Taiwania 69(4): 487–490, **2024**
DOI: 10.6165/tai.2024.69.487

Studies on *Typhonium* (Araceae) of Thailand II: *Typhonium fornicatum*, a new species from Bueng Kan Province, Northeastern Thailand

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(Manuscript received 4 September 2024; Accepted 15 October 2024; Online published 18 October 2024)

ABSTRACT: *Typhonium fornicatum* from Bueng Kan Province (Northeastern Thailand) is described and illustrated as a species new to science. Detailed description, color plates, discussion of similar taxa, phenology, distribution, and conservation status assessment are provided.

KEY WORDS: Aroideae, Areae, Indochina, plant taxonomy, *Typhonium circinnatum*, *Typhonium khonkaenense*.

INTRODUCTION

Typhonium Schott (1829) *sensu stricto*, a genus belonging to the family Araceae, is primarily distributed in Indochina, with a smaller presence in neighboring regions (Low *et al.*, 2020; Hay and Hein, 2022). It is the largest genus within the tribe Areae, comprising an estimated 100 species (Boyce and Croat, 2011), of which 72 are currently accepted (POWO, 2024). Thailand hosts the highest species diversity of *Typhonium*, with 39 species, 29 of which are endemic, though the true number is likely much higher (Boyce *et al.*, 2012; Saensouk *et al.*, 2024).

During a botanical survey in Bueng Kan Province, Northeastern Thailand, in July 2024, we collected an unidentified *Typhonium* species. This species is distinguished by its fornicate spathe limb and a spreading-declinate appendix, setting it apart from other known *Typhonium* species in Thailand. After a thorough morphological analysis and comparison with existing literature and type specimens from Thailand and neighboring regions, we determined that this specimen does not match any previously described species. We therefore describe it as a new species, *Typhonium fornicatum*, bringing the total number of *Typhonium* species recorded in Thailand to 40.

MATERIALS AND METHODS

Measurements and descriptions were based on fresh, and spirit-preserved materials. The species description follows the recent work of Saensouk *et al.* (2024), while Araceae morphological terminology follows Mayo *et al.* (1997) implemented by the descriptive terminology of Beentje (2016). Herbarium citations adhere to the Index Herbariorum (Thiers, 2024). Relevant type specimens of *Typhonium* species from Thailand and neighboring regions were examined at various herbaria (including A, AAU, B, BK, BKF, C, CAL, CMU, E, HITBC, K, KKU, KUN, L, M, MO, P, PE, QBG, SING, and WAG) using high-resolution images available through https://plants.jstor.org/ and the Global Biodiversity Information Facility (GBIF) accessed from https://www.gbif.org. An assessment of conservation status was conducted following IUCN (2024) guidelines, utilizing current knowledge and the appropriate terminology for categories, criteria, and subcriteria.

TAXONOMIC TREATMENT

Typhonium fornicatum P.Saensouk, K.Z.Hein & Saensouk, ***sp. nov***. **Figs. 1, 2A & 3**

Type**:** THAILAND. Northeastern: Bueng Kan Province, 27 July 2024, *Surapon Ara002* (holotype KKU!; isotypes FOF!, Mahasarakham University Herbarium (MSU!)).

Diagnosis**:** This new species differs from all other *Typhonium* species by having the fewest staminodes (only three) covering the lower portion of the sterile interstice. *Typhonium fornicatum* is most similar to *T. khonkaenense* A. Galloway & Charoenwong (Galloway, 2015) (Fig. 2B), but can be readily distinguished by its fornicate spathe limb (vs. recurved spathe limb), much shorter spadix (ca. 7 cm vs. ca. 15 cm), fewer staminodes

