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A new limestone-dwelling leaf-toed gecko (Gekkonidae: *Dixonius*) from coastal hills in Cha-am, peninsular Thailand

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Abstract

We describe *Dixonius pawangkhananti* **sp. nov.** from coastal limestone hills in Cha-am District, Phetchaburi Province, peninsular Thailand. The new species differs from all currently recognized *Dixonius* by the following combination of morphological characters and pattern: maximal known snout-vent length of 42.6 mm; 16 longitudinal rows of dorsal tubercles; 30 to 32 paravertebral scales; 16 longitudinal rows of ventral scales across the abdomen; six precloacal pores in males, no pores in females; a marked canthal stripe; and a sexually dimorphic dorsal pattern consisting of bands (males) or blotches (females). This description brings the number of *Dixonius* species to ten, with four species endemic to Thailand.

Key words: Thai-Malay Peninsula, *Dixonius pawangkhananti* sp. nov.

Introduction

The genus *Dixonius* Bauer, Good & Branch includes nine currently recognized species which globally extend from southern Myanmar to Vietnam and to southern Thailand (Sumontha *et al.* 2017; Nguyen *et al*. 2020). Seven of these nine species were described in the 21st Century. Except for the widespread *Dixonius siamensis* (Boulenger, 1898), type-species of the genus, all other species have a limited to an extremely restricted geographical distribution. In Thailand, we recently discovered two species, *Dixonius hangseesom* Bauer, Sumontha, Grossmann, Pauwels & Vogel, 2004 restricted to Sai Yok, a hilly locality in western Thailand with a high reptile endemism, and *D. kaweesaki* Sumontha, Chomngam, Phanamphon, Pawangkhanant, Viriyapanon, Thanaprayotsak & Pauwels, 2017, endemic to Khao Sam Roi Yot coastal massif in Prachuap Khiri Khan Province, peninsular Thailand. During fieldwork on two adjacent, coastal limestone hills in Phetchaburi Province, peninsular Thailand, at about 75 km north of the type-locality of *Dixonius kaweesaki*, we encountered two co-occurring, well-distinct *Dixonius* species. On both hills, the ground was occupied by *Dixonius siamensis*, while the boulders were inhabited by a smaller, shier and differently-patterned species. We compared the latter with all known congeneric species, from which it clearly differs in morphology and pattern. We hence describe it hereafter as a new species.

Material and methods

Voucher specimens were fixed in 90% ethanol and subsequently transferred into 70% ethanol for permanent stor-

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age. Measurements and meristic counts followed Sumontha *et al*. (2017) and Nguyen *et al*. (2020). Paired meristic characters are given left/right. Numbers of supralabial 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 longitudinal rows of body tubercles was counted transversely across the center of the dorsum. The number of longitudinal rows of ventral scales was counted transversely across the center of the abdomen between the lowest rows of dorsal tubercles. The numbers of subdigital lamellae beneath the toes were counted from the distal one containing claw (claw not counted) to the basal one that broadly contacts the adjacent fragmented scales (claw fragmented scales not counted).

