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Article

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A new species of the *Cyrtodactylus irregularis* complex (Squamata: Gekkonidae) from southern Vietnam

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Abstract

We describe a new species of the genus *Cyrtodactylus* from southern Vietnam, based on voucher specimens collected from Dong Nai and Ba Ria – Vung Tau provinces. *Cyrtodactylus cattienensis* **sp. nov.** is distinguished from the remaining Indochinese bent-toed geckos by a combination of the following characters: size small, with a maximum SVL of 69 mm; neck band present, extending to the posterior margin of the eye; trunk, tail and limbs bearing irregularly shaped bands: 4–6 light bands on trunk and 4–12 white bands on tail; 16–22 irregular longitudinal rows of dorsal tubercles; 28–42 longitudinal rows of ventrals at midbody; lateral folds weakly developed or absent, without enlarged tubercles; tail not depressed, not enlarged at base, scales arranged in whorls; males with 6–8 precloacal pores in angular continuous series; a patch of enlarged precloacal scales present in both sexes; 3–8 slightly enlarged femoral scales on each hind limb in both sexes; femoral pores absent; precloacal groove absent; subcaudal scales small, not transversely enlarged.

Key words: *Cyrtodactylus cattienensis* **sp. nov.**, Dong Nai and Ba Ria – Vung Tau Provinces, southern Vietnam, natural history, taxonomy

Introduction

There has been an enormous increase in the number of new species of the genus *Cyrtodactylus* recently described from Southeast Asia and the Oceanian region, resulting in a total of at least 90 currently recognized species (Ngo & Bauer 2008). *Cyrtodactylus* thus forms the most diverse group of gekkonid lizards to date (e.g., Kluge 2001), with "Indochina" representing one of the centres of undiscovered species diversity. Outside of Vietnam, numerous new records and discoveries from mainland Southeast Asia have been documented for Malaysia (Dring 1979; Das & Lim 2000; Grismer 2005; Grismer & Leong 2005; Grismer & Norhayati 2008; Grismer *et al.* 2008), Myanmar (Bauer 2002, 2003), Laos (David *et al*. 2004; Teynié 2004; Teynié *et al.* 2004), and Thailand (Bauer *et al.* 2002, 2003; Pauwels *et al*. 2004). In Vietnam, the species number of *Cyrtodactylus* remarkably increased from three recognized species in 1997 (*C. condorensis, C. intermedius, C. irregularis*) to 17 species in 2008 (see Ngo & Bauer 2008), namely *C. badenensis, C. caovansungi, C. chauquangensis, C. cryptus, C. eisenmani, C. grismeri, C. hontreensis, C. huynhi, C. nigriocularis, C. paradoxus, C. phongnhakebangensis, C. pseudoquadrivirgatus, C. takouensis,* and *C. ziegleri* (Ziegler *et al.* 2002; Heidrich *et al.* 2007; Orlov *et al.* 2007; Nazarov *et al.* 2008; Ngo 2008; Ngo &

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Bauer 2008; Ngo *et al.* 2008; Rösler *et al.* 2008). Nazarov *et al.* (2008) considered *C. irregularis* sensu lato to be a species complex composed of several unrecognized cryptic species. Most recently, two distinct species of this complex were described: *C. pseudoquadrivirgatus* and *C. ziegleri* (Rösler *et al.* 2008; Nazarov *et al.* 2008). Nazarov *et al.* (2008) further pointed to a possibly undescribed *Cyrtodactylus* of the *irregularis* complex occurring in the Cat Tien National Park, Dong Nai Province, southern Vietnam. During recent field research additional specimens of this *Cyrtodactylus* have been collected in Dong Nai and Ba Ria - Vung Tau provinces. Detailed taxonomic study of these small-sized *Cyrtodactylus* proved that they represent an unnamed species which is described herein.

Material and methods

Field work was conducted in Dong Nai Province (Cat Tien National Park and Vinh Cuu Nature Reserve), and in Ba Ria – Vung Tau Province (Nui Dinh forest). Specimens were anaesthetized, ethanol-fixed and subsequently deposited in the collections of the Institute of Ecology and Biological Recources (IEBR), the Vietnam National University (VNUH), Hanoi, Vietnam; the Zoologisches Forschungsmuseum Alexander Koenig (ZFMK), Bonn, Germany; the Zoological Museum, Moscow State University (ZMMU), Moscow, and the Zoological Institute, St. Petersburg (ZISP), Russian Academy of Sciences, Russia.

The following measurements were taken with a digital vernier calliper, interpolated to the nearest 0.1 mm: Snout-vent length (SVL, from tip of snout to vent); tail length (TL, from vent to tip of tail); distance from snout to eye (SE, from tip of snout to anteriormost point of eye including ciliaria); distance from eye to ear (EE, from posterior corner of eye to anterior margin of ear including ciliaria); maximum head width (HW); maximum head height (HH); head length (HL, from tip of snout to anterior margin of ear); maximum ear diameter (EAD); horizontal eye diameter (ED); distance between nares (IND); distance from axilla to groin (AG); forearm length (FL, from base of palm to elbow); femur length (FEL, from posterior edge of hindlimb insertion to knee).