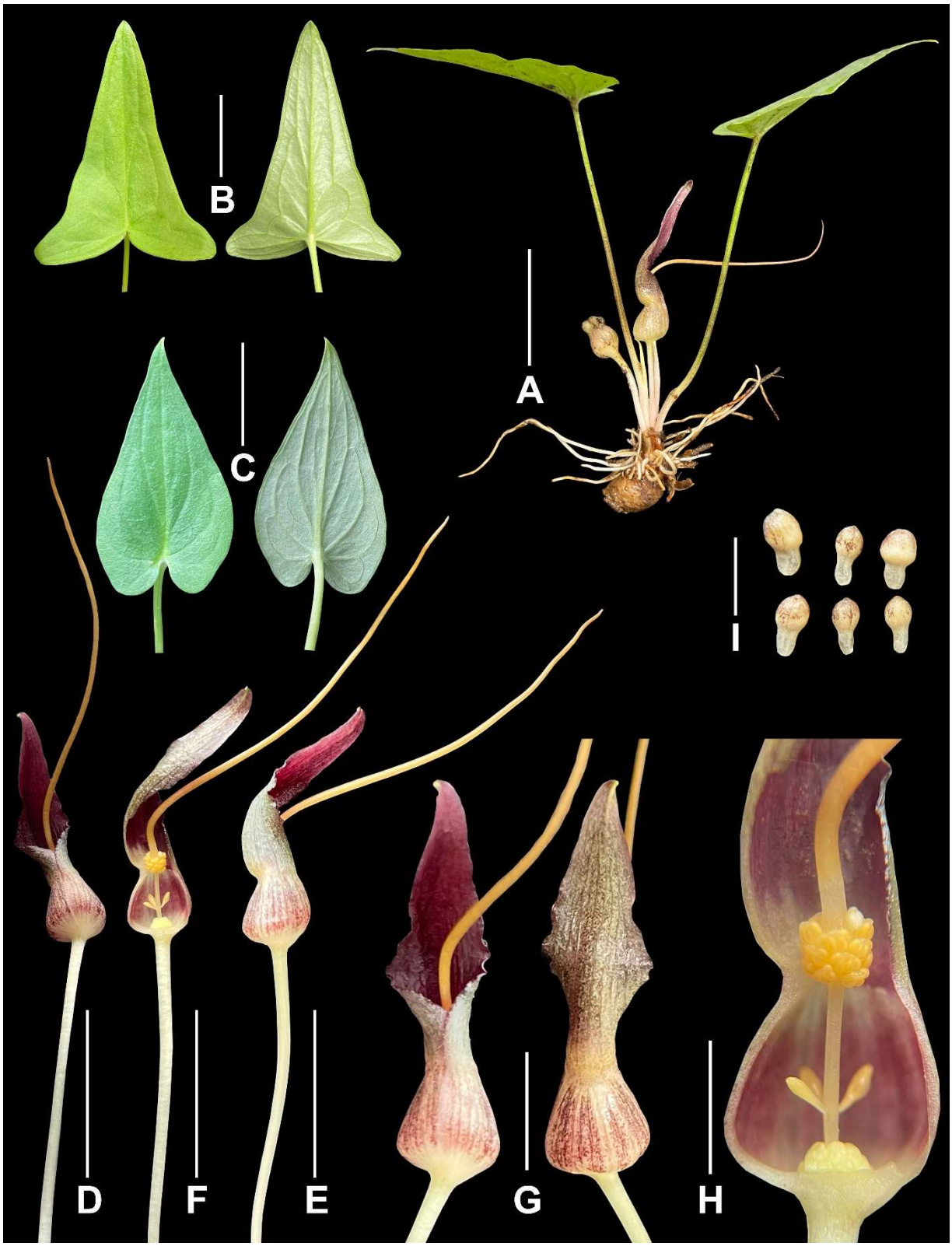

Fig. 1. ***Typhonium fornicatum*** sp. nov. **A.** Excavated flowering and fruiting plant, **B.** Hastate leaf (left showing adaxial surface; right showing abaxial surface), **C.** Narrowly ovate leaf (left showing adaxial surface; right showing abaxial surface), **D.** Front view of inflorescence, **E.** Side view of inflorescence, **F.** Spadix at pistillate anthesis, nearside spathe artificially removed, **G.** Spathe (left showing front view; right showing back view), **H.** Detail of spadix showing pistillate zone, sterile interstice and staminate zone (nearside spathe artificially removed) & **I.** Berries. Scale bars: A.=3 cm, B., C., D., E. & F.=2 cm, G.=1 cm, H. & I.=5mm. Photos by: Khant Zaw Hein.