The following measurements were taken with a digital caliper to the nearest 0.1 mm: BW: Body width, greatest width of torso, taken at level of midbody; EarL: ear length, the greatest horizontal distance of the ear opening; FAL: 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 depth 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; InterN: internarial distance, measured between the nares across the rostrum; InterOrb: interorbital distance, measured between the anterior edges of the orbits; NosOrb: nostril to orbit distance, from the posterior margin of the external nares to the anterior margin of the orbit; OrbD: orbit diameter, the greatest horizontal diameter of the orbit; OrbEar: orbit to ear distance, from the anterior edge of the ear opening to the posterior edge of the orbit; SnOrb: snout to eye distance, from the tip of the snout to the anteriormost margin of the orbit; SVL: snout-vent length, taken from the tip of snout to the vent; TailL: tail length, taken from the vent to the tip of the tail, original or regenerated; TailW: tail width, taken at the base of the tail immediately posterior to the postcloacal swelling; TibL: tibia length, taken on the ventral surface from the posterior surface of the knee while flexed 90° to the base of heel; TrunkL: axilla to groin length (trunk 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. Meristic characters abbreviations: DTR: longitudinal rows of dorsal tubercles; FemPo: femoral pores; ICS: interciliary scales, counted between supraciliaries at midpoint of orbit; IL: infralabial scales; InterOrb: interorbital scales, counted across the narrowest point of the frontal bone; PrePo: precloacal pores; PV: paravertebral scales, number of scales in a paravertebral row from first scale posterior to parietal scale to last scale at the level of vent opening; PV': paravertebral scales in a row between limb insertions; SL: supralabial scales; SLMOrb: number of supralabial scales at mid-orbital position; SubLT4: number of subdigital lamellae beneath 4th toe; Ven: ventral scales.

Comparisons were made using the original descriptions of all currently recognized *Dixonius* species and their synonyms (Boulenger 1898; Mocquard 1904; Annandale 1905a-b; Taylor 1962, 1963; Bauer *et al*. 2004; Das 2004; Ngo & Ziegler 2009; Botov *et al*. 2015; Ziegler *et al*. 2016; Sumontha *et al*. 2017; Nguyen *et al*. 2020; and references therein) and museum preserved specimens (see Appendix).

Museum and other acronyms: AUP: Agriculture University of Phayao, Phayao; CUMZ-R: Chulalongkorn University Museum of Zoology, Reptile Collection, Bangkok; MNHN: Muséum national d'Histoire naturelle, Paris; MS: Montri Sumontha's field number series; PSUZC, Prince of Songkhla University Zoological Collection, Songkhla; RBINS: Royal Belgian Institute of Natural Sciences, Brussels; THNHM: Thailand Natural History Museum, National Science Museum, Technopolis, Pathum Thani; and ZMKU Rep: Zoological Museum of Kasetsart University, Reptile Collection, Bangkok.

Systematics

Dixonius pawangkhananti sp. nov.

(Figures 1–5)

Holotype. THNHM 25606 (field no. MS 563), adult male caught at night by M. Sumontha, N. Chomngam and P. Pawangkhanant on 8 August 2015 on the foot of the hill (12°50'04.4"N, 99°56'10.3"E) behind Wat (= Temple) Nikhom Wachiraram, Khao Yai Subdistrict, Cha-am District, Phetchaburi Province, peninsular Thailand.

Paratypes (2). AUP-02001 (field no. MS 564), adult male, and PSUZC-R 728 (field no. MS 565), adult female. Same locality, collecting date and collectors as holotype.

Diagnosis. *Dixonius pawangkhananti* **sp. nov.** can be distinguished from all other congeneric species by the

combination of its maximal known SVL of 42.6 mm; 16 longitudinal rows of dorsal tubercles; 30 to 32 paravertebral scales; 16 longitudinal rows of ventrals across the abdomen; six precloacal pores in males, no pores in females; a marked canthal stripe; and a dorsal pattern consisting of bands or blotches.

FIGURE 1. Preserved adult male holotype of *Dixonius pawangkhananti* **sp. nov.** in dorsal view (**A**) and in ventral view (**B**). **C.** Live holotype of *Dixonius pawangkhananti* **sp. nov.** in dorsal view. Photos. by M. Sumontha.

