



Article

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A new species of Parachute Gecko (Squamata: Gekkonidae: genus *Ptychozoon*) from Kaeng Krachan National Park, western Thailand

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Abstract

A new species of Parachute Gecko, *Ptychozoon kaengkrachanense* **sp. nov.**, is described from montane evergreen forest in Kaeng Krachan National Park, western Thailand. It differs from all known *Ptychozoon* species by having three dark dorsal chevrons between limbs insertions, homogeneous dorsal scalation without enlarged scales, original tail without long terminal flap, supranasals widely in contact, a continuous series of 14–19 enlarged precloacofemoral scales, bearing 13–17 pores in males, the absence of a predigital notch in the preantibrachial cutaneous expansion and the presence of cutaneous expansions on sides of head. It is the eighth species described in the genus and the only species of *Ptychozoon* endemic to Thailand.

Key words: Thailand, Phetchaburi Province, Kaeng Krachan National Park, *Ptychozoon kaengkrachanense*, new species, taxonomy

Introduction

In the course of our ongoing taxonomic and zoogeographical review of the herpetofauna of peninsular Thailand, we examined photographic and preserved voucher material of a *Ptychozoon* species from Kaeng Krachan National Park, Phetchaburi Province, western Thailand, possessing only three dark dorsal chevrons between limb insertions, in contrast to the only species recorded so far from the park, *P. lionotum* Annandale (Pauwels & Chan-ard 2006; Pauwels *et al.* 2009), which has four chevrons between limbs insertions. Our field investigations demonstrated that both forms occur within a few hundred meters of each other in the mountainous areas of the park. We thoroughly examined the morphological characters of this unique Kaeng Krachan *Ptychozoon* population in order to clarify its taxonomic status, and compared it to all seven congeneric species. Our findings demonstrate that it is clearly distinct from all known taxa and, therefore, warrants recognition as a new species.

Material and methods

Numbers of supralabials and infralabial scales were counted from the largest scale immediately posterior to the dorsal inflection of the posterior portion of the upper jaw to the rostral and mental scales, respectively. The number of rows of differentiated, imbricate, ventral scales was counted transversely across the abdomen between the flanks, which are covered by minute rounded scales. The number of the subdigital lamellae beneath the 4th toe was

counted from the base of the first phalanx to the claw. Measurements were taken with calipers to the nearest 0.1 mm. Morphological abbreviations: AG = axilla to groin length, taken from the posterior margin of the forelimb at its insertion point on the body to the anterior margin of the hind limb at its insertion point on the body; ED = eye diameter, the greatest horizontal diameter of the eye-ball; EAO = eye to auricular opening distance, from the anterior edge of the auricular opening to the posterior edge of the eye-ball; AOW = auricular opening width, the greatest horizontal distance horizontally across the auricular opening; EN = eye to nostril distance, from the anterior margin of the eye to the posterior margin of the external nares; ES = eye to snout distance, from the anteriormost margin of the eye to the tip of snout; FL = forearm length, taken on the dorsal surface from the posterior margin of the elbow while flexed 90° to the inflection of the flexed wrist; HD = head depth, the maximum height of head from the occiput to the throat; HL = head length, from the posterior margin of the retroarticular process of the lower jaw to the tip of the snout; HW = head width, measured at the angle of the jaws; IN = internarial distance, measured between the nares across the rostrum; IO = interorbital distance, measured between the anterior edges of the orbit; SVL = snout-vent length, taken from the tip of snout to the vent; TBL = tibia length, taken on the ventral surface from the posterior surface of the knee while flexed 90° to the base of the heel; TL = tail length, taken from the vent to the tip of the tail, original or regenerated; TW = tail width, taken at the base of the tail immediately posterior to the postcloacal swelling. Museum acronyms: Chulalongkorn University Museum of Zoology, Herpetological Section, Bangkok (CUMZ R); Institut Royal des Sciences naturelles de Belgique, Brussels (IRSNB); Khorat Zoo Museum, Nakhonratchasima (KZM); Muséum National d'Histoire naturelle, Paris (MNHN); Prince of Songkhla University Zoological Collection, Reptile Section, Songkhla (PSUZC-RT); Thailand Natural History Museum, National Science Museum, Technopolis, Pathum Thani (THNHM).

Systematics

Ptychozoon kaengkrachanense sp. nov.

Figures 1–5.

Holotype. Adult female PSUZC-RT 2012.1 (formerly Montri Sumontha (MS) field number 541) from Khao Phanernthung (coordinates UTM UPS ca. 47 p0539530 1417468 = 12°49'18.8"N 099°21'51.4"E; altitude ca. 970 m asl), Kaeng Krachan National Park, Amphoe (= District) Kaeng Krachan, Phetchaburi Province, western Thailand. Collected 15 March 2012 by S. Ruksue, P. Chamted and A. Limsuwan.