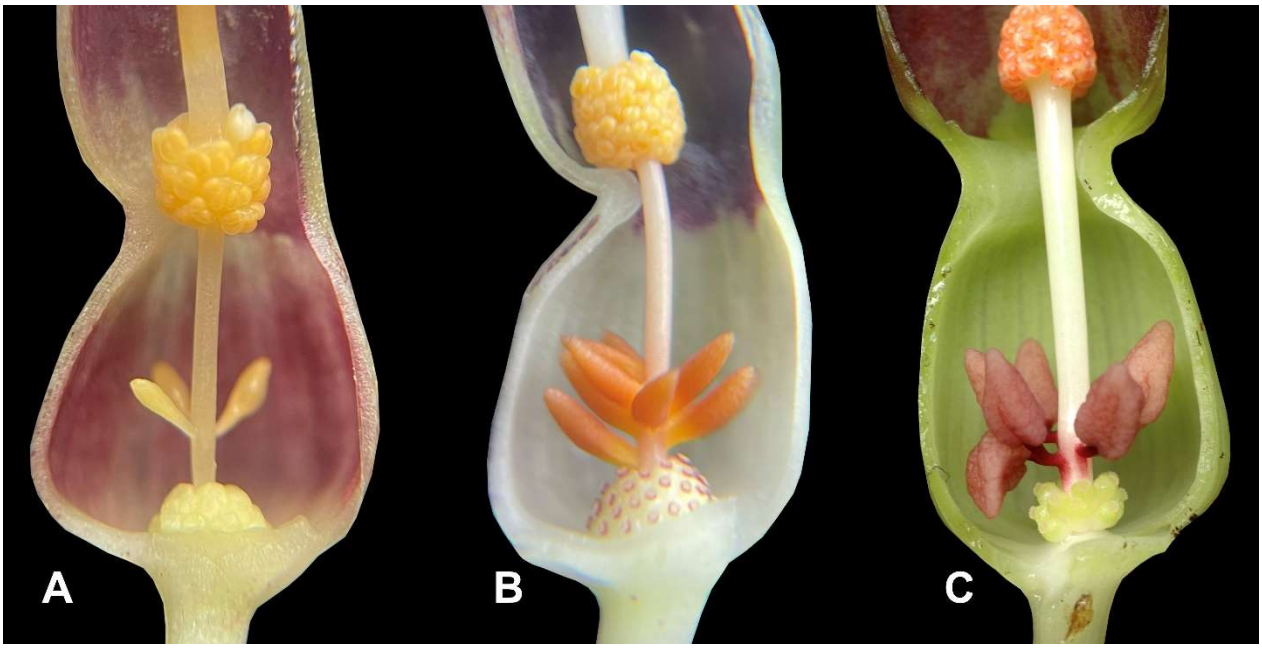

Fig. 2. Detail of spadices showing pistillate zone, sterile interstice and staminate zone (nearside spathe artificially removed). **A.** ***Typhonium fornicatum***, **B.** ***T. khonkaenense*** & **C.** ***T. circinnatum***. Photos by: Khant Zaw Hein (A & B) and Wilbert Hetterscheid (C).

Fig. 3. ***Typhonium fornicatum*** sp. nov. Plants in habitat. Photo by: Khant Zaw Hein.

on the lower portion of the sterile interstice (3 vs. 8–10), and a spreading-declinate appendix (vs. erect appendix).

Description*:** Small deciduous herbs to 10 cm tall. ***Stem a hypogeal, subglobose or depressed globose tuber, 1.3–1.5 cm in diameter, externally pale brown, internally white. ***Roots*** filiform, ca. 1.0 mm in diameter, white. ***Leaves*** 2–4 together; *petioles* 8.0–9.0 cm long, ca. 0.2 cm in diameter, erect, older ones ascending to spreading, slender, terete, glabrous, basal subterranean portion white, upper aerial portion green with numerous longitudinal dark brownish purple striations and spots; *petiolar sheath* 1.5–2.2 cm long, 1/5–1/4 of petiole length; *leaf blade* 5.0–6.5 × 2.6–2.8 cm, narrowly ovate to ovate, or hastate, thinly coriaceous, adaxially medium green, abaxially pale green, glabrous on both sides, margin entire; *anterior lobe* apex attenuate or acute; *posterior lobes* pointing downwards or outwards, 1/6–1/5 the length of the anterior lobe, apices rounded, sinus between posterior lobes acute; *midrib* adaxially impressed, abaxially raised, rounded, ca. 1.8 mm wide at the base, ca. 0.8 mm wide at center, then narrowing towards blade apex; *primary lateral veins* 3–4 per side, adaxially impressed, abaxially raised, diverging from the midrib at 15–40°, anastomosing at 3.0–4.0 mm from margin into a submarginal (intramarginal) collective vein; 1 *marginal vein* present; *interprimary veins* somewhat less conspicuous than primaries; *higher order venation* reticulate. ***Inflorescence*** solitary, subtended by a cataphyll; *cataphyll* up to 3.0 cm long, linear-lanceolate, membranous, semi-hyaline, white, later withering brown; *peduncle* 2.5–4.5 cm long, ca. 0.2 cm in diameter, almost entirely subterranean, white, terete, glabrous; *spathe* 3.7–4.3 cm long, strongly differentiated into a spathe tube and a spathe limb by a constriction; *spathe tube* 0.8–0.9 cm long, 0.8–0.9 cm in diameter, convolute, obliquely ovoid, externally pinkish white with a dense dark purple mottling,

