

## Taxonomic notes on the genus *Hymenopyramis* (Lamiaceae) in Thailand with one new species, four lectotypifications and two new synonyms

BHANUBONG BONGCHEEWIN<sup>1,\*</sup> & ALAN PATON<sup>2</sup>

### ABSTRACT

*Hymenopyramis sabuletorum*, a new species from the sandstone plateau in Pha Taem National Park, Ubon Ratchathani Province, Thailand is described and illustrated. Four species are lectotypified, i.e. *H. acuminata*, *H. cana*, *H. siamensis* and *H. vesiculosa*. *Hymenopyramis parviflora* var. *nitida* and *H. pubescens* are placed in synonymy of *H. parviflora* and *H. siamensis*, respectively. A key to the seven species recognised in Thailand is provided.

KEYWORDS: *Hymenopyramis*, new species, wind dispersal, Lamiales, Ubon Ratchathani, taxonomy.

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### INTRODUCTION

During the preparation of the Lamiaceae account for the Flora of Thailand, a new species of the genus *Hymenopyramis* Wall. ex Griff. (Lamiaceae: Peronematoideae) was found growing in the open sandstone plateau in Pha Taem National Park, Ubon Ratchathani Province, the eastern part of Thailand near the Mekong River, where several other species and new records have been previously discovered, i.e. *Sonerila dongnathamensis* Suddee, Phutthai & Rueangruea (Melastomataceae) (Suddee *et al.*, 2014), *Tolypanthus lageniferus* (Wight) Tieghem (Loranthaceae) (Barlow, 2005).

The genus *Hymenopyramis* is mainly distributed in South-East Asia (Harley *et al.*, 2004), especially Thailand. The genus is present in the seasonal areas of Thailand from Prachuap Khiri Khan Province northwards, but absent from Peninsular Thailand (following the Floristic Province of Thailand limits as used by the Flora of Thailand). The habitat of *Hymenopyramis* species in Thailand is mostly in scrub forest and open areas in mixed deciduous forest, deciduous dipterocarp forest, from sea level up to 500 m. Occasionally, the genus has been found in limestone areas or dry evergreen forests.

Recently, the genus has been placed in the subfamily Peronematoideae B.Li, R.G.Olmstead & P.D.Cantino based on the molecular evidence (Li *et al.*, 2016; Zhao *et al.*, 2021). The genus is easily recognised by having a scrambling habit, woody stem with longitudinal lenticellate stripes, an enlarged and inflated fruiting calyx facilitating wind dispersal, and an almost actinomorphic corolla.

Types of four names have to be lectotypified, i.e. *Hymenopyramis acuminata*, *H. cana*, *H. siamensis* and *H. vesiculosa* (McNeill, 2014; and following Art. 9.1–9.4 of the Code, Turland *et al.*, 2018). All type specimens have been seen by the first author unless indicated otherwise.

A key to the species of *Hymenopyramis* in Thailand is presented below, followed by the description of the new species and a commentary on the new typifications. The species of *Hymenopyramis* are very similar, with species sometimes merging into one another morphologically, but often are more easily recognised in the field. Molecular analyses are needed to clarify species boundaries within the genus, particularly between, *H. acuminata*, *H. parvifolia* and *H. vesiculosa*. Both Moldenke (1982) and Fletcher (1938) rely on leaf size and shape to separate these taxa, but these characters can be variable between species.

<sup>1</sup> Department of Pharmaceutical Botany, Faculty of Pharmacy, Mahidol University, Bangkok 10400, Thailand.

<sup>2</sup> Royal Botanic Gardens, Kew, Richmond, TW9 3AE, UK.

\* Corresponding author: [bhanubong.boc@mahidol.edu](mailto:bhanubong.boc@mahidol.edu)