Paratypes. Adult female QSMI 1169 (formerly MS 545) and adult males PSUZC-RT 2012.2 (formerly MS 542), same locality and collector as holotype. KZM 010 (formerly MS 543) from Amphoe Kaeng Krachan, Phetchaburi Province, western Thailand. Collected 15 June 2011 by K. Kunya.

Diagnosis. *Ptychozoon kaengkrachanense* sp. nov. is a medium-sized *Ptychozoon* species, reaching an apparent maximum SVL of at least 86 mm. It differs from all known *Ptychozoon* species by having three dark dorsal chevrons between limbs insertions, homogeneous dorsal scalation without enlarged scales, original tail without long terminal flap, supranasals widely in contact, a continuous series of 14–19 enlarged precloacofemoral scales, bearing 13–17 pores in males (pores absent in females), the absence of predigital notch in the preantebrachial cutaneous expansion and the presence of cutaneous expansions on sides of head. The main morphological and coloration characters of all *Ptychozoon* species are shown in Table 2.

Description of holotype (Figures 1–4). Body depressed dorsoventrally, relatively stout, somewhat elongate (AG/SVL 0.48). Head short (HL/SVL 0.26), wide (HW/SVL 0.21), depressed (HD/HL 0.42), distinct from neck. Snout rounded at tip. Interorbital region flat. Rostral scale large, rectangular, without dorsomedian groove; rostral width 3.9 mm; rostral depth 2.4 mm. Rostral in contact with 2 supranasals, nostrils and supralabial I. Supralabials 9 (left) / 10 (right), supralabial XIII in mid-orbital position; 9 infralabials on each side. Mental subtriangular, wider than deep, bordered laterally by infralabials I and posteriorly by left and right paired postmentals which contact medially for about 70% of their length. Postmentals subrectangular, slightly longer than mental. One row of slightly enlarged sublabials extending along all infralabials. Nostril rounded, oriented laterally, surrounded by rostral, supralabial I, two postnasals and supranasal. Supranasals trapezoidal, in broad contact with each other. Eye diameter shorter than snout length and subequal to eye-ear distance. Scales on snout and forehead small, rounded, smooth; scales on snout larger than those on occipital region. No ridge of tubercles along mandibles. Eyes large (ED/HL 0.28). Pupil vertically elliptical, with crenelated edges. Supraciliaries elongated, anterior ones lacking

spines, posteriormost ones showing minute spines. Auricular opening rounded, lacking enlarged lobes; tympanum deeply sunken. Infra-auricular cutaneous expansion a broad round flap, measuring 3.4 mm at its widest point, with subimbricate hexagonal to round scales dorsally and minute scales ventrally, forming a second, much smaller lobe, tapering into nuchal region. Entire anterior and posterior margins of forelimbs, entire posterior margins of hindlimbs and distal half of anterior margins of hindlimbs (along tibia) with wide cutaneous expansions. Limb expansions with minute scales ventrally and moderately enlarged scales dorsally. Pre- and postantebrachial expansions very reduced near base of digits I and V of manus; digits I and V of manus showing no external cutaneous expansion. No predigital notch in preantebrachial cutaneous expansion. Axilla-groin cutaneous expansion measuring 6.9 mm at midpoint of body with enlarged, imbricate, rectangular scales dorsally and minute scales ventrally; 10–12 enlarged dorsal scales on each side of axilla-groin expansion at midbody. Pretibial expansion a single rounded lobe, beginning at knee, extending distally but not reaching pes. Posttibial expansion not continuous with fringe of digit V of pes.



FIGURE 1. Preserved type series of *Ptychozoon kaengkrachanense* sp. nov. Photo by M. Sumontha.

Chin scales small, rounded, posteriorly abruptly increasing in size and imbricating in the gular area, grading into ventral scales. Dorsal scales at midbody minute, rounded, much smaller than the imbricate, flat, ventrals. Smooth, imbricate ventrals in 24 transverse rows between the flanks which show minute rounded scales below the base of the axilla-groin cutaneous expansion; ventrals gradually decreasing in size laterally.

Scales on manus and pes smooth, rounded. Scales on inner- and outer surfaces of fore- and hind limbs smooth. Precloacal depression or groove absent. Eighteen enlarged precloacofemoral scales in a continuous angular series, lacking pores. Forelimbs moderately short, stout. Forearm short; hind limbs relatively short; tibia short (TBL/SVL 0.16). Digits relatively short, dorsoventrally compressed, all clawed except the inner digit. Claws recurved. Distal

phalanges not elevated. Subdigital scensors subrectangular, entire, unnotched. Basal subdigital lamellae broad. Lamellae numbering on manus I (10), II (15), III (15), IV (18) and V (14), and on pes I (12), II (16), III (16), IV (17) and V (14). Inner surface between fingers and toes extensively webbed.