Description of holotype. Adult male (Figure 1). SVL 40.7 mm. Head relatively long (HL/SVL ratio 0.32), wide (HW/HL ratio 0.61), not markedly depressed (HD/HL ratio 0.37), distinct from neck. Lores and interorbital region weakly inflated. Canthus rostralis relatively prominent. Snout moderately short (SnOrb/HL ratio 0.39), rounded, slightly longer than orbit diameter (OrbD/SnOrb ratio 0.58). Scales on snout and forehead small, hexagonal to rounded, flattened, with smooth or slightly rugose surface. Scales on snout larger than those on occipital region. Eye of moderate size (OrbD/HL ratio 0.22). Pupil vertical with crenelated margins. Supraciliaries short, without spines. Ear opening rounded, moderate (EarL/HL ratio 0.05); orbit to ear distance greater than orbit diameter. Rostral about twice wider than high. Two enlarged supranasals in broad contact. Rostral in contact with supralabial I on each side, nostrils and both supranasals. Nostrils round, each surrounded by supranasal, rostral, supralabial I and two postnasals. Mental triangular, about as long as deep. Two pairs of enlarged postmentals, anteriormost approximately four times larger than posterior. Each anterior postmental bordered anteriorly by mental, medially by the other anterior postmental, anterolaterally by infralabial I, posterolaterally by the second postmental; the pair collectively bordered posteromedially by a row of four throat scales. Supralabials to mid-orbital position 6/6; enlarged supralabials to angle of jaws 8/8. Infralabials 7/7. Interorbital scales 7.

Body slender, elongate (TrunkL/SVL ratio 0.43), without ventrolateral folds. Dorsal scales heterogeneous, small, irregular, flattened to conical, distributed among large, strongly keeled tubercles arranged in 16 more-or-less regular longitudinal rows at midbody. Flanks covered with irregular, smooth to slightly conical scales. Gular region with relatively homogeneous, granular scales. Ventral scales smooth, imbricate, their free margin rounded. Ventrals increasing in size from throat to chest to abdomen, somewhat smaller in precloacal region. Midbody scale

rows across belly to lowest rows of tubercles 16. Six precloacal pores in a discontinuous series: a poreless scale is separating three pores on the left side from three pores on the right side. Pore-bearing scales not enlarged relative to adjacent scale rows. Scales in the row immediately posterior to the pore-bearing row about three times the size of other scales in precloacal region. No femoral pores or enlarged femoral scales.

FIGURE 2. A. Preserved adult male paratype of *Dixonius pawangkhananti* **sp. nov.** in dorsal view. **B.** Preserved adult female paratype of *Dixonius pawangkhananti* **sp. nov.** in dorsal view. **C.** Live adult female paratype of *Dixonius pawangkhananti* **sp. nov.** in laterodorsal view. Photos. by M. Sumontha.

Fore- and hind limbs short, slender (FAL/SVL ratio 0.15; TibL/SVL ratio 0.16). Digits slender, dilated distally, all bearing robust, slightly recurved claws. Basal subdigital lamellae narrow, without scansorial surfaces (6-9-12-11-9 right manus; 8-14-14-15-15 right pes); setae-bearing lamellae restricted to enlarged, distal, ‘‘leaf-like’’ scansors. Scales on palm and sole small, smooth, rounded to oval. Interdigital webbing absent. Relative length of digits: III>IV>II>V>I (manus), IV>III>V>II>I (pes). Tail original; total length of tail 57.3 mm. Tail slender, tapering to tip, longer than snout-vent length (TailL/SVL ratio 1.41). Supracaudals markedly keeled in the anterior portion of the tail. Ventral tail scales enlarged into transverse plates; 59 subcaudals.

Coloration in life. Dorsal surface of head gray with several irregular black blotches. On each side of the head a black canthal stripe runs from the nostril through the eye and extends to the neck; it is bordered below and above by a light grey thin stripe. The supralabials are whitish with each a black spot. The dorsal surface of the neck shows two longitudinal blotches followed by one transversal irregular blotch. The dorsum shows a gray background color with five irregular bars between the anterior and posterior limb insertions (Figure 1C). The same gray background color extends to the base of the tail, with one black bar above sacrum and two above the base of the tail; posteriorly to these two supracaudal black bars the following bars are all orangish on a light gray background. In total two black bars and ten orangish bars alternate with the light gray background color from the base of the tail to its tip. Dorsal surfaces of members gray with black spots. Ventral surfaces of head, body, members and tail whitish. In preservative the colors strongly fade and become less contrasted (Figure 1A–B).

