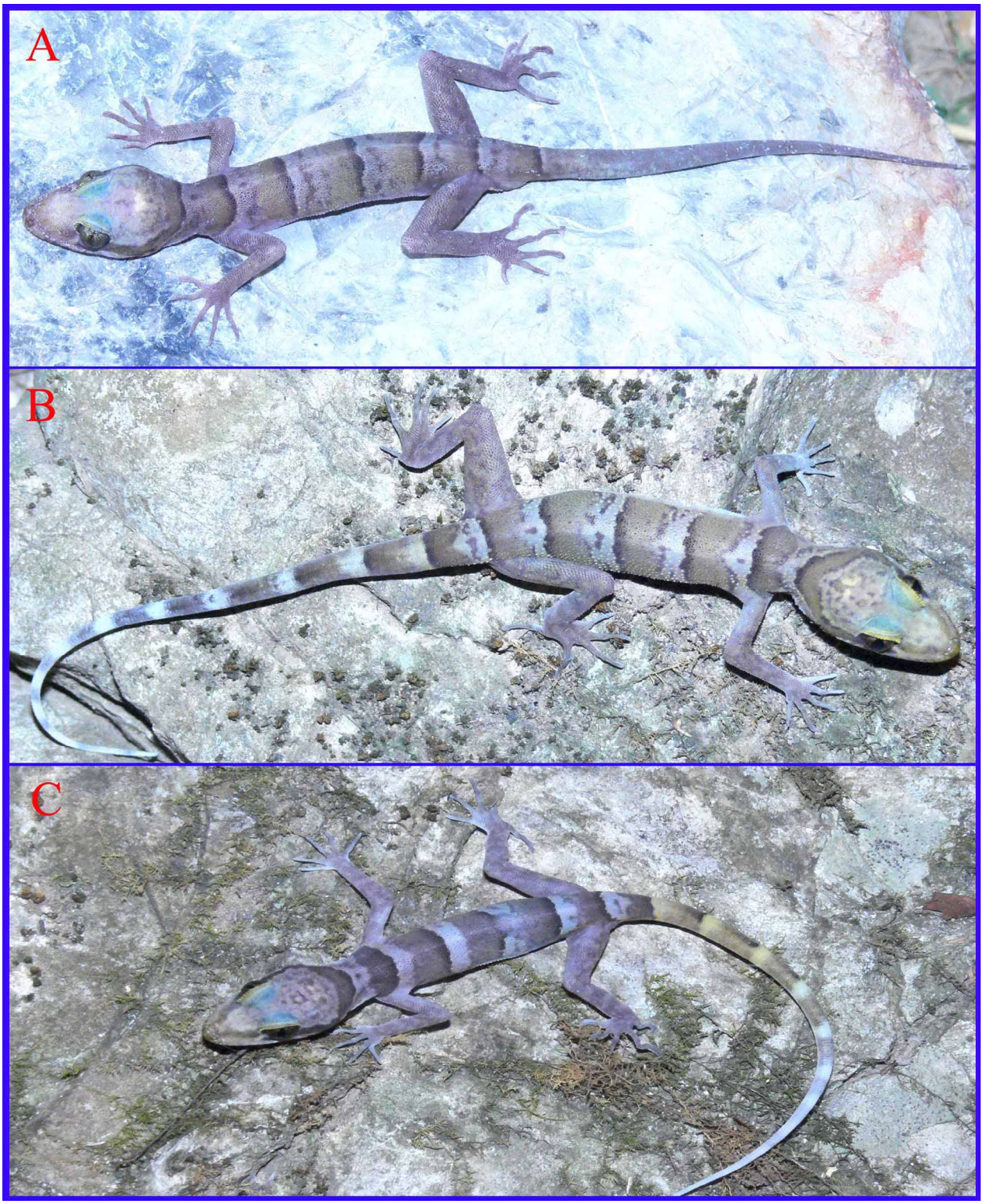


**PLATE 1A:** Adult male holotype of *Cyrtodactylus lomyenensis* (UNS 0534); **1B**: Adult female paratype (UNS 0532); **1C**: Subadult female paratype (UNS 0527).

