



Confirmed occurrence and DNA barcoding of the Indo-Pacific Slender Gecko, *Hemiphyllodactylus typus* Bleeker, 1860 (Squamata, Gekkonidae) in Vietnam

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Abstract

Hemiphyllodactylus Bleeker is a complex taxon characterized by species with small body sizes, low population densities, inconspicuous morphologies, cryptic coloration, and overall difficulty of detection within their native ecosystems. The genus is one of the most diverse and fastest growing gekkonid genera — as of 2025, a total of 69 species have been described. Most species within this genus are endemic to restricted regions, whereas *Hemiphyllodactylus typus* Bleeker, 1860 has a remarkably broad distribution, ranging from the Indian Ocean to the Pacific Ocean. Previously, *H. typus* had been recorded in Vietnam by René Bourret under the name *H. typus chapaensis* from Sapa, Lao Cai. However, a subsequent study by George R. Zug identified this specimen as *H. yunnanensis* (Boulenger, 1903). Another instance of *H. typus* in Vietnam has been recorded, inferred solely from molecular analysis. Nevertheless, we re-examined the sequence of this specimen and confirmed that it does not belong to species *H. typus*. Our surveys in Can Gio Mangrove Biosphere Reserve, Ho Chi Minh City and My Phuoc's Melaleuca Forest, Can Tho City, Vietnam recovered specimens that, following both morphological and molecular analyses using the NADH dehydrogenase subunit 2 gene (ND2), are conclusively identified as *H. typus*. Thus, this study confirms the occurrence of *H. typus* in Vietnam for the first time. Additionally, we established DNA barcoding based on the cytochrome c subunit 1 gene (COI) to support identification and conservation management of biodiversity and discuss the potential for range expansion of this species within Vietnam, as well as hypotheses regarding its possible unisexual reproduction.

Key words: new country record; southern Vietnam; Can Gio Mangrove Biosphere Reserve; unisexual species

Reserve, Ho Chi Minh City (ITBCZ 11184) clustered with a clade of *H. typus* and were nearly genetically identical to sequences from Cambodia, Malaysia, the Philippines, Papua New Guinea, and Fiji, showing strong support (BPP = 1.00 and UFB = 100%). For the uncorrected pairwise distance (p-distance) (Table 2), the specimens from Vietnam are 0.55% divergent from the *H. typus* specimens from Cambodia, Malaysia, Fiji, Papua New Guinea, and Philippines.

Taxonomy

Hemiphyllodactylus typus Bleeker, 1860

Table 1–3, Fig. 1–4

Suggested name in Vietnamese. “Thạch sùng đẹp Ấn Độ-Thái Bình Dương”.

Specimens examined (n = 5). Two adult females (ITBCZ 11184 and ITBCZ 11188) were collected in September and November 2024 by L. P. V. Phan, T. D. Diep, and P. H. Chau, and two adult females (ITBCZ 11220 and ITBCZ 11246) collected in January and March 2025 by V. D. H. Nguyen, N. Q. Lam, and P. H. Chau at Can Gio Mangrove Biosphere Reserve, Ho Chi Minh City, Vietnam (10°30'22.4"N 106°52'00.4"E, at an elevation of 3 m a.s.l.); one juvenile (ITBCZ 11007) collected on September 2023 by Vu Dang Hoang Nguyen and Jake T. Smith at My Phuoc's Melaleuca Forest, Can Tho City (9°34'17.9"N 105°45'05.7"E, at an elevation of 6 m a.s.l.).