FIGURE 3. Live adult female (above) and male *Dixonius pawangkhananti* **sp. nov.** in Wat Nikhom Wachiraram, Phetchaburi Province, Thailand. Individuals not collected. Photo. by M. Sumontha.

Variation. Main morphometric and meristic characters of the type series are provided in Table 1. Morphological and coloration characters of the paratypes agree in most respects with the holotype. The paratype female has an original tail and shows a TailL/SVL ratio of 1.33; i.e., proportionally a bit shorter than in the holotype. Similarly to the holotype, the male paratype has three left precloacal pores separated from three right precloacal pores by a median poreless scale. Precloacal pores are absent in females. Depending on the individuals, the background color of the body is grey to light brown. The dorsal pattern shows a clear sexual dimorphism: while males have a banded pattern, females have a blotched one. The tail of older individuals, both males and females, often shows an orangish color (Figures 1C, 2C, 4A–B). None of the newborn and juvenile individuals seen showed an orangish tail (Figure 5).

Distribution and natural history. The type-specimens and other individuals of *Dixonius pawangkhananti* **sp. nov.** were found at night at the type-locality of the new species, i.e., at the foot of the hill behind Wat Nikhom Wachiraram (Figure 6). Several other individuals were observed a few hundred meters east, on another hill closer to the sea side, in Khao Nang Phanthurat Forest Park (Figure 7). Both hills are separated by 300 meters and are covered with secondary forest. They are located at about 5 km from the beach, and are totally surrounded by urbanized and cultivated areas. Individuals of *Dixonius pawangkhananti* **sp. nov.** were locally abundant, and always found on lime stones, never on the ground where *Dixonius siamensis* individuals were common. *Dixonius pawangkhananti* **sp. nov.** individuals were much shier than the latter, and seemed to fear light, rapidly retreating in rock crevices when approached with a torch.

Besides *Dixonius siamensis*, squamates we found in the direct surroundings of the new species included *Cyrtodactylus interdigitalis* Ulber and *C.* sp., *Gehyra fehlmanni* (Taylor) and *G. lacerata* (Taylor), *Gekko gecko* (Linnaeus) (Gekkonidae), *Ahaetulla nasuta* Lacepède, *Chrysopelea ornata* (Shaw) and *Lycodon capucinus* (Boie) (Colubridae).

A gravid female caught at the type-locality along with the type-series laid two eggs which hatched after three months.

FIGURE 4. A. Live adult male *Dixonius pawangkhananti* **sp. nov.** *in situ* in Khao Nang Phanthurat Forest Park, Phetchaburi Province, Thailand. **B.** Another live adult male *Dixonius pawangkhananti* **sp. nov.** *in situ* in Khao Nang Phanthurat Forest Park, Phetchaburi Province, Thailand. Individual not collected. Photo. by M. Sumontha.

Etymology. The specific epithet honors the Thai zoologist Parinya Pawangkhanant (Agriculture University of Phayao, Phayao, and Rabbit in the Moon Foundation, Ratchaburi), for his contributions to the herpetology of Thailand, and who is one of the collectors of the type-series. We suggest the following common names: *Djing-djok din Cha-am* (Thai), Cha-am leaf-toed gecko (English), *Dixonius de Cha-am* (French), *Cha-am Blattfingergecko* (German).