internally purplish red; *spathe limb* 3.4–2.9 cm long, ca. 0.8 cm in diameter at base, narrowly lanceolate, externally greenish white with a dense dark purple mottling, internally purplish red, basal part of limb shortly convolute, upper part fornicate, margins sinuate, apex narrowly acute. ***Spadix*** sessile, ca. 7.0 cm long, much longer than spathe; *pistillate zone* 1.7–2.0 mm long, ca. 2.0 mm in diameter at the base, shortly conical or hemispheroid, with 3 rows of congested pistils; *ovary* ca. 0.6 mm high, ca. 0.6 mm in diameter, obovoid, white, unilocular with one basal ovule held obliquely on a funicle, on a basal placenta; *stigma* sessile, ca. 0.3 mm in diameter, discoid, white, papillate; *sterile interstice* between pistillate and staminate zones 0.5–0.7 cm long, ca. 0.7 mm in diameter, upper part naked, terete, glabrous, glossy white, lower part covered with only a single whorl of 3 staminodes; *staminodes* 1.8–2.0 mm long, 0.5–0.7 mm in diameter at widest point, clavate-fusiform, apex obtuse, pointing upwards, free, glabrous, yellow; *staminate zone* ca. 2.5 mm long, ca. 2.7 mm in diameter, shortly subcylindric; *stamens* congested, not ostensibly arranged into staminate flowers, 0.8–1.0 mm in diameter, yellow, connective mucronate at apex; *appendix* sessile, 5.8–6.0 cm long, 0.8–1.0 mm in diameter at base, narrowly cylindrical, tapering towards apex, spreading-declinate, glabrous, orange, apex narrowly acute. ***Infructescence*** on an erect peduncle, with a persistent spathe tube; *berries* 0.4–0.5 cm long, ca. 0.2 cm at widest point, clavate with subglobose or ovoid head, brownish white with darker brown mottling, apex obtuse.

Distribution and habitat: The new species is found exclusively at its type locality in Bueng Kan Province, Northeastern Thailand. It grows in tropical deciduous forests with deep leaf litter soils, in shaded to semi-shaded environments at elevations between 200–250 m asl.

Phenology: Observed flowering and fruiting in July and August.

Etymology: The specific epithet is derived from the Latin "*fornicatus*" (arched), referring to the shape of the spathe limb.

Provisional conservation status: This new species requires further observation and collection to determine if additional populations exist elsewhere. Due to insufficient data on its distribution and population size in the wild, we propose treating this species as 'Data Deficient' (DD) following the IUCN Red List criteria (IUCN Standards and Petitions Subcommittee, 2024). Although listed as DD, this does not imply the species is not threatened. Further surveys are essential, as current information is inadequate to assess its conservation status.

***Taxonomic notes*:** Based on overall morphology, this new species is also similar to *Typhonium circinnatum* Hett. & Mood (Hetterscheid and Boyce, 2000) (Fig. 2C) from Vietnam, which is a sister species of *T. khonkaenense* (Low *et al.*, 2020). However, *T. fornicatum* strikingly differs from *T. circinnatum* by having a fornicate spathe limb (vs. circinately recoiled spathe limb) and a sterile interstice basally covered with clavate-fusiform yellow staminodes (vs. clavate purple staminodes with distinctly swollen heads).

ACKNOWLEDGMENTS

This research was financially supported by Mahasarakham University. We thank Wilbert Hetterscheid for permitting the use of the photograph in Figure 2C. The third author (KZH) expresses gratitude to Alistair Hay for his expert advice and guidance in aroid research, and to Vuong Truong for assistance in editing the figures.

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