KEY TO THE SPECIES

1. Upper leaf surface densely villose with long adpressed whitish hairs; plants growing in open sandstone outcrops in deciduous dipterocarp forest **5. *H. sabuletorum***
1. Upper leaf surface villose with long patent hairs, sparsely pubescent or pubescent or glabrous; plants growing in open margins of dry evergreen forest, mixed deciduous forest, scrub forest **6. *H. siamensis***
  2. Lower leaf surface villose with long patent hairs and easily visible numerous uncovered yellowish glands and small veins **7. *H. vesiculosa***
  2. Lower leaf surface pubescent with short adpressed hairs or both adpressed and interwoven hairs, hardly or usually visible yellowish glands underneath, small veins covered by hairs **1. *H. acuminata***
    3. Mature fruiting calyx 20–40 mm long **4. *H. parvifolia***
      4. Leaves 80–160 mm long
      4. Leaves 20–80 mm long
      5. Leaf apex acuminate or acute-acuminate or attenuate
      5. Leaf apex obtuse or broadly acute or emarginate
    3. Mature fruiting calyx less than 20 mm long **2. *H. brachiata***
      6. Lower leaf surface pubescent with short adpressed white or yellowish-white hairs **3. *H. cana***
      6. Lower leaf surface pubescent with both adpressed and interwoven white hairs

TAXONOMY

***Hymenopyramis sabuletorum*** Bongch. & A.J.Paton, **sp. nov.**

This species is recognised by having densely villose leaves with long adpressed whitish hairs on upper side and numerous yellowish glands not totally covered by hairs on lower side. It is morphologically similar to *Hymenopyramis siamensis* Craib but differs by having basal stems dark brown, terete occasionally with shallowly longitudinal grooves (vs basal stems greyish brown, obtusely quadrangular with deep longitudinal grooves), leaves ovate or elliptic-ovate, 55–100 × 45–60 mm and densely pubescent with adpressed and interwoven yellowish white hairs and numerous yellowish glands partly covered by hairs on lower side (vs leaves elliptic-ovate, (40–)100–150 × (20–)50–100 mm and villose with long patent hairs, and numerous easily visible yellowish glands and small veins underneath hairs on lower side) and growing in open sandstone outcrop in deciduous dipterocarp forest (vs growing in open margins of dry evergreen forest, mixed deciduous forest)(Table 1). Type: Thailand, Ubon Ratchathani Province, Khong Chiam District, Na Pho Klang Village, Wat Tham Patihan, Pha Taem NP, 249 m alt., 25 Aug. 2023, *Bongcheewin 1196* (holotype **BKF**; isotypes **K**, **PBM**). Figs. 1–2, 3A.

Scandent shrub up to 2 m tall. *Stems* dark brown, much-branched above ground, terete occasionally with shallow longitudinal grooves; young stems densely pubescent with adpressed hairs and yellowish glands. *Leaves* ovate or elliptic-ovate, 55–100 × 45–60 mm, apex acute or shortly acuminate, base

rounded or obtuse, margin entire, upper side densely villose with long adpressed whitish hairs, lower side densely pubescent with adpressed and interwoven yellowish white hairs and numerous yellowish glands not totally covered by hairs; petioles 10–13 mm long, densely pubescent with brownish hairs. *Inflorescence* terminal and axillary, thyrsoid, branched, lax; cymes pedunculate, condensed, many-flowered but with few developing to fruiting stage; leaf-like bracts usually present along the main axis, elliptic-ovate to broadly ovate, 30–60 × 20–45 mm, apex acute to acuminate or obtuse, margin entire or slightly undulate, base rounded or obtuse; bracteoles within cyme much reduced. *Flowering calyx* obconical, ca 1 mm long; tube 0.7–0.8 mm long, outside densely villose with long brownish white hairs, inside glabrous; teeth 4-lobed, equal, triangular, apex acute or shortly acuminate. *Fruiting calyx* enlarged; tube membranous inflated, 4-angled, reddish green or green, ovate or elliptic-ovate, 20–35 × 20–30 mm, outside pubescent with yellowish glands, sparsely pubescent. *Corolla* white with red markings, ca 3 mm long, obconical; tube 1–1.5 mm long, outside villose with long brownish yellow hairs and glabrous on lower half within the calyx, inside glabrous; lobes 4, reflexed, subequal, obovate or elliptic-obovate, 1–1.5 mm long, apex rounded-obtuse, margin entire, outside densely villose with long brownish hairs and brownish glands, inside glabrous. *Stamens* 4, exserted, all attached near the base of corolla tube, around the apex of ovary; filaments 2.5–3 mm long, glabrous; anther 2-celled, brownish white, oblong-ovate, 0.4–0.5 mm long, longitudinal dehiscent. *Style* terminal, 2–2.5 mm