Comparison to other species. *Dixonius pawangkhananti* **sp. nov.** is distinguished from the Vietnamese *D. aaronbaueri* Ngo & Ziegler, 2009 based on its larger SVL (42.6 vs. 38.6 mm), lower Ven number (16 vs. 18 or 19), much higher DTR number (16 vs. 11), sensibly lower PV number (30–32 vs. 45–50) and PV' number (18–21 vs. 29–32), lower InterOrb number (7 vs. 8–10), and its dorsal pattern (Ba or Bl vs. U). Although they show similarities in their dorsal pattern, *Dixonius pawangkhananti* **sp. nov.** clearly differs from *Dixonius hangseesom* by its much lower Ven number (16 vs. 22–26), higher DTR number (16 vs. 12–14), lower InterOrb number (7 vs. 10) and lower IL number (6 or 7 vs. 8). It can be separated from *Dixonius kaweesaki* by its much lower Ven number (16 vs. 24), higher DTR number (16 vs. 12 or 13), lower SL number (7 or 8 vs. 10 or 11) and lower SLMOrb number (5 or 6 vs. 7 or 8), lower PrePo number (6 vs. 9–11) and by its dorsal pattern (Ba or Bl vs. St). It differs from the Laotian *Dixonius lao* Nguyen, Sitthivong, Ngo, Luu, Nguyen, Le & Ziegler, 2020 by its much smaller SVL (42.6 vs. 55.4 mm), much lower Ven number (16 vs. 23 or 24), lower DTR number (16 vs. 20–23), much lower PV number (30–32 vs. 40–43) and lower PV' number (18–21 vs. 24 or 25), lower InterOrb number (7 vs. 8 or 9), lower SMLOrb number (5 or 6 vs. 7 or 8), lower PrePo number (6 vs. 8), its marked canthal stripe, and its dorsal pattern (Ba or Bl vs. U). It can be separated from *Dixonius melanostictus* Taylor, 1962 by its smaller SVL (42.6 vs. 50.0 mm), much lower Ven number (16 vs. 22), much higher DTR number (16 vs. 10 or 11), lower SL number (7 or 8 vs. 9) and SLMOrb

(5 or 6 vs. 7), lower PrePo number (6 vs. 9), and by its dorsal pattern (Ba or Bl vs. St). It is distinguished from the Vietnamese *Dixonius minhlei* Ziegler, Botov, Nguyen, Bauer, Brennan, Ngo & Nguyen, 2016 by its lower Ven number (16 vs. 20–23), slightly higher DTR (16 vs. 14 or 15), much lower PV number (30–32 vs. 38–44) and lower PV' number (18–21 vs. 23–26), lower PrePo number (6 vs. 7 or 8), and by its dorsal pattern (Ba or Bl vs. Sp). It differs from the sympatric *Dixonius siamensis* by its much smaller SVL (42.6 vs. 57.0 mm), lower Ven number (16 vs. 18–25), higher DTR (16 vs. 10–14), by its marked canthal stripe, and its dorsal pattern (Ba or Bl vs. Sp). It can be separated from the Vietnamese *Dixonius taoi* Botov, Phung, Nguyen, Bauer, Brennan & Ziegler, 2015 by its lower Ven number (16 vs. 21–23) and by its much higher DTR number (16 vs. 11 or 12). From *Dixonius vietnamensis* Das, 2004, it differs by its lower PV number (30–32 vs. 36), its lower InterOrb number (7 vs. 8–10) and by its dorsal pattern (Ba or Bl vs. Sp).

TABLE 1. Meristic and morphometric (in mm) data for the type series of *Dixonius pawangkhananti* **sp. nov.** Paired meristic characters are given left/right.

	Holotype, THNHM 25606	Paratype, AUP-02001	Paratype, PSUZC-R 728
Sex	Male	Male	Female
SVL	40.7	42.6	41.2
TailL	57.3	>46.1	54.7
TrunkL	17.3	18.4	17.8
TailW	4.1	4.5	4.3
BW	8.8	9.1	9.5
HL	12.9	13.6	12.7
HW	7.9	8.0	7.8
HD	4.8	4.8	4.7
EarL	0.7	0.7	0.6
TibL	6.6	6.6	6.5
FAL	6.1	6.1	5.1
OrbD	2.9	3.0	3.0
NosOrb	3.5	3.6	3.8
SnOrb	5.0	5.1	4.5
OrbEar	3.7	3.9	3.5
InterN	1.5	1.5	1.5
InterOrb	1.7	1.9	1.9
Ven	16	16	16
DTR	16	16	16
PV	30	30	32
PV'	18	21	21
SubLT4	15/15	15/14	15/14
InterOrb	7	7	7
ICS	26	24	25
SL	8/8	8/8	7/7
IL	7/7	6/6	6/6
SLMOrb	6/6	6/6	5/5
PrePo	3+3	3+3	0
FemPo	0/0	0/0	0/0