Tail original, flattened, nearly identical to SVL. Two median rows of transversely widened subcaudals; subcaudals smooth. Scales on postanal region and at proximal part of tail base smaller than on rest of tail. Terminal tail flap narrow, very short. Width of tail and lateral lobes progressively decreasing posteriorly; 25 tail lobes on the left side, 24 on the right side. The angling of the caudal lobes is strong.

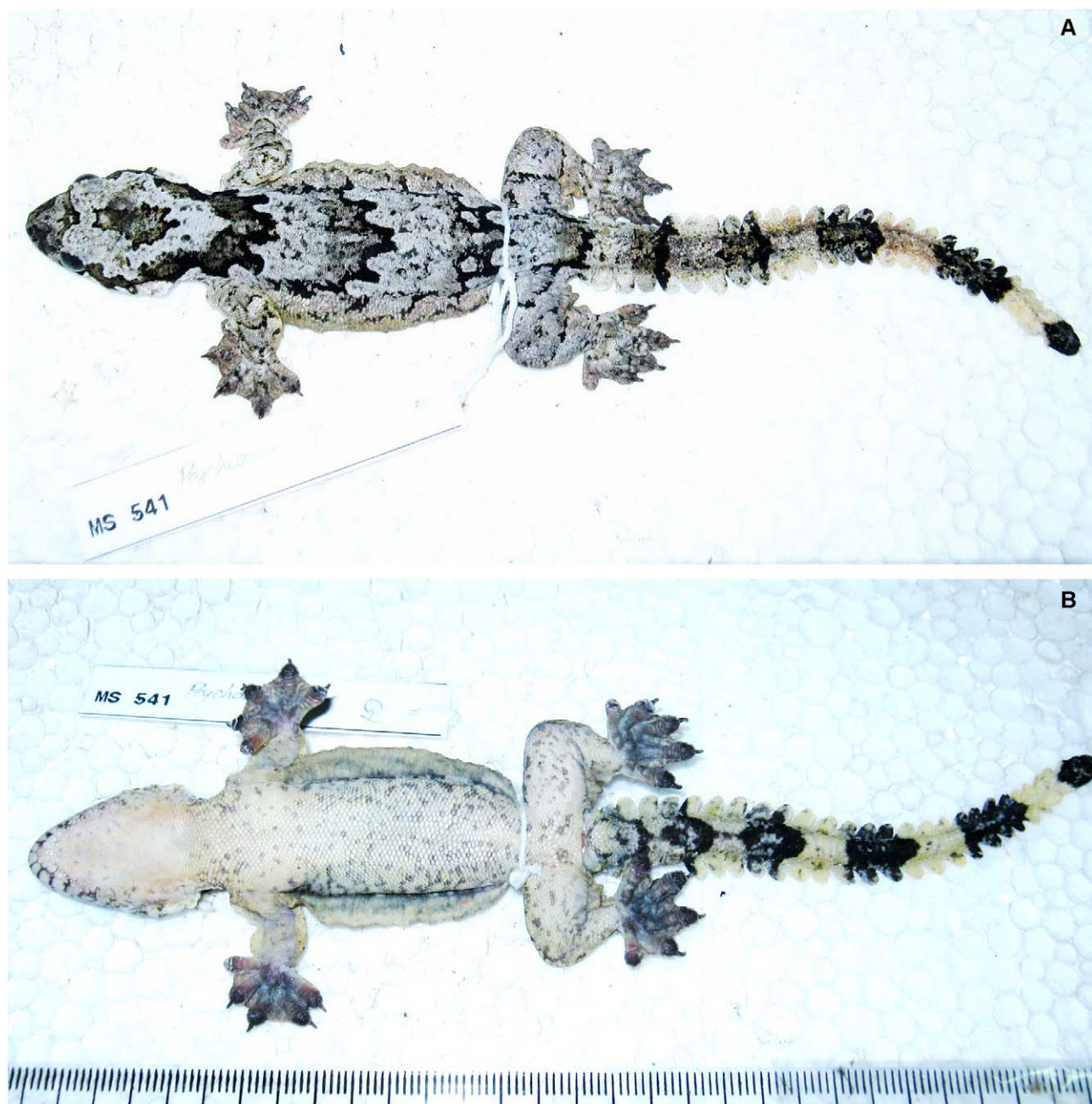


FIGURE 2A–B. Dorsal and ventral views of the preserved holotype of *Ptychozoon kaengkrachanense* sp. nov. (PSUZC-RT 2012.1). Photo by M. Sumontha.