Scale counts were taken as follows: supralabials (SPL); infralabials (IL); granular scales behind upper labials to angle of mouth (GBUL); granular scales behind lower labials to angle of mouth (GBLL); nasals (N) from rostral to labial (nasorostral, supranasal, postnasals); internasals (IN); postmentals (PM); scales between fifth supralabials (S5S); interorbitals (IO); dorsal tubercle rows (DTR, longitudinal rows of enlarged tubercles on the middle of dorsum and flanks); ventral scales in longitudinal rows at midbody (V); subdigital lamellae under fourth finger (LF4) and under fourth toe (LT4); precloacal pores in males (PP); postcloacal tubercles (PAT); enlarged precloacal scales (EPS); enlarged femoral scales (EFS); femoral pores (FP); granules surrounding dorsal tubercles (GST). All scale counts were taken on the right side of body where appropriate.

The bioacoustic analyses of the new species took place on live specimens held in the laboratory of the Zoological Museum, Moscow. The recordings were carried out in a terrarium at 26–28°C and 70–80% relative humidity. Sound records were measured using the audio program “Sound Forge 4.5” and a microphone with a range from 100 Hz to 16 kHz that was placed inside the terrarium. Records took place with a sampling frequency of 44 kHz. Spectrographic analysis was carried out by “Avisoft-SASLab Pro v. 4.3 (R. Specht)”. For the spectrograms the following parameters were used: Hamming window function; FFT-length 1024 points; frame 50%; overlap 96.87%; high pass filter 0.3 kHz.

Cyrtodactylus cattienensis sp. nov.

Holotype. Adult male (IEBR A.0856) collected on 1 August 2008 by Peter Geissler within Cat Tien National Park (11°27’N; 107°20’E), Dong Nai Province, southern Vietnam, at an altitude of ca. 120 m a.s.l.

Paratypes. Two adult males (IEBR A.0845, VNUH 2008.0520) and two adult females (IEBR A.0843-A.0844) from Nui Dinh, Ba Ria – Vung Tau Province, southern Vietnam, coll. Phung My Trung on 20 May

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2008; one male (ZFMK 88095), three females (ZFMK 88090-88091, IEBR A.0855), and three juveniles (ZFMK 88092-88094) from Cat Tien National Park, Dong Nai Province, coll. Peter Geissler, 23 July to 3 August 2008; one male (IEBR 656) from Cat Tien National Park, Dong Nai Province, coll. Paul Moler on 20 May 2001; one male (IEBR A.0854) and one female (VNUH 2008.09.07) from Vinh Cuu Nature Reserve, Dong Nai Province, coll. Phung My Trung and Nguyen Thanh Binh on 9 July 2008; two males (ZMMU R-11444.1, R-11444.2), coll. Alex Borisenko and Nataly Ivanova, 12–21 December 2002, one male (ZMMU R-11926), coll. Vladimir Bobrov on 17 May 2004, and one female (ZMMU R-11189), coll. Alex Borisenko on 9 December 2004, all from Cat Tien National Park, Dong Nai Province; one male (ZISP 25216) and one female (ZISP 25217) from Cat Tien National Park, Dong Nai Province, coll. Nikolai Orlov in 2006.

Diagnosis. A small slender *Cyrtodactylus* with a maximum SVL of 69 mm, distinguished from all congeners by the combination of the following characters: 1) rounded body in cross-section, not depressed; 2) neck band extending to the posterior margin of the eye; 3) trunk, tail, and limbs bearing irregularly shaped bands (4–6 on trunk, and 4–12 across the tail); 4) tubercles present on the head, body, limbs and tail; 5) dorsal tubercles in 16–22 irregular longitudinal rows; 6) ventrals in 28–42 longitudinal rows at midbody; 7) lateral folds weakly developed or absent and lacking enlarged tubercles; 8) tail base bearing scales arranged in whorls, not depressed nor enlarged; 9) two or three postcloacal spurs in both males and females; 10) precloacal pores 6–8, in an angular row in males and a patch of enlarged precloacal scales in both sexes; 11) slightly enlarged femoral scales present in both males and females, numbering 3–8 on each hindlimb; 12) femoral pores absent; 13) precloacal groove absent; 14) subcaudal scales not enlarged; 15) fourth toe with 14–19 subdigital lamellae.

Description of holotype. Size small (SVL 49.9 mm, TL 59.3 mm), HL 13.4, HW 10.0 mm, HH 6.0 mm , SE 5.9 mm, EE 4.0 mm, ED 3.1 mm, EAD 0.9 mm; proportions are as follows: SVL/HL 3.72, HL/HW 1.35, HL/HH 2.23, SE/EE 1.49, ED/EAD 3.34.

Rostral wider than high (RW 2.3 mm, RH 1.0 mm, RW/RH 2.3) with an inverse Y-shaped median suture; supralabials 10/9; scales between orbit and the seventh supralabial 3/3, small; infralabials 8/9; nares bordered by rostral anteriorly, first supralabial laterally and four nasals posteriorly; rostral approximately four times larger than supranasal and 2.5 times larger than intersupranasal; supranasals separated from each other by an intersupranasal; medial snout scales granular, those in contact with the supralabials flattened and approximately 2–3 times larger than the medial scales; upper anterior ciliaries two times larger than posterior cilaries; head scales granular, one-half as large as median snout scales; centre of dorsal head and temporal region with rounded, smooth tubercles, three times larger than the surrounding scales; mental triangular, as wide as rostral; one pair of enlarged postmentals, trapezoidal, longer than wide, bordering with mental anteriorly and followed by seven pairs of enlarged gular scales, the anteriormost pair largest and surrounded by nine granular scales; gular pairs from second to seventh separated from infralabials by a row of scales; dorsal scales granular, as large as medial snout scales; dorsal tubercles round, conical, keeled anteriorly, surrounded by 9–10 granular scales, tubercles forming 17 longitudinal rows at midbody; ventral scales smooth, medial scales three times larger than the dorsal granules, 38 longitudinal rows at midbody; lateral folds absent; upper and lower arm lacking enlarged tubercles, covered with slightly enlarged granules; dorsal hind limb covered with granular scales and scattered, smooth, conical tubercles; four enlarged femoral scales on each hind limb; fingers and toes lacking webbing; basal lamellae basally more rounded than distally, numbering eight under first finger, 16 under fourth finger, nine under first toe, and 17 (6 basal and 11 distal lamellae) under fourth toe; claws surrounded by a small scale on upper and a large scale on lower sides; six contiguous precloacal pores in a right angle; precloacal region covered by a patch of 18 enlarged scales; two pairs of slightly enlarged postcloacal tubercles on lateral surface of hemipenial swelling; dorsal tail base whorls covered by convex scales, posterior part of tail covered by flattened, rounded scales, twice as large as medial snout scales; first four whorls with tubercles (numbering 10/4/4/4), tubercles keeled anteriorly; subcaudals not enlarged, flat, smooth, imbricate, about two times larger than scales on dorsum of tail.