Discussion

We have done intensive herpetological searches in all districts of Phetchaburi Province and adjacent districts where

we found only *Dixonius siamensis* (see Pauwels *et al*. 2003, 2009; Pauwels and Chan-ard 2006; and Comparative material examined). It seems that the new species described here is restricted to two small adjacent hills along the Gulf of Thailand, similarly to the distribution of *Dixonius kaweesaki* which appears limited to another isolated coastal limestone massif at about 75 km further south along the same coastline. The distribution of *Dixonius hangseesom* is limited to hills in Sai Yok District, Kanchanaburi Province, western Thailand, and that of *D. melanostictus* to a few limestone formations in Nakhon Ratchasima and Saraburi provinces, central Thailand; their known distributions are thus located at respectively about 200 km NW and NE of the type-locality of *Dixonius pawangkhananti* **sp. nov**.

Similarly to *Dixonius pawangkhananti* **sp. nov.**, *D. kaweesaki* was found on limestone rocks while representatives of the widespread *D. siamensis* (or similar, cryptic species) were found on the ground around these rocks (Sumontha *et al*. 2017). Their micro-endemism is probably directly linked to their substrate specialization, such as for *Dixonius hangseesom*, *D. lao* and *D. melanostictus* (Nguyen *et al*. 2020).

TABLE 2. Comparison of selected diagnostic characters of *Dixonius* spp. Ba = banded; Bl = blotched; Sp = spotted; St = striped; U = uniform. NA = not available. Bolded values are diagnostic differences from *Dixonius pawangkhananti* **sp. nov**.

Character	*Dixonius aaronbaueri*	*D. hangseesom*	*D. kaweesaki*	*D. lao*	*D. melanostictus*	*D. minhlei*	*D. pawangkhananti* sp. nov.	*D. siamensis*	*D. taoi*	*D. vietnamensis*
Max. SVL	**38.6**	42.1	41.6	**55.4**	**50.0**	47.5	42.6	**57**	43.9	42.4
Ven	**18–19**	**22–26**	**24**	**23–24**	**22**	**20–23**	16	**18–25**	**21–23**	15–21
DTR	**11**	**12–14**	**12–13**	**20–23**	**10–11**	**14–15**	16	**10–14**	**11–12**	13–17
PV	**45–50**	NA	NA	**40–43**	NA	**38–44**	30–32	NA	31–42	**36**
PV’	**29–32**	NA	NA	**24–25**	NA	**23–26**	18–21	NA	18–25	NA
SubLT4	13–15	NA	15	15	15	12–15	14–15	12–16	12–14	12–15
InterOrb	**8–10**	**10**	6–7	**8–9**	NA	7–10	7	NA	7–10	**8–10**
SL	8–9	8	**10–11**	8–10	**9**	7–9	7–8	7–8	7–8	7
SLMOrb	6–7	6	**7–8**	**7–8**	**7**	5–6	5–6	NA	5–6	5–6
IL	6–8	**8**	6–8	7–8	7	6–7	6–7	6–7	5–7	6–7
PrePo	**5**	6–8	**9–11**	**8**	**9**	**7–8**	6	6–7	5–6	5–7
FemPo	0	0	0	0	0	0	0	0	0	0
Marked canthal stripe	1	1	1	**0**	1	1	1	**0**	1	1
Dorsal pattern	**U**	Ba / Bl	**St**	**U**	**St**	**Sp**	Ba / Bl	**Sp**	Bl	**Sp**

In spite of its small postulated distribution, *Dixonius pawangkhananti* **sp. nov.** benefits from some level of protection and stability, being found in an officially protected natural park, and in a temple area. No direct threats on its population were noted. We never found this species in the pet or traditional medicinal trade, but its non-spectacular colors and size and its general resemblance with the most common *Dixonius* species, i.e., *D. siamensis*, should keep it safe from the dealers.