Measurements and meristic counts taken on the holotype are shown in Table 1.

Coloration in life. Background color of dorsum light gray with three dark irregular bicolored chevrons (anterior chevron part dark gray with irregular black pigmentation, posterior part black). First chevron beginning at posterior edge of orbit, extending posteriorly beyond forelimbs insertion. Second chevron above midbody and third just before hind limbs insertion. Upper surface of limbs light gray, irregularly barred with black. Upper surfaces of

manus and pes light gray with irregular dark pigmentation. One irregular, elongate, dark patch on nape. Dark transverse bar above anterior part of orbits. One reduced, simplified, chevron just posterior to hind limb insertion. Tail encircled by five dark rings. Background color of tail lighter posteriorly. Undersurface of hand cream with scattered dark pigmentation. Belly cream with scattered dark pigmentation increasing posteriorly. Undersurfaces of limbs cream with scattered dark pigmentation, more intense on hind limbs. Underside of manus and pes dark gray. Upper surface of axilla-groin cutaneous expansion light gray with irregular dark pigmentation; underside cream with little, scattered, dark pigmentation.

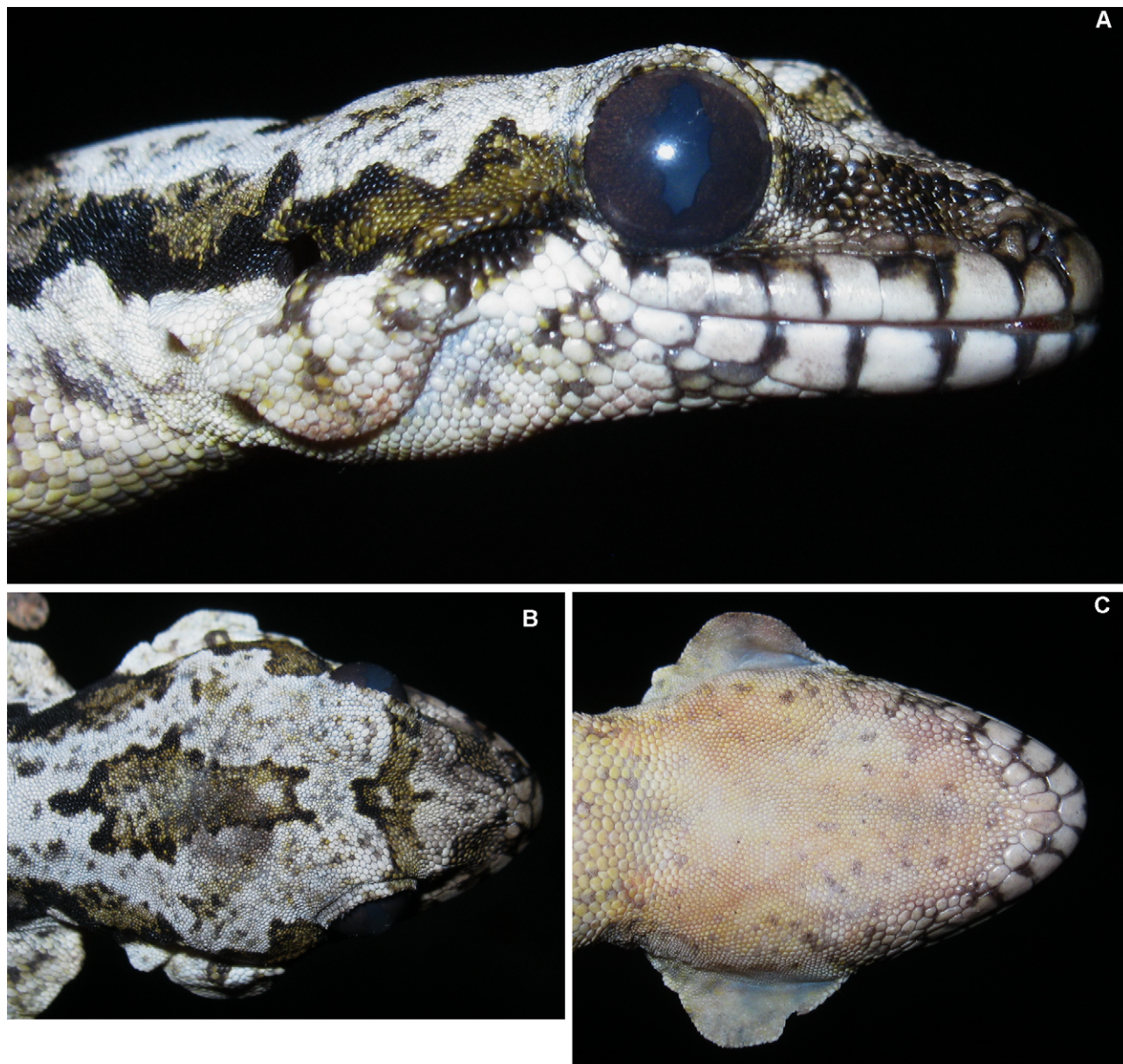


FIGURE 3A–C. Head of the holotype of *Ptychozoon kaengkrachanense* **sp. nov.** (PSUZC-RT 2012.1). Photo by M. Sumontha.