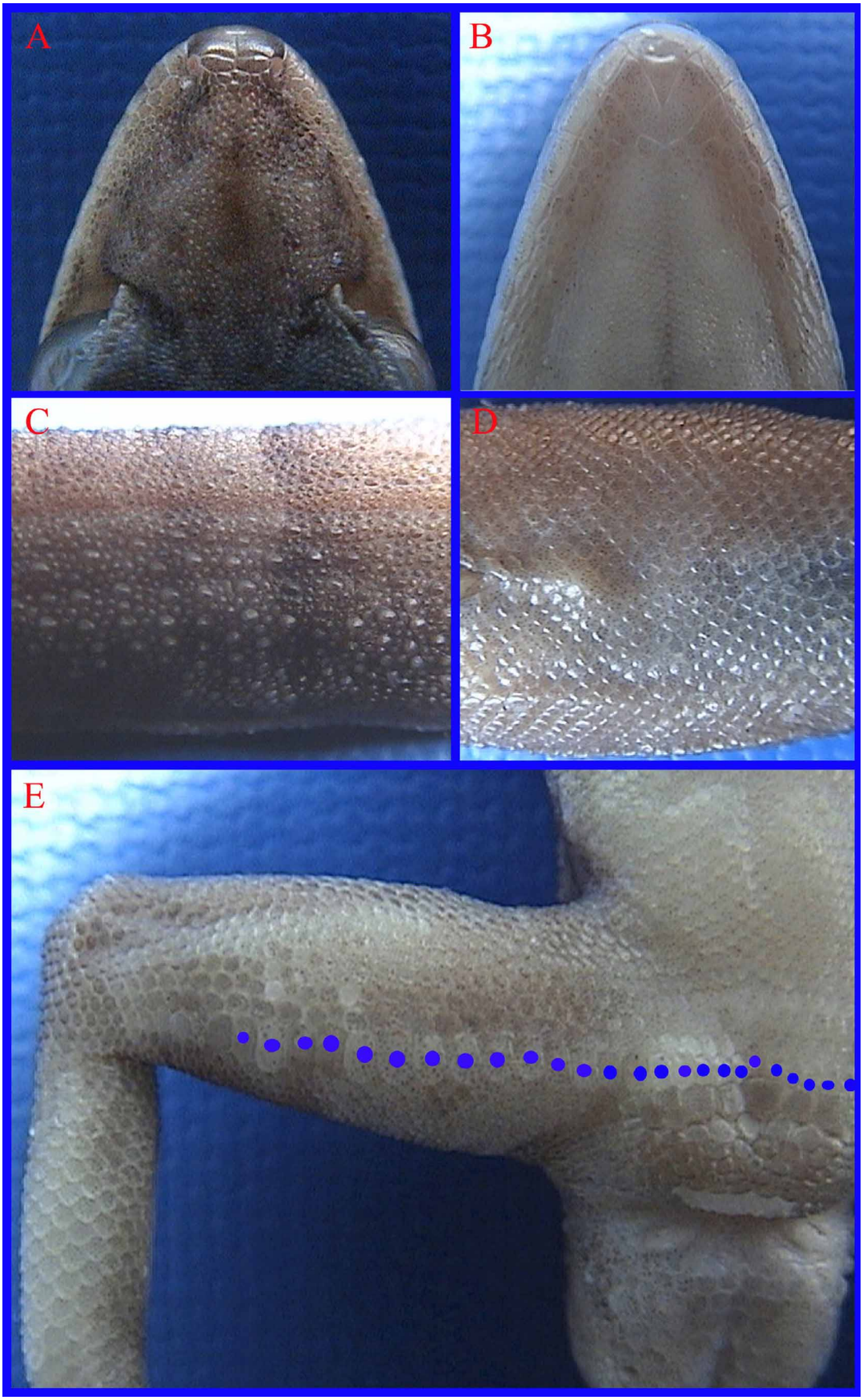


**PLATE 2.** Holotype of *Cyrtodactylus lomyenensis* **sp. nov.** showing: **A:** Rostral scale; **B:** Mental scales; **C**: Tubercle rows on the dorsum; **D:** Ventral scale rows; **E:** Precloacal-femoral pores connected beneath the right thigh, pores marked with blue dot.