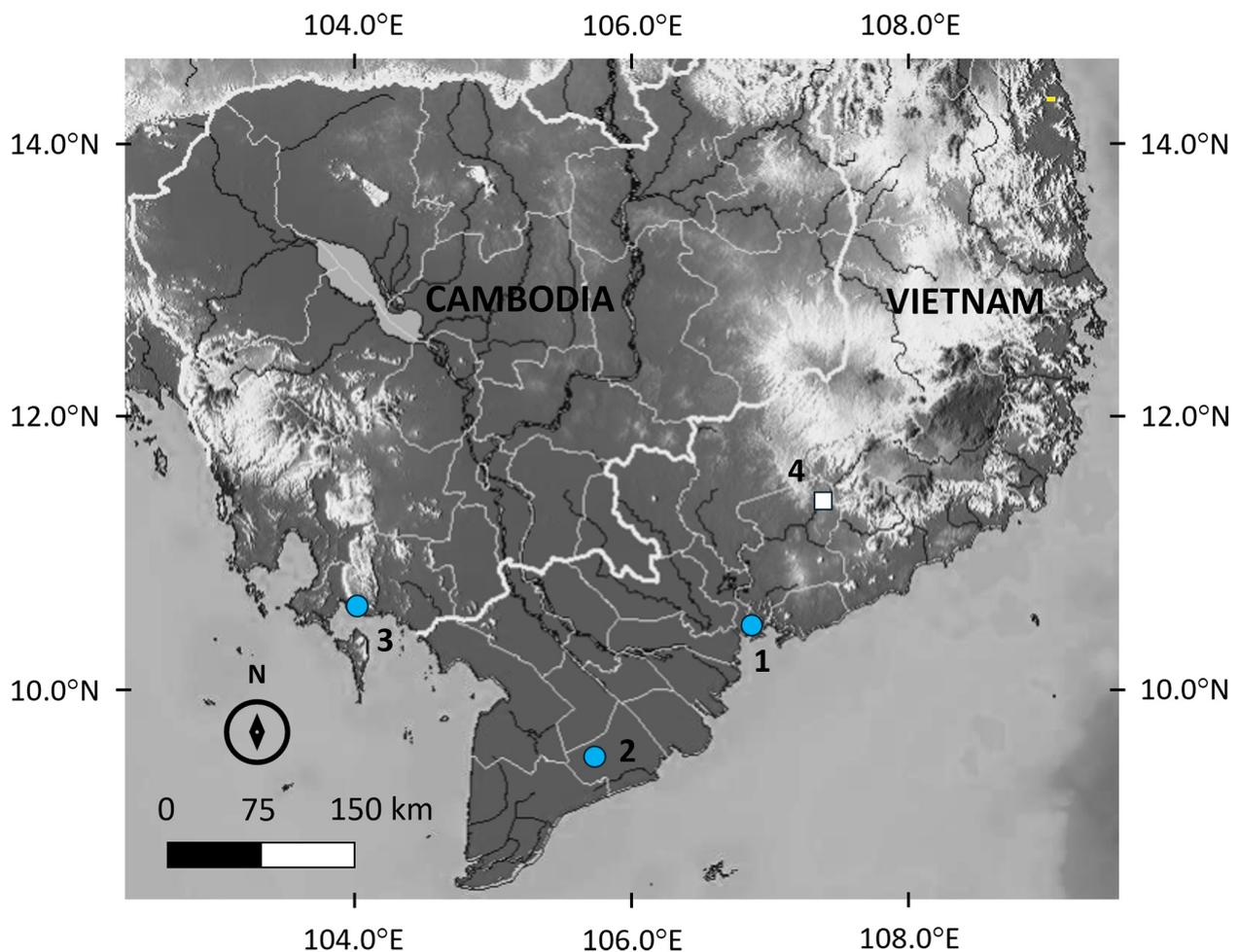


FIGURE 1. Map showing distribution of *Hemiphyllodactylus typus* in Southern Indochina. **Vietnam:** 1 = Can Gio Mangrove Biosphere Reserve, Ho Chi Minh City; 2 = My Phuoc's Melaleuca Forest, Can Tho City; 4 = iNaturalist (186283864), Cat Tien National Park, Dong Nai Province. **Cambodia:** 3 = Preah Monivong Bokor National Park, Kampot Province. Symbols: blue circle = locality where the occurrence of *H. typus* was confirmed from this study and Neang *et al.* (2024), white square = a locality that was not examined, based on an observation from iNaturalist.