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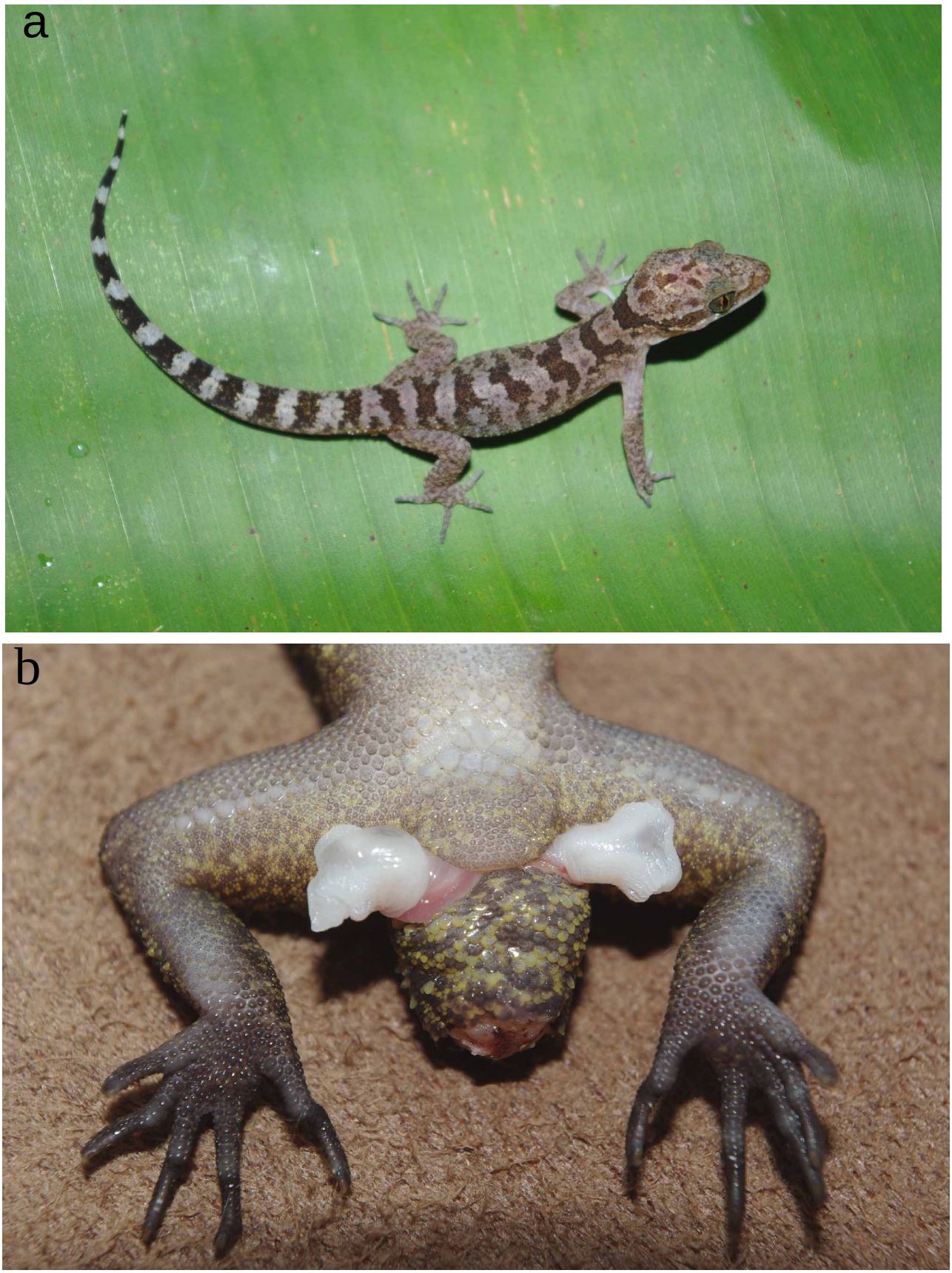

FIGURE 1. a) *Cyrtodactylus cattienensis* **sp. nov.** in life (holotype: IEBR A.0856) showing light color pattern at night and b) Ventral view of the cloacal region with everted hemipenes (paratype: ZFMK 88095).