**Etymology.** The specific epithet is derived from the name of Lomyen Cave. Suggested common names: Lomyen Bent-toed Gecko (English); Thằn lằn chân ngón Lomyen (Vietnamese); Khi Kiem Tham Lomyen (Lao); Cyrtodactyle de Lomyen (French); Tuk kai Tham Lomyen (Thai).

**Distribution and natural history.** *Cyrtodactylus lomyenensis* is currently known only from its type locality in southern Laos (Fig. 1). Lomyen Cave is situated on a forested karst hill (Fig. 2). All specimens were observed and collected at night at the cave entrance. A hatchling was observed in a karst crevice at dawn but eluded capture. This species is probably not a true cave obligate, but rather a troglophile, using this environment as a convenient foraging and shelter area. One large Pitviper–*Protobothrops mucrosquamatus* (Cantor) (Viperidae) was observed and photographed near Lomyen Cave entrance. The call of *Gekko gecko* (Linnaeus) (Gekkonidae) was heard in the dry forest around the karst hill.

**TABLE 1.** Mensural and meristic data for the type series of *Cyrtodactylus lomyenensis* **sp. nov.** Abbreviations are stated in the Materials and Methods. Measurements are in mm; F = female; M = male; Reg = regenerated tail.

| | Holotype UNS 0534 | Paratype UNS 0533 | Paratype UNS 0532 | Paratype UNS 0527 | min-max $\bar{x}_{\pm}$ s.d. |
|---|---|---|---|---|---|
| Sex | M | M | F | F (subadult) | 2 M, 2 F |
| SVL | 71.2 | 69.1 | 68.2 | 57.7 | 57.7 – 71.2<br>66.6 ± 6.0 |
| HeadL | 19.9 | 18.3 | 18.0 | 16.1 | 16.1 – 19.9<br>18.1 ± 1.6 |
| HeadW | 13.0 | 12.1 | 11.4 | 10.6 | 10.6 – 13.0<br>11.8 ± 1.0 |
| HeadH | 6.9 | 5.9 | 5.6 | 5.4 | 5.4 – 6.9<br>6.0 ± 0.7 |
| SnEye | 7.8 | 7.7 | 7.4 | 6.2 | 6.2 – 7.8<br>7.3 ± 0.8 |
| NarEye | 6.1 | 5.8 | 5.7 | 4.9 | 4.9 – 6.1<br>5.6 ± 0.5 |
| OrbD | 5.3 | 5.2 | 5.3 | 4.6 | 4.6 – 5.3<br>5.1 ± 0.3 |
| EyeEar | 5.9 | 4.7 | 5.3 | 4.5 | 4.5 – 5.9<br>5.1 ± 0.6 |
| EarL | 2.4 | 2.3 | 2.2 | 1.7 | 1.7 – 2.4<br>2.2 ± 0.3 |
| InterNar | 1.8 | 1.7 | 1.7 | 1.4 | 1.4 – 1.8<br>1.7 ± 0.2 |
| InterOrb | 6.5 | 5.6 | 5.9 | 5.1 | 5.1 – 6.5<br>5.8 ± 0.9 |
| TrunkL | 28.5 | 28.4 | 20.7 | 22.1 | 20.7 – 28.5<br>24.9 ± 4.1 |
| ForeaL | 10.7 | 10.2 | 10.1 | 8.9 | 8.9 – 10.7<br>10.0 ± 0.8 |
| CrusL | 12.9 | 12.7 | 12.6 | 11.0 | 11.0 – 12.9<br>12.3 ± 1.1 |
| TailL | 86.1 (Reg) | 82.9 (Reg) | 72.2 | 73.9 | 72.2 – 86.1<br>78.8 ± 6.8 |
| TailW | 5.3 | 5.0 | 4.6 | 4.0 | 4.0 – 5.3<br>4.7 ± 0.6 |
| SupL | 13 | 13 | 14 | 14 | 13 – 14 |
| Infra | 11 | 11 | 11 | 11 | 11 |