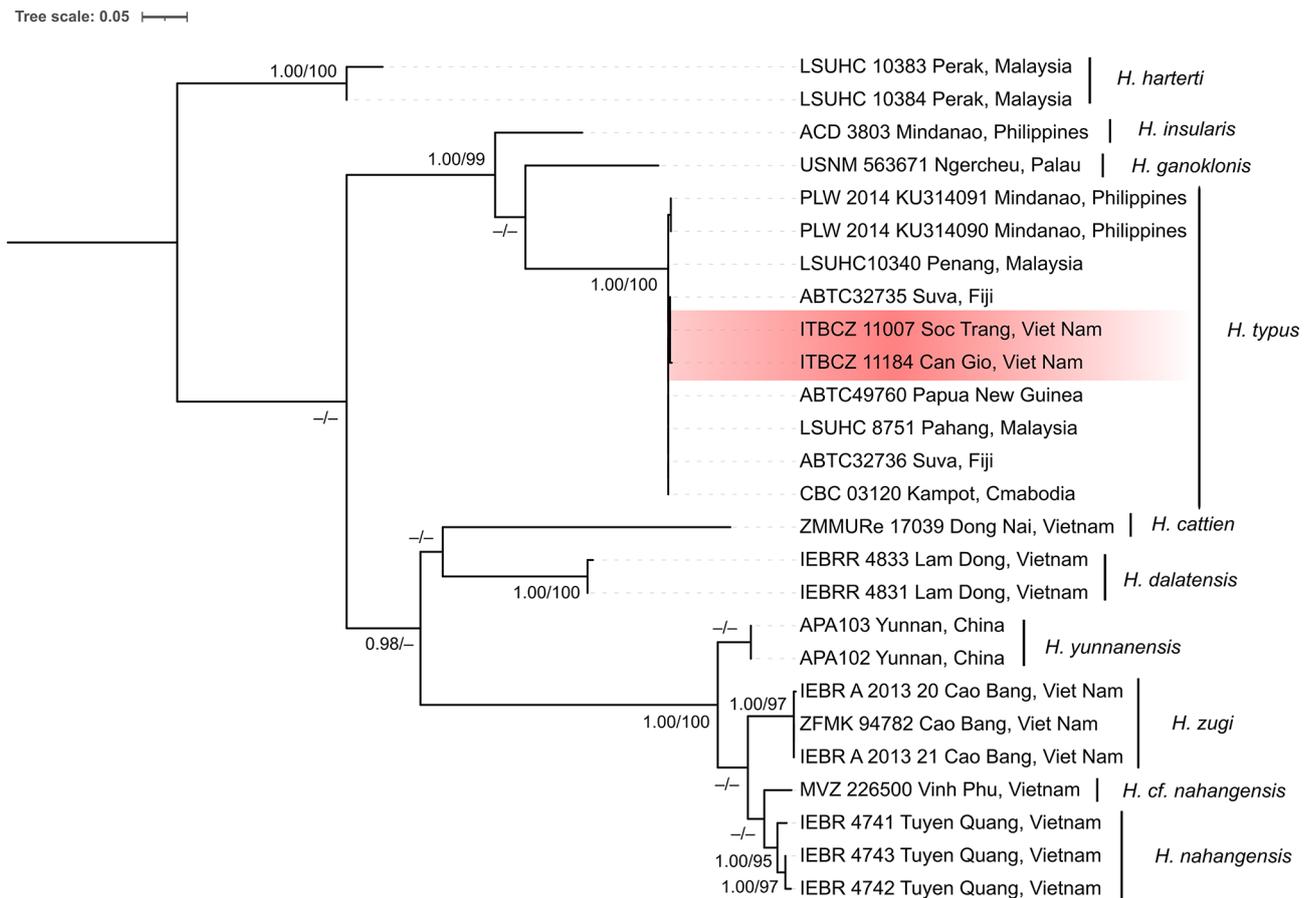


FIGURE 2. Bayesian inference (BI) tree for the *Hemiphyllodactylus* based on ND2 sequences. Numbers left and right are Bayesian posterior probabilities (BPP) and ML ultrafast bootstrap (UFB), respectively; -- = bootstrap values <95%. Prepared by Truong Minh Nhat Nguyen and Phuc Hong Chau.

Diagnosis. Morphological characteristics of the specimens in southern Vietnam match the description of *Hemiphyllodactylus typus* by Bleeker (1860) and Zug (2010) of an all-female population with elongate, compressed, and slender body with short limbs; tail shorter than SVL; TrunkL/SVL 0.49–0.55; HL/SVL 0.23–0.26; HW/SVL 15–17; HW/HL 0.57–0.69; SnEye/HL 0.35–0.42; NarEye/HL 0.31–0.33; EyeD/HL 0.20–0.25; SnW/HL 0.12–0.15; SnW/HW 0.19–0.24; EyeD/NarEye 0.64–0.82; 10–12 chin scales; no enlarged postmentals; 2–3 circumnasal scales; 2 (rarely 3) intersupranasals; 11 (rarely 10) supralabials; 10 (rarely 9) infralabials; 15–23 longitudinal rows of dorsal scales and 13 longitudinal rows of ventral scales at midbody contained within one eye diameter; five (rarely six) subdigital lamellae on the first finger; 5–7 subdigital lamellae on the first toe; digital formula 4-4-4-4 on hands and 4-4(5)-5-4 on feet; 9–12 precloacal pores in females; femoral pores absent; one or two cloacal spurs on each side; dark pigmented caecum and gonadal ducts (Fig. 3 f–k); a dark postorbital stripe extending to at least insertion of hand; dorsal trunk pattern with two series of orange or whitish beige spots running from temporal to the level of hindlimb insertion (Fig. 4); dorsal postsacral dark-brown blotch bordered posteriorly by transverse bars of beige; pale markings at the base of the tips of the digits; ventral surface of tail orange-yellow.