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TABLE 1. Measurements and selected morphological characters of the type series of *Cyrtodactylus cattienensis* **sp. nov.** (f: female, j: juvenile, m: male, measurements in mm, -: regenerated or broken tail)

a) holotype and male paratypes

	IEBR A.0856	IEBR A.0845	IEBR A.0854	IEBR 656	ZMMU R-11444.1	ZMMU R-11444.2	ZMMU R-11926	ZISP 25216	VNUH 2008.0520	ZFMK 88093	ZFMK 88095	Mean value ± Standard deviation
Sex	m	m	m	m	m	m	m	m	m	m	m	n = 11
SVL	49.9	54.6	61.7	52.6	58	56	59	57	58.7	43.5	58.2	55.4 ± 5.11
TL	59.3	58.9	-	54.7	62	55	61	57.5	-	51.2	-	57.8 ± 3.75 (n = 8)
EAD	0.9	0.9	1.2	1.5	1	1	0.8	0.8	1.0	0.9	1.1	1.0 ± 0.20
ED	3.1	3.1	4.2	3.4	3.5	3.4	3.4	3.6	3.7	3	4	3.5 ± 0.37
EE	4	4.7	5.3	4.5	4.4	4.4	4.4	4.3	4.9	4.2	5.4	4.6 ± 0.44
HH	6	6.2	8.1	5.9	7	7	6.8	6.4	7.4	5.1	6.2	6.6 ± 0.82
HL	13.4	15.3	17.8	14.1	17.5	17.4	17.2	16.5	17.2	13.4	17.1	16.1 ± 1.71
HW	9.6	10.2	13.1	10.2	11.3	11.2	11.3	10	11.2	8.5	10.8	10.7 ± 1.18
IND	1.8	1.9	2.1	2.2	2.5	2.4	2.3	2.4	2.2	2.3	2.3	2.2 ± 0.21
SE	5.9	6.3	7.9	6.3	6.5	6.3	6.7	6.2	7.3	5.5	6.1	6.5 ± 0.66
AG	18.7	22.6	23.1	24.1	25.3	22.3	25.2	23.4	23.1	17.6	23.6	22.6 ± 2.42
FEL	9.2	10.3	11.8	8.6	11.2	10.7	11.2	10.6	10.2	7.2	10.9	10.2 ± 1,34
FL	7	9	10	8	9.2	8.7	9	8	9	6	9	8.3 ± 1.05
GBLL	5	4	6	7	7	9	7	5	5	6	6	6.1 ± 1.38
GBUL	8	6	8	10	9	10	9	7	8	8	7	8.2 ± 1.25
SBL	8	8	8	9	9	9	7	8	10	9	10	8.6 ± 0.92
IN	1	1	1	3	2	1	1	2	3	3	1	1.7 ± 0.91
IO	18	19	17	17	40	47	41	41	17	19	18	26.7 ± 12.45
S5S	51	49	44	50	49	50	50	44	44	46	50	47.9 ± 2.81
SL	10	8	10	11	10	10	10	9	9	11	11	9.9 ± 0.94
GST	9	10	9	9	10	10	10	10	10	9	9	9.5 ± 0.52
V	38	38	35	34	37	42	36	34	33	35	28	35.5 ± 3.53
DTR	17	17	19	21	20	20	18	18	16	19	19	18.5 ± 1.51
EFS	4	4	5	5	6	6	7	7	6	4	8	5.6 ± 1.36
LF4	16	14	16	15	14	15	13	14	12	16	16	14.6 ± 1.36
LT4	17	17	17	14	18	16	15	16	15	17	18	16.4 ± 1.29
EPS	18	19	17	20	10	9	10	8	15	16	21	14.8 ± 4.75
PP	6	7	6	8	6	6	7	6	7	6	7	6.5 ± 0.69

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b) female and juvenile paratypes

	IEBR A.0844	IEBR A.0843	IEBR A.0855	ZMMU R-11189	ZISP 25217	VNUH. 2008.09.07	ZFMK 88090	ZFMK 88091	Mean value ± Standard deviation	ZFMK 88092	ZFMK 88094
Sex	f	f	f	f	f	f	f	f	n = 8	j	j
SVL	47.7	67.2	63.4	69	58.4	64.0	64.8	49.2	60.5 ± 8	42	36.2
TL	51	64.7	-	62	59	-	-	54.5	58.2 ± 5.5 (n = 5)	49.2	34.4
EAD	1.4	1.2	1.3	1.2	1	1.1	1.5	1.1	1.2 ± 0.2	1.3	0.8
ED	3.5	4.1	4.1	4	3.4	3.8	3.1	3.2	3.7 ± 0.4	2.8	2.6
EE	4.3	6.7	5.3	5.3	4.5	5.8	5.4	3.8	5.1 ± 0.9	4.1	3.7
HH	5.2	7.3	7.1	7.8	6.8	7.8	7.3	5.8	6.9± 0.9	4.8	4.5
HL	14.2	20	18.4	19.5	16.8	18	18.7	14.8	17.6± 2,1	11.7	11.3
HW	8.8	12.5	12.3	13.3	11	12.7	11.9	9.6	11.5± 1.6	8.6	7.3
IND	1.8	2.4	2.5	2.4	2	2.5	2	2.3	2.2 ± 0.3	2.4	2.0
SE	6	7.6	6.9	7.3	6.2	8.2	7	6.2	6.9 ± 0.8	5.3	4.8
AG	19.2	25.9	27.8	30	24.3	27.1	28.1	20.4	25.4± 3.8	17.1	14.5
FEL	8.5	11	10.1	11.5	11	11.8	11.8	10.1	10.7 ± 1.1	8.9	6.8
FL	7	10	8	9.8	9.2	10	10	7	8.9 ± 1.2	6	6
GBLL	6	5	6	7	6	6	6	5	5.9 ± 0.64	7	5
GBUL	8	7	7	9	9	9	9	7	8.1 ± 0.99	7	7
SBL	10	9	9	8	9	9	9	8	8.9 ± 0.64	9	8
IN	4	1	2	1	1	3	1	1	1.75 ± 1.65	1	1
IO	19	19	17	38	48	16	18	17	24 ± 12.07	16	17
S5S	46	50	45	47	48	47	45	44	46.5 ± 1.93	47	50
SL	10	9	11	10	10	10	11	10	10.1 ± 0.64	10	10
GST	9	10	9	10	10	10	9	9	9.5 ± 0.53	9	10
V	41	34	31	39	36	42	35	41	37.4 ± 3.96	36	33
DTR	16	19	19	22	18	18	20	18	18.8 ± 1.75	19	18
EFS	3	5	4	7	6	5	4	4	4.8 ± 1.28	5	5
LF4	14	14	14	16	14	15	14	15	14.5 ± 0.76	15	15
LT4	15	15	18	19	17	17	18	17	17 ± 1.41	17	16
EPS	16	14	19	10	10	20	20	20	16.1 ± 4.35	15	14
PP	0	0	0	0	0	0	0	0	0	0	0