continued next page

**TABLE 1.** (continued)

| | Holotype UNS 0534 | Paratype UNS 0533 | Paratype UNS 0532 | Paratype UNS 0527 | min-max $\bar{x}_{\pm}$ s.d. |
|---|---|---|---|---|---|
| TubR | 20 | 24 | 24 | 22 | 20 – 24 |
| Paravert | 33 | 35 | 33 | 33 | 33 – 35 |
| VenS | 35 | 36 | 36 | 36 | 35 – 36 |
| EnlfemS | 18/18 | 17/17 | 18/17 | 18/18 | 17 – 18/17 – 18 |
| Pre-Fem pores | 40 | 39 | 32 small | 20 pitted | 39 – 40 (adult males); 32 (adult female) |
| PCT | 5/5 | 5/5 | 5/5 | 5/5 | 5/5 |
| NSF | I: 8+10<br>II: 8+11<br>III: 9+11<br>IV: 7+12<br>V: 7+10 | I: 7+10<br>II: 7+9<br>III: 7+11<br>IV: 8+11<br>V: 8+10 | I: 7+10<br>II: 7+10<br>III: 8+10<br>IV: 7+10<br>V: 7+10 | I: 7+8<br>II: 7+9<br>III: 8+10<br>IV: 7+9<br>V: 7+9 | I: 15 – 18<br>II: 16 – 19<br>III: 18 – 20<br>IV: 16 – 19<br>V: 16 – 18 |
| NST | I: 7+11<br>II: 7+11<br>III: 9+12<br>IV: 10+13<br>V: 10+13 | I: 6+10<br>II: 7+10<br>III: 9+11<br>IV: 10+11<br>V: 10+13 | I: 7+10<br>II: 7+11<br>III: 8+12<br>IV: 8+11<br>V: 10+11 | I: 7+10<br>II: 7+9<br>III: 8+10<br>IV: 9+10<br>V: 9+11 | I: 16 – 18<br>II: 16 – 18<br>III: 18 – 21<br>IV: 19 – 23<br>V: 20 – 23 |
| FronS | 18 | 18 | 17 | 18 | 17 – 18 |
| Orb–nosS | 22 | 22 | 20 | 19 | 19 – 22 |
| IntersupS | 0 | 1 | 0 | 1 | 0 – 1 |
| Enlar–chin | 3 | 4 | 3 | 3 | 3 – 4 |

**Comparison with other species.** *Cyrtodactylus lomyenensis* differs from other Lao endemic *Cyrtodactylus*, *C. buchardi* David *et al*. 2004 by its brown nuchal loop reaching the posterior edge of the orbit (vs. not reaching in *C. buchardi*), its banded dorsal pattern (vs. blotched), enlarged femoral scales (vs. not enlarged), and enlarged subcaudal scales (versus not distinctly enlarged).

Based on the intrageneric comparison tables provided by Linkem *et al*. (2008), Ngo & Chan (2010), Rösler & Glaw (2008), Sumontha *et al*. (2010), Welton *et al*. (2009) and Ziegler *et al*. (2010), and on the morphological data provided by all other references cited in the literature section, *Cyrtodactylus lomyenensis* **sp. nov.** differs, by possessing a continuous row of precloacal-femoral pores, from all *Cyrtodactylus* species, except *C. batucolus* Grismer *et al*., *C. chanhomeae* Bauer *et al*., *C. consobrinoides* Annandale, *C. deveti* (Brongersma), *C. epiroticus* Kraus, *C. feae* (Boulenger), *C. fumosus* (Müller), *C. jarujini* Ulber, *C. klugei* Kraus, *C. loriae* (Boulenger), *C. macrotuberculatus* Grismer & Ahmad, *C. marmoratus* Gray, *C. novaeguineae* (Schlegel), *C. phongnhakebangensis* Ziegler *et al*., *C. robustus* Kraus, 2008, *C. roesleri* Ziegler *et al*., *C. seribuatensis* Youmans & Grismer, *C. serratus* Kraus, *C. tamaiensis* (Smith), *C. tiomanensis* Das & Lim, *C. tripartitus* Kraus, *C. variegatus* (Blyth) and *C. zugi* Oliver *et al*.