Discussion

In this study, we examined specimens from southern Vietnam (Ho Chi Minh City and Can Tho City) identified as *Hemiphyllodactylus typus*. Previously, a specimen was described under the name *H. typus chapaensis* from “Chapa” (now Sa Pa, Lao Cai Province, Vietnam) by Bourret (1937). However, Zug (2010) re-examined the specimen and determined that it was not *H. typus*, but rather a synonym of *H. yunnanensis* (Boulenger, 1903). Another instance

is the identification of *H. typus* by Luu *et al.* (2023) and Luu *et al.* (2024) from Vinh Phuc, Vietnam, which was inferred solely from molecular analysis of a GenBank-deposited sequence (GenBank no. KF219798, voucher MVZ 226500, from Grismer *et al.* 2013), without accompanying morphological verification. However, the table of Grismer *et al.* (2013) was in error and MVZ 226500 was identified as *H. zugi* Nguyen, Lehmann, Le, Duong, Bonkowski & Ziegler, 2013 in their tree prior to the description of *H. nahangensis* Do, Pham, Phan, Le, Ziegler & Nguyen, 2020. We included the sequence of this specimen and found that it showed 33.49–33.61% uncorrected p-distance from *H. typus*, while its minimal divergence was from *H. nahangensis* (5.86%) (Table 2). This indicates that it is not referable to *H. typus*. Furthermore, phylogenetic analysis shows that it is sister to *H. nahangensis* (Fig. 2). Therefore, it should be regarded as *H. cf. nahangensis*. Our specimens, therefore, constitute the first confirmed record of true *Hemiphyllodactylus typus* in Vietnam.