Orange tails observed in mature individuals of *Dixonius pawangkhananti* **sp. nov.** are also found in male and female *D. aaronbaueri*, in *D. hangseesom* (although much brighter in the latter species), in male and female *D. kaweesaki* and in *D. melanostictus*. According to our personal field observations, the lime stones on which *D. hangseesom*, *D. kaweesaki* and *D. pawangkhananti* **sp. nov.** live are mostly grey and black with orange marks (see micro-biotope photographs for these species in Sumontha *et al.* 2017 and Figures 1C, 4A–B). Their grey or brown and black bodies prolonged by orange tails probably efficiently contribute to crypsis through camouflage of these limestone substrate specialists.

Dixonius pawangkhananti **sp. nov.** is the tenth species recognized in the genus. It is the fourth believed to be endemic to Thailand, along with *Dixonius hangseesom* from western Thailand, *D. kaweesaki* from northern peninsular Thailand, and *D. melanostictus* from central Thailand.

FIGURE 5. A. Live juvenile *Dixonius pawangkhananti* **sp. nov.** in Wat Nikhom Wachiraram, Phetchaburi Province, Thailand. Individual not collected. **B.** Live hatchling *Dixonius pawangkhananti* **sp. nov.** from one of the two eggs laid by a female caught in Wat Nikhom Wachiraram, Phetchaburi Province, Thailand. Individual not preserved. Photos. by M. Sumontha.