Variation. Measurements and meristic counts taken on the paratypes are provided in Table 1. precloacofemoral pores are present in adult males and absent in females. The postcloacal hemipenial bulge is distinct in males. Males possess a single round, flat postcloacal spur on each side of the cloaca. All paratypes have partly regenerated tails, exhibiting fusion of the lateral lobes into a long terminal flap, narrower than the anterior part of tail. The banded pattern of the original tail is absent in the regenerated portion. Males have a more contrasting and darker pigmentation on the throat and belly than females. Besides the type-series, six adults, not collected, were closely observed at the type-locality; all had three dark dorsal chevrons between limbs insertions and a similar dorsal coloration, and their SVL were within the range observed in our type-series. Juveniles are unknown.

TABLE 1. Meristic, morphometrical (in mm) and pattern data for the type series of *Ptychozoon kaengkrachanense* sp. nov. Paired meristic characters are given left/right. Abbreviations provided in Material and methods section.

	Holotype	Paratype	Paratype	Paratype
	PSUZC-RT 2012.1	QSMI 1169	PSUZC-RT 2012.2	KZM 010
Sex	Female	Female	Male	Male
Supralabials	9/10	9/9	9/8	9/10
Infralabials	9/9	8/8	9/9	9/9
Interorbital scales	35	34	35	37
Supranasals in contact	Yes	Yes	Yes	Yes
No. of ventral scale rows	24	24	25	25
Enlarged precloacofemoral scales (no separated femoral scales)	18	19	19	14
precloacofemoral pores	0	0	17	13
Lamellae under 4 th toe of pes	17	16	17	15
Predigital notch in preantebrachial cutaneous expansion	No	No	No	No
No. of lateral tail lobes	25/24	17/17 (tail partly regenerated)	9/10 (tail partly regenerated)	13/13 (tail partly regenerated)
Black dorsal chevrons between limbs insertions	3	3	3 (4 th one above hind limbs insertion)	3
SVL	79.5	78.5	86.0	78.0
AG	38.2	37.4	40.4	35.7
TL	79.8	73.8 (of which original part 56.4)	66.2 (of which original part 32.1)	69.7 (of which original part 44.0)
TW	7.2	6.8	10.9	8.4
HL	20.9	20.0	21.6	20.6
HW	16.9	15.4	17.5	16.0
HD	8.7	8.0	10.6	10.0
ED	5.8	5.8	7.1	6.7
EA0	6.5	5.9	6.9	6.5
EN	6.1	5.8	6.5	5.9
ES	8.7	8.5	9.0	8.4
AOW	1.5	1.6	1.3	1.2
IN	3.5	3.1	4.0	3.2
IO	3.7	3.5	4.3	3.7
FL	8.4	7.5	8.1	7.6
TBL	13.1	12.2	14.5	12.8

Distribution. Due to the proximity of the type locality to Myanmar (16 airline km), and the environmental homogeneity in the intervening area, there is a very strong possibility that it also occurs in the latter country. Other areas that may support populations of the new species include the mountainous, forested areas in Ratchaburi Province and in northern Prachuap Khiri Khan Province, which are contiguous with those of Kaeng Krachan National Park.

Natural history. Individuals of the new species are commonly observed in wooden houses and man-made structures at the type locality. They rest under the roof during daytime, and hunt insects at night on walls, sometimes around neon lights. Up to seven individuals have been observed hunting insects attracted by light on the same wall. On the same wooden buildings and at the same time we observed *Cyrtodactylus brevipalmatus* (Smith), *Hemidactylus platyurus* (Schneider) and *Gehyra mutilata* (Wiegmann). Many *Ptychozoon lionotum* were observed in nearby wooden man-made structures in the park (Pauwels & Chan-ard 2006; unpubl. obs.), although not in strict syntopy with *P. kaengkrachanense* **sp. nov.**

Etymology. The specific epithet is a reference to Kaeng Krachan National Park and Kaeng Krachan District, Phetchaburi Province (the type locality of the new species). We suggest the following common names: *Took-kay bin Kaeng Krachan* (Thai), Kaeng Krachan Parachute Gecko (English), *Gecko planant de Kaeng Krachan* (French).