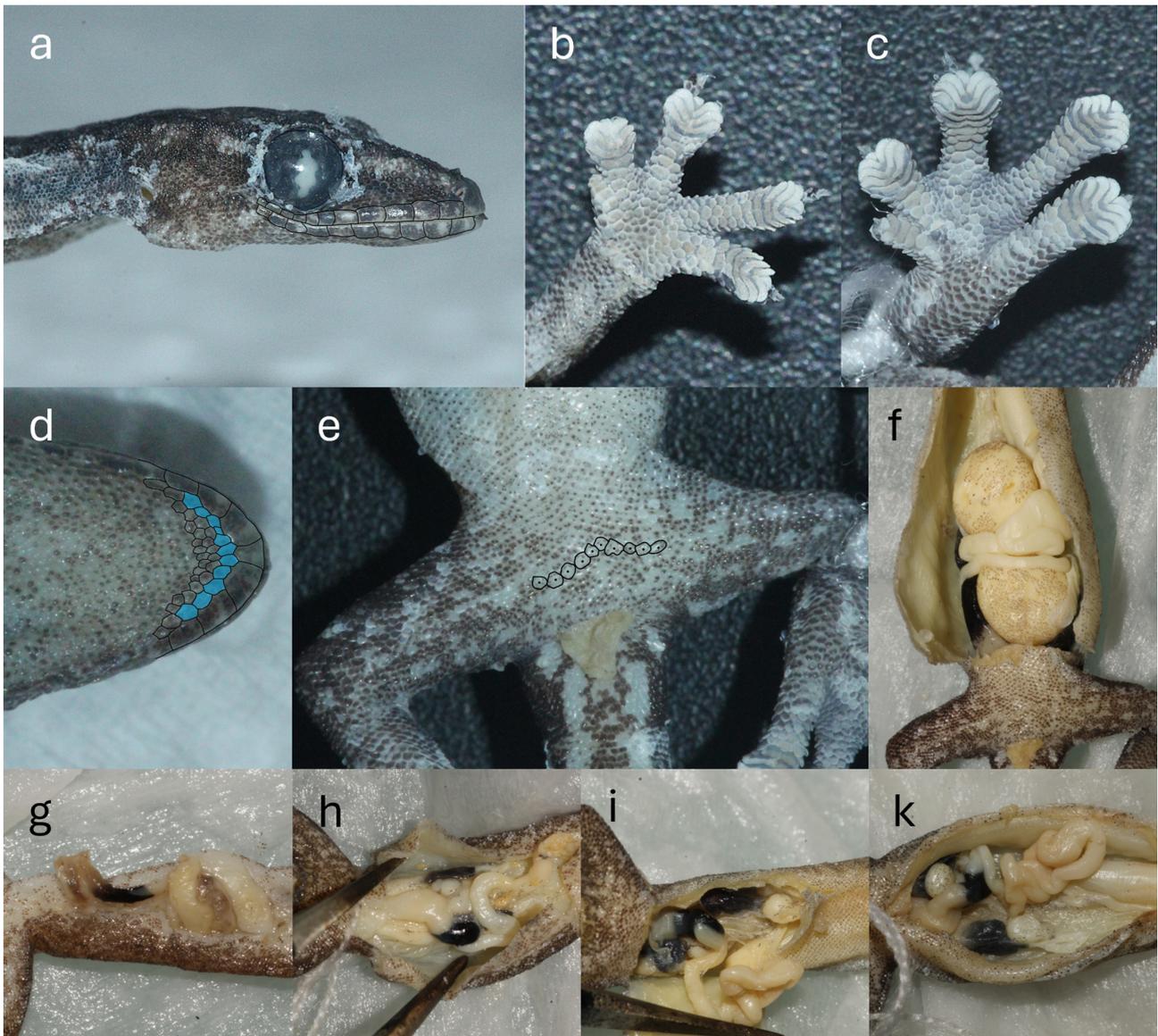


FIGURE 3. *Hemiphyllodactylus typus* (ITBCZ 11184) showing (a) lateral view of head; (b) ventral view of left hand; (c) ventral view of left foot; (d) arrangement of mental, postmental and chin scales; (e) precloacal region; (f) pigmented caecum and oviducts of ITBCZ 11184; (g) pigmented caecum of ITBCZ 11007; (h) pigmented caecum and oviducts of ITBCZ 11188; (i) pigmented caecum and oviducts of ITBCZ 11220; (k) pigmented caecum and oviducts of ITBCZ 11246. Photographs by Phuc Hong Chau.



FIGURE 4. *Hemiphyllodactylus typus* in Vietnam. a–d: Life photos from Can Gio Mangrove Biosphere Reserve, Ho Chi Minh City. ITBCZ 11220 (a), an uncaptured individual in situ (b), ITBCZ 11184 (c), and ITBCZ 11188 (d); e: Freshly dead specimen from My Phuoc’s Melaleuca Forest, Can Tho City, ITBCZ 11007. Photographs by Thinh Gia Tran (a and e), Phuc Hong Chau (b and d), and Vu Dang Hoang Nguyen (c).

TABLE 1. List of specimens used for phylogenetic analyses in this study.

No.	Species	Voucher	Locality	GenBank no.	BINs in BOLD	Reference
1	<i>Hemiphyllodactylus typus</i>	ITBCZ 11007	My Phuoc’s Melaleuca Forest, Can Tho City, Vietnam	PV872597	BOLD: ADE2841	This study
2	<i>H. typus</i>	ITBCZ 11184	Can Gio Mangrove Biosphere Reserve, Ho Chi Minh City, Vietnam	PV879451	BOLD: ADE2841	This study
3	<i>H. typus</i>	ABTC32735	Suva, Fiji	GQ257743	—	Sistrom <i>et al.</i> (2009)
4	<i>H. typus</i>	ABTC32736	Suva, Fiji	GQ257745	—	Sistrom <i>et al.</i> (2009)
5	<i>H. typus</i>	ABTC49760	Papua New Guinea	GQ257744	—	Sistrom <i>et al.</i> (2009)
6	<i>H. typus</i>	CBC 03120	Kampot, Cambodia	PP805711	—	Neang <i>et al.</i> (2024)
7	<i>H. typus</i>	LSUHC 10340	Pulau Pinang, Penang, Malaysia	KF219796	—	Grismer <i>et al.</i> (2013)

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Neang pers. comm., November 2025), without dissection and examination of the gonads. Moreover, the specimen was identified to species only on the basis of morphology, without any supporting DNA analysis. These factors indicate that the identification of this specimen as *H. typus* remains uncertain. Therefore, Zug's hypothesis that *H. typus* is an exclusively unisexual species should still be accepted, and CBC 02880 should be re-examined. If it is indeed a male, it is possible that this individual represents a new species.

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