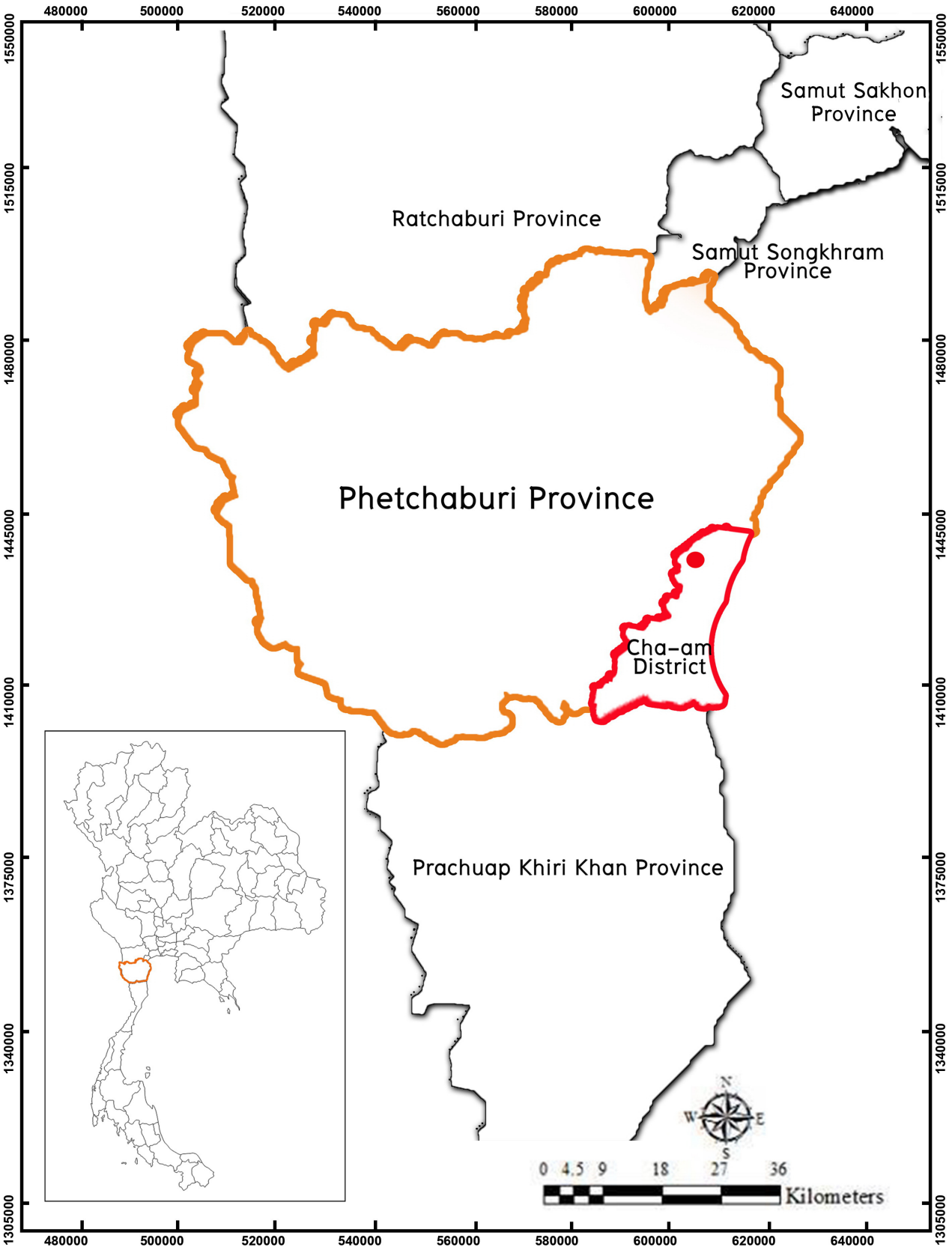

FIGURE 6. Map of Thailand showing the position of the type locality of *Dixonius pawangkhananti* **sp. nov.** Map by N. Chomngam.

FIGURE 7. Biotope where *Dixonius pawangkhananti* sp. nov. lives in Khao Nang Phanthurat Forest Park, Phetchaburi Province, Thailand. Photo. by P. Pawangkhanant.

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APPENDIX. Comparative material examined.

Dixonius hangseesom: see CUMZ-R and RBINS type material listed in Bauer *et al*. (2004).

Dixonius kaweesaki: see PSUZC, THNHM and ZMKU type material listed in Sumontha *et al*. (2017).

Dixonius siamensis: Cambodia: RBINS 18571-18572, Ou Krieng, Kratie Prov.; RBINS 18573, Chrouy Banteay, Kratie Prov. Thailand: CUMZ-R 2003.59, near Sai Yok Waterfall, Sai Yok District, Kanchanaburi Prov.; RBINS 15155, Ban Khao Kling, Kaeng Krachan District, Phetchaburi Prov.; RBINS 16642, Chiang Mai City, Muang District, Chiang Mai Prov.; RBINS 16643, Doi Saket, Doi Saket District, Chiang Mai Prov.; RBINS 16645, foot of Khao Loun, Ban Nong Ipho, Ban Lat District, Phetchaburi Prov.; RBINS 17015 (4 specimens), Hin Chang See, Ban Fang District, Khon Kaen Prov.; MNHN-RA 1998.0522, Ban Tham Rong, Ban Lat District, Phetchaburi Prov.; MNHN-RA 1998.0529, Doi Saket, Doi Saket District, Chiang Mai Prov.; MNHN-RA 1999.7606, Ban Salakern, Ban Lat District, Phetchaburi Prov.; MNHN-RA 1999.7627, Huay Kwang Jing, Tha Yang District, Phetchaburi Prov.; THNHM 1282, island in Kaeng Krachan Reservoir, Kaeng Krachan District, Phetchaburi Prov.; THNHM 1299–1305, Forestry Training Center, Cha-am, Cha-am District, Phetchaburi Prov.