Coloration in alcohol. Head dorsally brownish grey with seven irregularly shaped dark brown patches; nuchal band broadened, dark brown and without a white margin, extending from the neck to the posterior margins of eyes; labials lighter with black dots. Dorsum brownish grey with six irregular, dark brown transverse bands, bands without white margins; first band on the shoulder X-shaped; the last dorsal band located in the sacral region; dark bands interrupted by light grey patches on lateral sides; flanks greyish white. Venter cream, the lower side of toes and fingers grey; dorsal limbs and digits grey with white spots. Dorsal

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side of tail with 12 dark brown bands which are wider than the light grey bands in-between. Ventral side of tail dark grey with white spots that are becoming darker posteriorly.

For coloration in life see Fig. 1. During daytime, the colour is darker, making the colour pattern more indistinct.

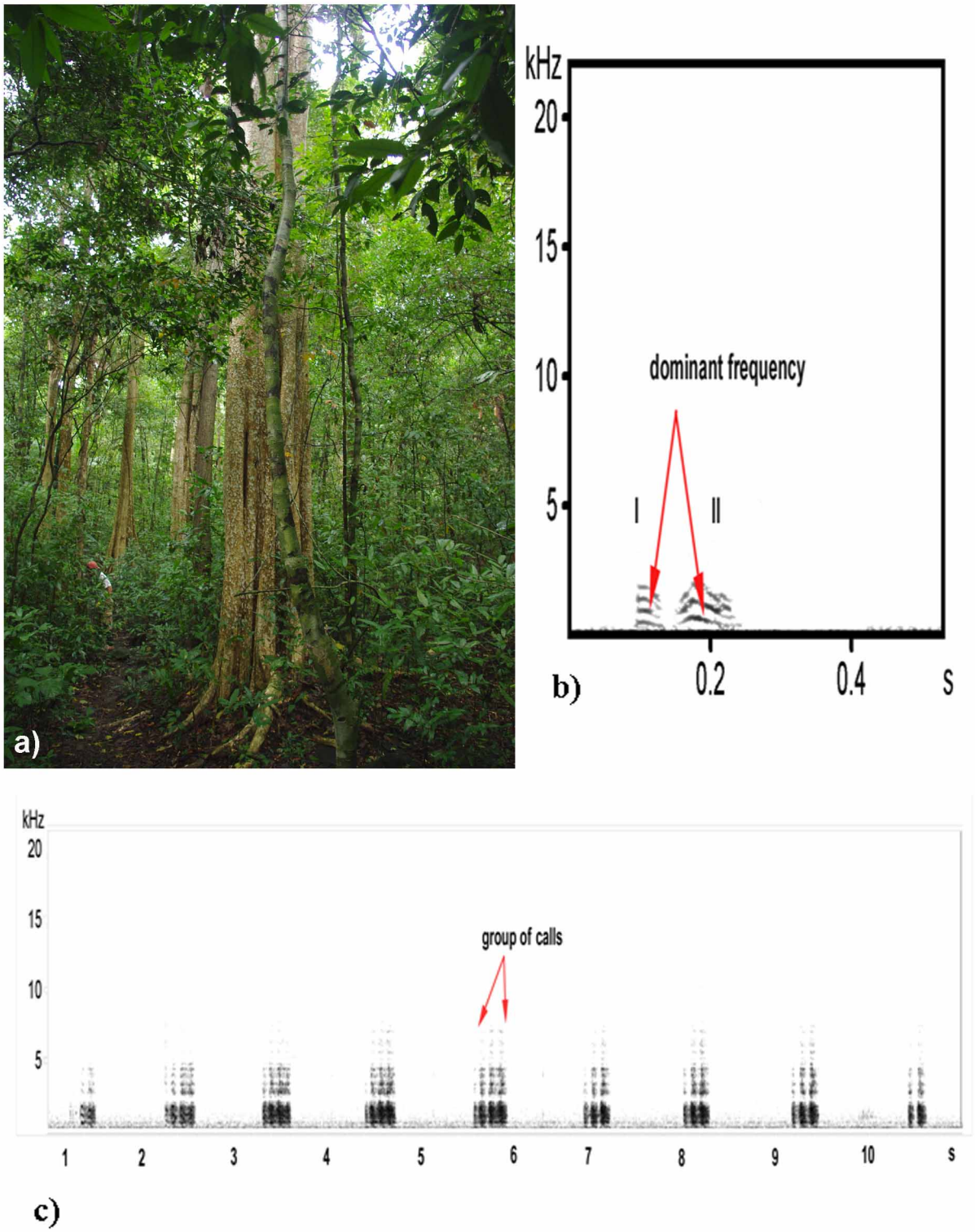

FIGURE 2. a) Habitat of *Cyrtodactylus cattienensis* **sp. nov.** showing secondary lowland rainforest, dominated by *Lagerstroemia* sp., b) Two call frequency structure types of male acoustic signals of *Cyrtodactylus cattienensis* **sp. nov.**, and c) Sonogram showing the male acoustic signal of *Cyrtodactylus cattienensis* **sp. nov.** consisting of a long series of call groups.