Male *Cyrtodactylus lomyenensis* **sp. nov.** have a lower number of precloacal–femoral pores (39–40) than male *C. batucolus* (43–46), *C. epiroticus* (60–82), *C. fumosus* (42–52), *C. klugei* (66–76), *C. marmoratus* (45–50), *C. robustus* (75–85), *C. serratus* (87), and *C. tripartitus* (64–78). Males of the New Guinea species *Cyrtodactylus loriae* show 30 – 81 precloacal-femoral pores, but are distinguishable by their blotched dorsal pattern.

*Cyrtodactylus lomyenensis* **sp. nov**. shows a similar number of precloacal-femoral pores as *C. tamaiensis* (Smith) (39–40 vs. 40), but it differs from this taxon by its smaller size (57.7–71.2 mm vs. 90 mm), its nuchal loop (present vs. absent), dorsal body pattern (four narrow bands vs. contrasting dense pale and dark brown marbling), more post cloacal tubercles (5 vs. 3–4), and its enlarged subcaudal scales (present vs. absent).

Males of the Malaysian species *C. seribuatensis* show an overlap with 40–44 precloacal-femoral pores, but are readily distinguished from the new species by their blotched dorsal pattern. From the Indonesian *C. fumosus* and *C. marmoratus* and the Malaysian *C. batucolus*, which show only slightly higher numbers of precloacal-femoral pores, *C. lomyenensis* **sp. nov.** is moreover readily distinguished by the presence of enlarged median subcaudals. Male *Cyrtodactylus lomyenensis* **sp. nov.** show a higher number of precloacal-femoral pores (39–40) than male *C.*

*consobrinoides* (26), *C. deveti* (18–23), *C. feae* (32), *C. macrotuberculatus* (35–37), *C. tiomanensis* (19), *C. variegatus* (32) and *C. zugi* (>21). The Malaysian *Cyrtodactylus macrotuberculatus*, which shows a number of precloacal-femoral pores close to that of *C. lomyenensis* **sp. nov.**, is otherwise very distinct morphologically, for example, in its possession of a precloacal groove. Males of the New Guinea species *C. novaeguineae* show an overlap with 24–43 precloacal-femoral pores, but, this species lacks enlarged median subcaudals.

Specific comparisons with the Indochinese–Thai *Cyrtodactylus* with a continuous row of precloacal-femoral pores are presented in Table 2. While *Cyrtodactylus lomyenensis* **sp. nov.** is different in many respects from the blotched *C. jarujini*, it shows the strongest morphological similarities with the Thai *C. chanhomeae* and the Vietnamese *C. phongnhakebangensis* and *C. roesleri*. From *C. roesleri*, it is distinguished by a higher number of precloacal-femoral pores (39–40 vs. 20–28) and of tubercle rows (20–24 vs. 13) and by its dorsal color. From *C. phongnhakebangensis*, it differs by its dorsal pattern and color, including in possessing 4 vs. 2–3 light bands between limb insertions, and by its smaller size. From *C. chanhomeae*, which seems to share the strongest similarities, it differs by a higher number of precloacal-femoral pores in males (39–40 vs. 32–34), a higher number of light dorsal bands between limb insertion (4 vs. 3); moreover, in *C. chanhomeae*, the light band above shoulders contacts the brown nuchal loop, whereas it is separated in *C. lomyenensis* **sp. nov.**

*Cyrtodactylus lomyenensis* **sp. nov.** differs from the recently described species *Cyrtodactylus mandalayensis* Mahony, *C. nuaulu* Oliver *et al*., *C. yangbangensis* Ngo & Chan, *C. phuquocensis* Ngo *et al*., *C. zhaoermii* Lei & Hui, *C. jambangan* Welton *et al*., and *C. wayakonei* Nguyen *et al*. in possessing femoral pores in males.