TABLE 2. Comparison of selected morphological characters between the *Ptychozoon* species (data from Creveld 1809; Brown *et al.* 1997; Brown 1999; Das & Vijayakumar 2009; Kunya *et al.* 2011). A slash indicates “not applicable.”

Character/species	<i>P. horsfieldii</i>	<i>P. intermedium</i>	<i>P. kuhli</i>	<i>P. lionotum</i>	<i>P. nicobarense</i>	<i>P. rhacophorus</i>	<i>P. trinotaterra</i>	<i>P. kaengkrachanense</i> sp. nov.
Maximal known SVL	73.9	99.8	107.8	98.6	100.3	64.5	71.3	86.0
Disposition of dorsal tubercles	Absent	0–10 irregular rows	2–6 straight rows	Absent	4 irregular rows	6–10 rows, scattered	0–1 mediodorsal row	Absent
Dorsal tubercle shape /		Flat or convex	Convex or / spiculate		Flat	Spiculate to highly spinose	Flat	/
Separated femorals	8–11	12–19	/	/	/	/	/	/
Precloacofemorals	10–11	8–12	14–32	15–26	14–22	12–18	19–21	14–19
Supranasals contact	No	Yes or no	Yes or no	No	Yes	No	Yes	Yes
Infra-auricular cutaneous expansion	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Predigital notch in preantibrachial expansion	Absent	Absent	Absent	Present	Absent	Absent	Absent	Absent
Imbricate parachute support scales	Yes	yes	Yes	Yes	Yes	No	Yes	Yes
Caudal lobe angling	Strong	Strong	Slight	Slight	Strong	Strong	Slight	Strong
Distal lobes fused into a long terminal flap in original tail	No	No	Yes	Yes	Yes	No	Yes	No
Number of chevrons between limbs insertions	4	3	4	4	3 (indistinct)	0	3	3

Comparisons

Seven *Ptychozoon* species are currently recognized (Brown 1999; Brown *et al.* 1997, 2012; Das & Vijayakumar 2009; Kunya *et al.* 2011): *P. horsfieldii* Gray from Borneo, *P. intermedium* Taylor from the Philippines, *P. kuhli* Stejneger, distributed from southern Thailand and Sumatra eastwards to Sulawesi (potentially including several undescribed species according to Brown *et al.* 2012), *P. lionotum*, which occurs in Cambodia, Myanmar, Thailand and

peninsular Malaysia, *P. nicobarense* Das & Vijayakumar, 2009 from the Indian Nicobar Islands, *P. rhacophorus* Boulenger, 1899 from Borneo and *P. trinotaterra* Brown, 1999 from eastern Thailand and central Vietnam.



FIGURE 4. Ventral view of hindlimbs of the preserved adult male paratype of *Ptychozoon kaengkrachanense* **sp. nov.** [PSUZYC-RT 2012.2] Photo by M. Sumontha.



FIGURE 5. Adult female *Ptychozoon kaengkrachanense* **sp. nov.** (not collected) on a wooden house in Khao Phanern Thung, Kaeng Krachan National Park. Photo by M. Sumontha.

So far, only three *Ptychozoon* species were known to possess only three dark dorsal chevrons between limb insertions: *P. intermedium* from the Philippines, *P. nicobarense* from the Nicobar Archipelago and *P. trinotaterra* from eastern Thailand and central Vietnam (Brown 1999; Das & Vijayakumar 2009; Kunya *et al.* 2011). The tail shape (tapering, lobe angling, minute distal flap, and lack of lobe fusion) and overall appearance of *P. kaengkrachanense* **sp. nov.** suggest a close relationship with *P. intermedium* and *P. horsfieldii*, which were shown in a recent molecular phylogenetic analysis to be closely related to each other and quite distinct from the *P. kuhli*-*P. lionotum*-*P. trinotaterra* clade (Brown *et al.* 2012).