TABLE 2. Morphological characters of *Cyrtodactylus cattienensis* **sp. nov.** compared with its Vietnamese congeners (m: male, f: female, -: characters unobtainable from literature)

	SVL (mm)	TL (mm)	IN	V	DTR	EFS	FP	EPS	PP (in males)	LF4	LT4	Enlarged subcaudals
C. badenensis	59.3–74.1	58.6–82.4	2	25–28	–	absent	absent	present	absent	–	18–22	present
C. caovansungi	90.4–94	120	–	38–44	16–18	8	3	present	9	22	23–25	present
Cyrtodactylus cattienensis sp. nov.	43.5– 69	51–64.7	1–4	28–42	16–22	3–8	absent	8–21	6–8	12–16	14–19	absent
C. chauquangensis	90.9–99.3	97–108.3	0	36–38	–	absent	absent	present	6–7 (m and f)	16–18	19–23	–
C. condorensis	80	100	–	35–40		present	–	–	4–7	–	–	present
C. cryptus	62.5–90.8	63.5–88.4	1	47–50	19–20	absent	absent	16–27	9–11	18–19	20–23	absent
C. eisenmani	76.8–89.2	91–103.8	–	44–45	14	4–6	–	32	0	18–20	17–18	present
C. grismeri	68.3–95	111.3–115.1	–	33–38	18–22	0	–	19–22	0	16–18	16–19	present
C. hontreensis	72.4–88.9	84.2–106.5	–	40–42	14	2–5	–	present	7–8	16	17–19	present
C. huynhi	54.8–79.8	61.5–78.6	–	43–46	16–18	3–5	1–5	present	7–9	15–17	17–20	absent
C. intermedius	61–85	80–110	–	40–50	–	6–10	–	present	8–10	20	22	present
C. irregularis	72–86	66–74	–	38–45	–	–	–	–	5–7	15–16	18–19	absent
C. nigriocularis	82.7–107.5	70.6–121	2	42–49	–	absent	absent	present	0–2	–	17–21	present
C. paradoxus	52–84	80.8–111	–	32–40	–	present	absent	–	0–4	15–18	17–23	present
C. phongnhakebangensis	52–96.3	83–110	0–1	32–42	11–20	–	–	2–6	32–42 (PP + FP)	17–19	17–26	present
C. pseudoquadrivirgatus	48.6–83.3	55.7–82.3	0–2	41–57	16–24	absent	absent	1–12	5–9	15–21	16–25	absent
C. takouensis	74.7–81.1	77.7–91	1	39–40	9–10	3–5	1	present	3–4	16–17	18–20	present
C. ziegleri	84.6–93	95–107	–	33–39	20–24	8–10	present	–	5–8	16–19	18–21	absent

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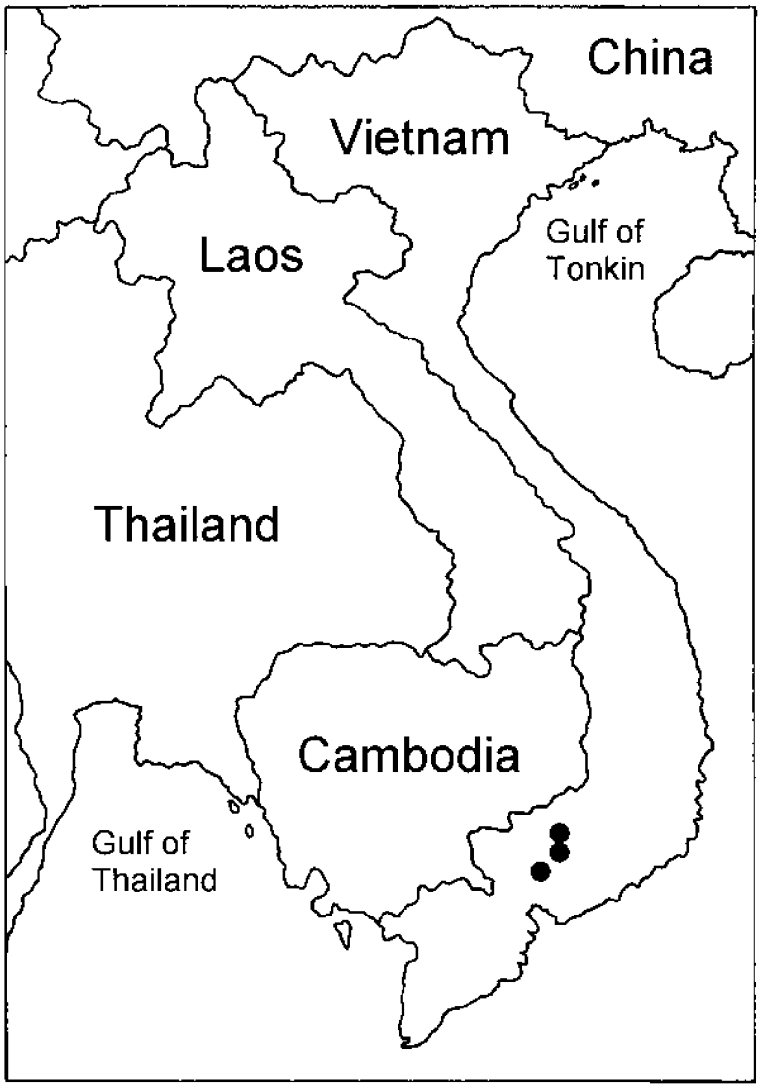