**TABLE 2.** Comparison of *Cyrtodactylus lomyenensis* **sp. nov.** with other Indochinese-Thai *Cyrtodactylus* bearing a continuous series of precloacal-femoral pores (data from Bauer *et al*. 2003; David *et al.* 2004; Rösler & Glaw 2008; Sumontha *et al*. 2008; Ulber 1993; Ziegler *et al*. 2002, 2010; and our observations on the type series of *C. lomyenensis* **sp. nov.).**

| | *C. lomyenensis* **sp. nov.** | *C. chanhomeae* | *C. jarujini* | *C. phongnhakebangensis* | *C. roesleri* |
|---|---|---|---|---|---|
| N | 4 | 2 | 3 | 8 | 19 |
| Maximal SVL | 71.2 | 78.8 | 90 | 96.3 | 75.3 |
| Maximal TailL | 86.1 | 74.7 | 116.0 | 110.0 | 101.0 |
| VenS | 35 – 36 | 36 – 38 | 32 – 38 | 32 – 42 | 34 – 40 |
| TubR | 20 – 24 | 16 – 18 | 18 – 20 | 11 – 20 | 13 (n=1) |
| Precloacal-femoral pores | 39 – 40 (males); 32 (female) | 32 – 34 (males); females unknown | 52 – 54 (males); 0 (female) | 32 – 42 (males); 0 – 41 (females) | 20 – 28 (males); 17 – 22 (females) |
| Femoral scales | Enlarged | Enlarged | Enlarged | Enlarged | Enlarged |
| Subcaudal Scales | Median enlarged | Median enlarged | Median enlarged | Enlarged | Enlarged |
| SupL | 13 – 14 | 12 – 13 | 12 – 16 | 9 – 13 | 10 – 12 |
| Infra | 11 | 9 – 10 | 10 – 12 | 8 – 12 | 7 – 10 |
| NST IV | 19 – 23 | 21 – 23 | 15 – 17 | 18 – 26 | 17 – 21 |
| Tubercles on lateral skin folds | Absent | Absent | Absent | Present | Absent |
| Dorsal pattern between limbs insertions | 4 light transversal bands | 3 light transversal bands | Blotches | 2 – 3 light transversal bands | 3 – 4 sometimes irregular shaped light transversal bands |
| Tail pattern | Rings | Bands | Bands | Bands | Bands |
| Tubercles on tail dorsum | Absent | Only on tail base | Present | Present | Absent |