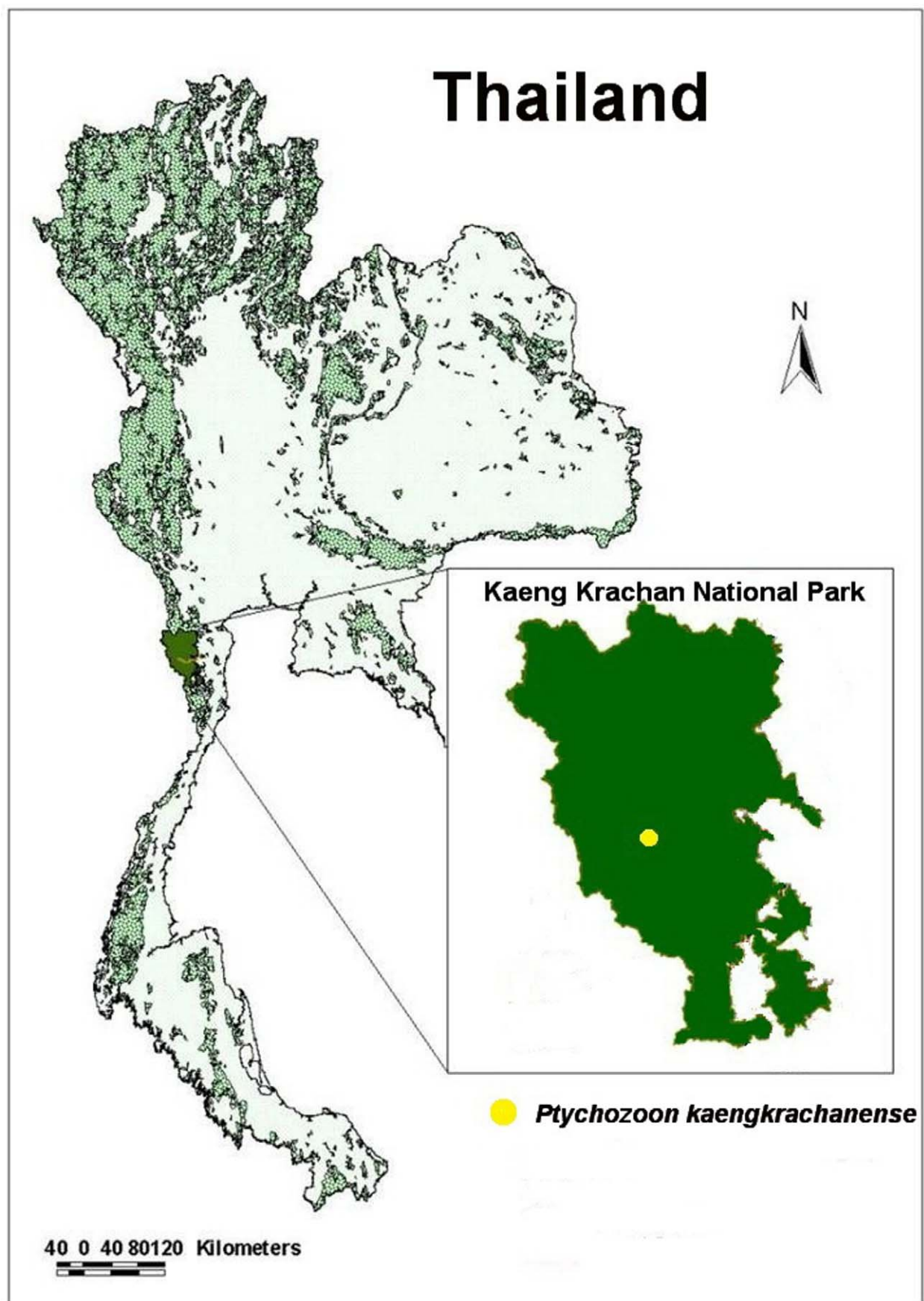


FIGURE 6. Map of Thailand showing the type locality of *Ptychozoon kaengkrachanense* sp. nov. (yellow dot). Light green color shows mid- and high-altitude areas. Dark green color shows the surface of Kaeng Krachan National Park. Provided by S. Ruksue.



FIGURE 7. Biotope of *Ptychozoon kaengkrachanense* **sp. nov.** in Khao Phanern Thung, Kaeng Krachan National Park. Photo by M. Sumontha.