FIGURE 3. Map showing the currently known localities of *Cyrtodactylus cattienensis* **sp. nov.** in Vietnam

Variation of paratypes. For the variation of paratypes see Table 1. Males are somewhat smaller than the females (SVL males 55.4 ± 5.11 mm, n = 11; females 60.5 ± 8.0 mm, n = 8). Paratypes ZFMK 88090 and ZFMK 88094 have dark dorsal bands longitudinally connected to each other, thus enclosing brownish grey patches (three in ZFMK 88090 and five in ZFMK 88094). Paratype IEBR A.0854 shows a considerably lighter (cream) ground colour between the dorsal bands. The paratypes IEBR A.0854-A.0855, VNUH 2008.09.07, and ZFMK 88090 have regenerated tails without dark brown bands. Paratype IEBR 656 was fixed in formalin and thus shows a yellowish-brown ground colour instead of a greyish one. Paratype ZFMK 88091 shows a bifurcation at the posterior 10 mm of its tail. The hemipenes of paratype ZFMK 88095 are partially everted. Their apex is thickened and deeply bifurcated. Sulcus spermaticus thin, deep, bordered by bulging lips; the sulcus bifurcates in the upper truncus region. Apical lobes with serrated skin rims.

Comparisons. Comparisons are based on the original descriptions or descriptions provided in broader faunal and taxonomic publications (e. g., Smith 1920, 1921, 1935; Taylor 1963; Ulber 1993; Darevsky & Szczerbak 1997; Das 1997; Manthey & Grossmann 1997; Chan-ard *et al.* 1999; Das & Lim 2000; Ziegler *et al.* 2002; Bauer 2002, 2003; Bauer *et al.* 2002, 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; Kraus 2007; Orlov *et al.*

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2007; Grismer & Norhayati 2008; Nazarov *et al.* 2008; Ngo 2008; Ngo & Bauer 2008; Ngo *et al.* 2008; Rösler & Glaw 2008; Rösler *et al.* 2008).

In comparison with Vietnamese congeners, *Cyrtodactylus cattienensis* **sp. nov.** is distinguished from *C. badenensis*, *C. caovansungi*, *C. condorensis*, *C. eisenmani*, *C. grismeri*, *C. hontreensis*, *C. intermedius*, *C. nigrocularis*, *C. paradoxus*, *C. phongnhakebangensis*, and *C. takouensis* by the absence of transversally enlarged subcaudals. *Cyrtodactylus cattienensis* **sp. nov.** differs from *C. chauquangensis* and *C. cryptus* by having enlarged precloacal scales (absent in latter species). The new species further differs from *C. chauquangensis* by having a smaller SVL (43.5–69 mm versus 90.9–99.3 mm) and lacking precloacal pores in females (present in females of *C. chauquangensis*). *Cyrtodactylus cattienensis* **sp. nov.** can also be distinguished from *C. cryptus* by having fewer ventrals in longitudinal rows (28–42 versus 47–50), a lower number of precloacal pores in males (6–8 versus 9–11), and fewer subdigital lamellae on fourth toe (14–19 versus 20–23). *Cyrtodactylus cattienensis* **sp. nov.** differs from *C. huynhi* by having fewer ventrals in longitudinal rows (28–42 versus 43–46) and lacking femoral pores in males (1–5 pores on each thigh in males of *C. huynhi*). *Cyrtodactylus cattienensis* **sp. nov.** is most similar to the members of the *C. irregularis* complex. However, the new species differs from *C. pseudoquadrivirgatus* by having a continuous nuchal band and enlarged femoral scales (nuchal band interrupted and enlarged femoral scales absent in *C. pseudoquadrivirgatus*). The new species is distinguished from *C. irregularis* and *C. ziegleri* by having a smaller SVL (43.5–69 mm versus 72–86 mm in *C. irregularis* and 84.6–93 mm in *C. ziegleri*). *Cyrtodactylus cattienensis* **sp. nov.** further differs from *C. irregularis* by having smooth enlarged femoral scales (enlarged femoral scales containing pits in *C. irregularis*), by lacking light margins around the dark patches on the back and enlarged spurs on the tail-base whorls (present in *C. irregularis*). The new species also differs from *C. ziegleri* by lacking femoral pores in males (present in males of *C. ziegleri*). For further comparisons see Table 2.