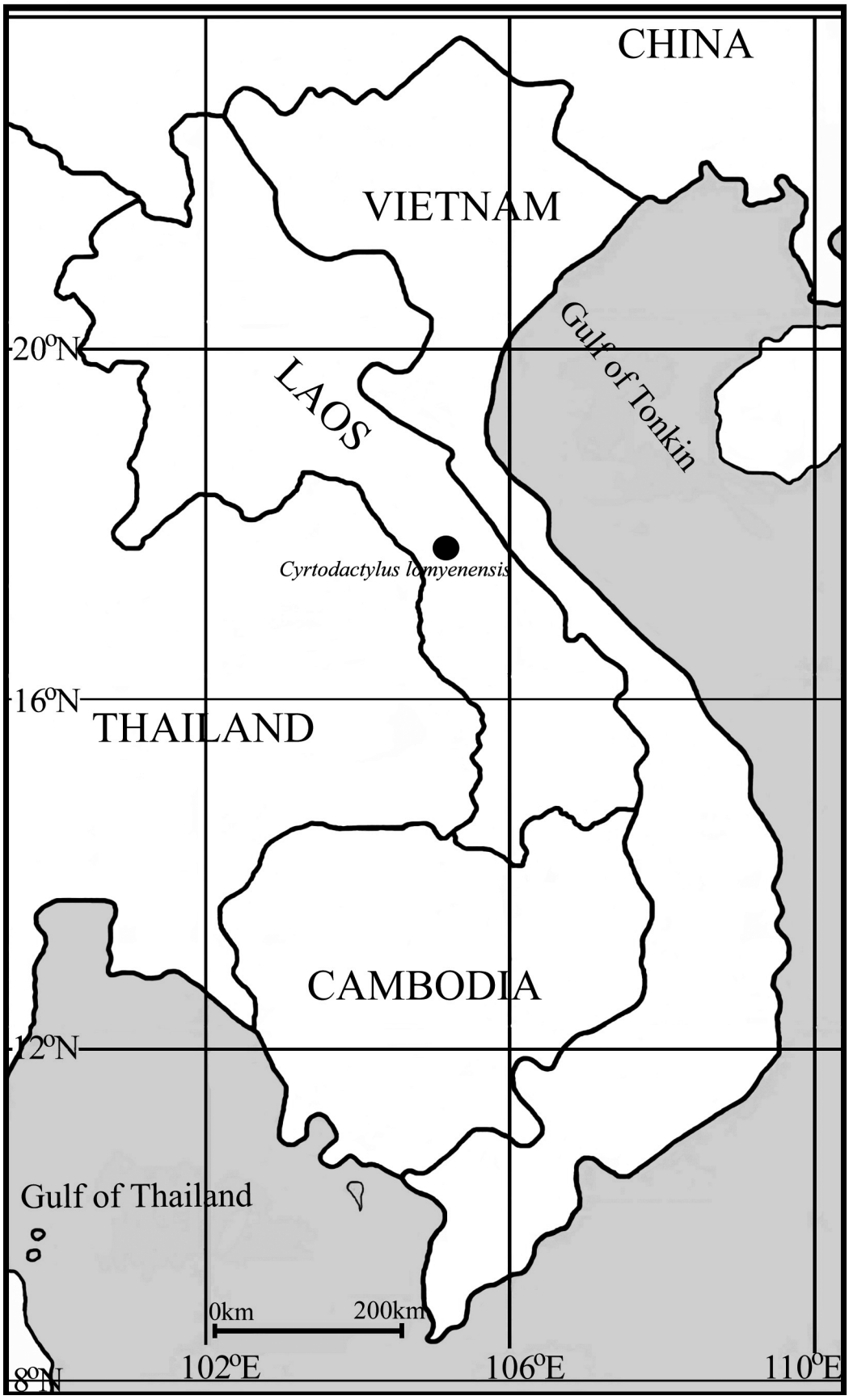


**FIGURE 1.** Type locality of *Cyrtodactylus lomyenensis* **sp. nov.** in Gnommalath District, Khammouane Province, Southern Laos.

**FIGURE 2.** Macrohabitat of *Cyrtodactylus lomyenensis* **sp. nov.** in karst forest, Gnommalath District, Khammouane Province, Southern Laos.

## Discussion

*Cyrtodactylus lomyenensis* **sp. nov.** is the fifth *Cyrtodactylus* found in Laos after *C. buchardi*, *C. interdigitalis*, and *C. jarujini* and *C. Wayakonei*. It is the fifth Indochinese-Thai species of *Cyrtodactylus* bearing a continuous series of precloacal-femoral pores.

*Cyrtodactylus lomyenensis* **sp. nov.** is not a cave-obligate and has never been seen deep inside a cave by day or night. Moreover, the cave floor was totally covered by stalagmites and lacked the moist soft soil that *Cyrtodactylus* require for oviposition. Although associated with caves, this new species can be better regarded as a karst crevice dweller at the entrance of deep caves rather than a troglodyte.

*Cyrtodactylus lomyenensis* **sp. nov.** seems to be endemic to Laos because systematic surveys in many other caves in the general vicinity of the type locality did not reveal another population of *C. lomyenensis*, and the only *Cyrtodactylus* found in the area is another undescribed species (Ngo Van Tri & Pauwels, O.S.G *in preparation*).

Lomyen Cave is located outside Nakai–Nam Theun National Biodiversity Conservation Area and is planned for ecotourism development. Thousands of tourists visit this cave yearly, and precautions should be taken to minimize their impact on this endemic taxon. Population surveys and ecological studies are therefore much needed as urgent conservation actions.

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