Ptychozoon kaengkrachanense **sp. nov.** can be readily distinguished from *P. horsfieldii* by lacking separated enlarged femoral scales (*versus* 8–11 enlarged femoral scales + 10–11 enlarged precloacals in *P. horsfieldii*), by having supranasals in contact, by having three dark chevrons between limb insertions (*versus* four in *P. horsfieldii*), by the absence of rounded nuchal markings (present in *P. horsfieldii*) and by a greater SVL (86.0 mm in *P. kaengkrachanense* **sp. nov.** *versus* 73.9 mm in *P. horsfieldii*). It differs from *P. intermedium* by lacking separated enlarged femoral scales (*versus* 12–19 enlarged femoral scales + 8–12 enlarged precloacals in *P. intermedium*), by lacking enlarged tubercular dorsal scales (*versus* 0–10 irregular rows of enlarged dorsal scales in *P. intermedium*; only one out of 25 *P. intermedium* specimens examined by Brown *et al.* 1997 lacked enlarged dorsal scale rows) and by a smaller SVL (86.0 mm, *versus* 99.8 mm in *P. intermedium*); both species also differ in dorsal color pattern: the dark dorsal chevrons show a double posterior point in *P. kaengkrachanense* **sp. nov.** and a single point in *P. intermedium*, and the posterior extremity of the nuchal chevron of *P. kaengkrachanense* **sp. nov.** is pointed while it is straight in *P. intermedium* (see description and figures in Brown *et al.* 1997). *P. kaengkrachanense* **sp. nov.** differs from *P. kuhli* by the absence of dorsal tubercles (*versus* 2–6 straight tubercle rows in *P. kuhli*), by having three dorsal dark chevrons between limbs insertions (*versus* four), by lacking fusion of distal tail lobes into a long terminal flap in original tail and by a smaller SVL (86.0 mm in *P. kaengkrachanense* **sp. nov.** *versus* 107.8 mm in *P. kuhli*). *Ptychozoon kaengkrachanense* **sp. nov.** can be distinguished from *P. lionotum* by its possession of three dark dorsal chevrons between limbs insertions (*versus* four), by lacking a predigital notch in preantibrachial cutaneous expansion, and by lacking fusion of distal tail lobes into a long terminal flap in original tail. It differs from *P. nicobarense* by having very visible and contrasting dorsal chevrons (*versus* three indistinct chevrons in *P. nicobarense*), lacking a tan vertebral stripe, lacking enlarged dorsal tubercles (*versus* four irregular rows of enlarged tubercular dorsal scales in *P. nicobarense*), lacking fusion of distal tail lobes into a long terminal flap in original tail, and by a smaller SVL (86.0 mm in *P. kaengkrachanense* **sp. nov.** *versus* 100.3 mm in *P. nicobarense*). It differs from *P. rhacophorus* by lacking enlarged dorsal tubercles, by having supranasals in contact, by having 3 dorsal dark chevrons between limbs insertions (*versus* chevrons absent in *P. rhacophorus*), by having cutaneous expansions on sides of head (*versus* absent) and by a larger size (maximal known SVL 86.0 and 64.5 mm, respectively). *Ptychozoon kaengkrachanense*

sp. nov. can be easily distinguished from *P. trinotaterra* by the absence of fusion of distal tail lobes into a long terminal flap in original tail; by having black dorsal chevrons with more posterior projections in *Ptychozoon kaengkrahanense* **sp. nov.** than in the simpler W-shaped chevrons of *P. trinotaterra* (see Kunya *et al.* 2011); and apparently by reaching a larger body size (maximal known SVL 86.0 and 71.3 mm, respectively).

Ptychozoon kaengkrahanense **sp. nov.** is the 5th species of this genus recorded from Thailand, along with *P. horsfieldii*, *P. kuhli*, *P. lionotum* and *P. trinotaterra* (Brown 1999; Kunya *et al.* 2011). It is the only *Ptychozoon* species endemic to Thailand. It is the 68th reptile species recorded from Kaeng Krachan National Park, which was already known to house the richest herpetofauna of all protected areas of Thailand (Pauwels & Chan-ard 2006; Pauwels *et al.* 2009), and it thus reinforces the exceptional value of the park in terms of biodiversity and its conservation.

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Appendix: Comparative material examined

Ptychozoon kuhli: IRSNB 12 (“Buitenzorg, Java” = Bogor, Java, Indonesia); IRSNB 781 (no locality); IRSNB 781γ (“Java”); IRSNB 781δ (“Sumatra”); IRSNB 781ε (2 specimens, “Batchian, Moluques” = Bacan, Maluku Islands, Indonesia); IRSNB 781ζ (4 specimens, “Batavia” = Jakarta, Indonesia); IRSNB 11721 (“Buitenzorg, ±250m, Java” = Bogor, ±250m asl, Java, Indonesia); MS 544 (“Khao Krachong, Trang Province, southern Thailand”).

Ptychozoon lionotum: CUB-MZ-R 1999.07.15.4, MNHN 1998.0590, MNHN 1999.7661 (“Phang-Nga Wildlife Breeding Station, Muang District, Phang-Nga Province, southern Thailand”); IRSNB 15144 (“Phang-Nga City, Muang District, Phang-Nga Province, southern Thailand”), PSUZC-RT 2012.3 (formerly MS 447, “Khao Phanern Thung, Kaeng Krachan National Park, Phetchaburi Province, western Thailand”).

Ptychozoon trinotaterra: CUMZ-R-S-1 (“Ubon Ratchathani Zoo compound, Amphoe Muang, Ubon Ratchathani Province, northeastern Thailand”).