We also compare *Cyrtodactylus cattienensis* **sp. nov.** with its remaining congeners from the neighbouring countries in mainland Southeast Asia whose species lack enlarged subcaudal scales or femoral pores in both sexes. *Cyrtodactylus cattienensis* **sp. nov.** differs from *C. angularis* and *C. feae* by having discontinuously enlarged precloacal-femoral scales; the new species differs from *C. aurensis*, *C. gansi*, *C. pulchellus*, *C. semenanjungensis*, *C. stresemanni*, and *C. tiomanensis* by lacking a precloacal groove; from *C. ayeyarwadyensis* by having a lower count of precloacal pores in males (6–8 versus 10–28 in *C. ayeyarwadyensis*); from *C. brevidactylus* in dorsal pattern (5–7 irregular dark bands versus 3–4 black dorsal blotches in *C. brevidactylus*) and by having enlarged femoral scales; from *C. buchardi* by having precloacal pores in males (absent in males of *C. buchardi*); from *C. chrysopylos* by the absence of a single, much larger pore bearing scale posterior to the precloacal pore series (present in *C. chrysopylos*); from *C. consobrinus* by having a lower number of ventrals in longitudinal rows at midbody (28–42 versus 65–70 in *C. consobrinus*); from *C. elok* by having a higher count of dorsal tubercles (16–22 versus 6–10 in *C. elok*) and a lower number of ventrals in longtudinal rows at midbody (28–42 versus 44 in *C. elok*); from *C. interdigitalis* and *C. sumonthai* by lacking well developed lateral folds with large tubercles (present in latter species); from *C. jarakensis* in the presence of enlarged precloacal and femoral scales (absent in *C. jarakensis*); from *C. lateralis* by having a lower number of ventrals in longitudinal rows at midbody (28–42 versus 60–64 in *C. lateralis*); from *C. quadrivirgatus* by having a higher count of precloacal pores in males (6–8 versus 4 in *C. quadrivirgatus*); from *C. sworderi* by having enlarged femoral scales (absent in *C. sworderi*); and from *C. wakeorum* by having a lower count of longitudinal dorsal tubercle rows (16–22 versus 24 in *C. wakeorum*).

Distribution. *Cyrtodactylus cattienensis* **sp. nov.** is currently known from Dong Nai Province (Cat Tien National Park and Vinh Cuu Nature Reserve) and Ba Ria – Vung Tau Province (Nui Dinh) (Fig. 3).

Etymology. We name this species after Cat Tien National Park where the holotype and a part of the type series were collected and which represents the first locality where the new *Cyrtodactylus* species was discovered. The National Park was established in 1978 and it represents one of the largest remaining and most important lowland forest areas in Vietnam with a total land area of 71.920 hectares and the protection of its in part unique biodiversity deserves special attention.

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Ecological notes. Most of the observations took place at night. The specimens were found on large leaves of scrub vegetation and young trees in lowland forest, at a height of about 1 m above ground (even during rain). A few specimens were found during the day, beneath volcanic rocks or below the bark of rotten trees.

Bioacoustic notes. The vocal repertoire of the new species consists of two signal types: 1) Squeak: an acoustic signal of discomfort, produced by males, females and juvenile specimens when they are stressed (e. g., during capture); 2) Male signal (Fig. 2b). This acoustic signal can only be produced by males. It consists of a long series (6.55–22.36s) of call groups (Fig. 2c). The single call groups consist of 1–4 calls each. The intervals between call groups within a series vary from 0.85–1.25s. Intervals usually increase by the end of the series. At the beginning of a series the call loudness is -45dB re 0dB and distinctly increases towards the end of the series (-23.5 dB re 0dB). We observed two call frequency structure types (Fig. 2b): 1) single call and first call in a call group, respectively (Fig. 2c): these calls are frequency modulate and always consist of three harmonics (405, 1395, and 1825 kHz), the dominant average frequency is 900 kHz and 2) subsequent calls in a call group: these calls are also frequency modulate, but include two or three harmonics (1285, 2052, and 3180 kHz), the dominant average frequency is 568 kHz.

Discussion

Cyrtodactylus cattienensis **sp. nov.** is the 18th species of *Cyrtodactylus* to become known from Vietnam. From external morphology it belongs to the *C. irregularis* species group, which currently is evaluated to consist of the species *Cyrtodactylus cattienensis* **sp. nov.**, *C. irregularis*, *C. pseudoquadrivirgatus* and *C. ziegleri* in Vietnam (see Nazarov *et al.* 2008). *Cyrtodactylus cattienensis* **sp. nov.** differs from its latter Vietnamese congeners by having a smaller size (SVL 43.5–69 mm versus 72–86 mm in *C. irregularis* and 84.6–93 mm in *C. ziegleri*), a continuous nuchal band (being interrupted in *C. pseudoquadrivirgatus*), and enlarged femoral scales (absent in *C. pseudoquadrivirgatus*) that are smooth in *Cyrtodactylus cattienensis* **sp. nov.** (versus containing pits in *C. irregularis*), as well as lacking femoral pores in males (present in males of *C. ziegleri*), lacking light margins around the dark dorsal patches and lacking enlarged spurs on the tail-base whorls (both present in *C. irregularis*). Facing not only the enormously increased number of bent-toed geckos in general but also within the *C. irregularis* species group in particular, there is an enormous need of phylogenetic studies, preferably based on molecular methods: not only to learn more about the systematic relations of single representatives or the affirmation of morphological species groups, but also to uncover still cryptic species as was most recently suspected by Nazarov *et al.* (2008).

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Note added in proof

The repeatedly cited species *Cyrtodactylus eisenmani* is, according to its original description (Ngo 2008), dedicated to Stephanie Eisenman, obviously a woman. According to article 31 (a) (ii) of the International Code of Zoological Nomenclature (ICZN) the name should have had the ending *-ae* istead of *-i*. Consequently, the name *eisenmani* is an incorrect spelling that has to be corrected to *eisenmanae*, according to article 32 (c) and (d) of the Code (ICZN 1999). For details see: International Commission on Zoological Nomenclature (1999): The International Code of Zoological Nomenclature. - London (Nat. Hist. Mus.), 306 pp.