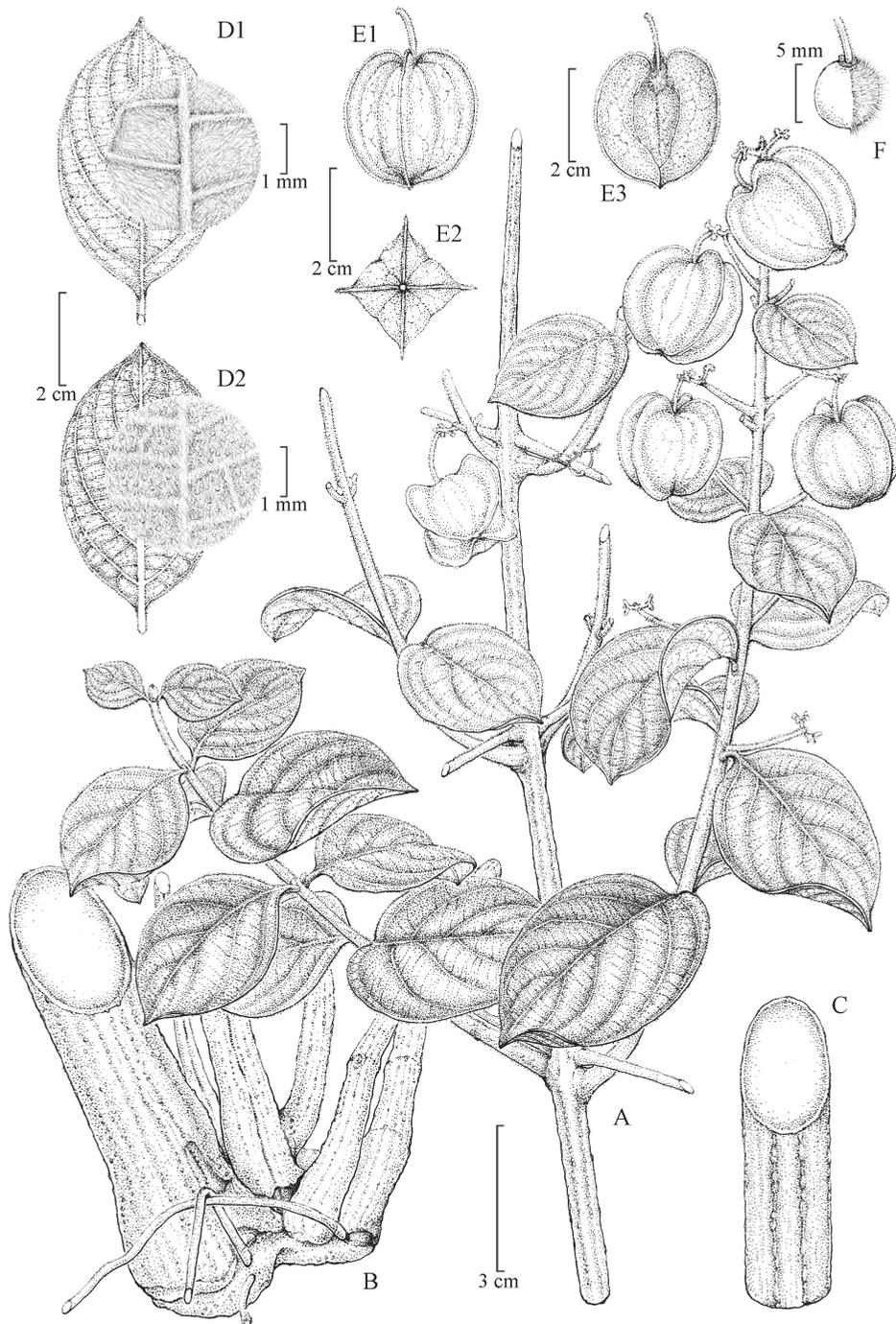


Figure 1. *Hymenopyramis sabuletorum* Bongch. & A.J.Paton: A. Habit; B. Branching stems above ground; C. Cross-sectioned stem; D1. Upper leaf surface; D2. Lower leaf surface; E1. Fruiting calyx, side view; E2. Fruiting calyx, top view; E3. Opened fruiting calyx, showing fruit inside; F. Fruit showing long patent hairs on the right-side and surface removed hairs on the left-side. Drawn by Sorawis Arreenich.

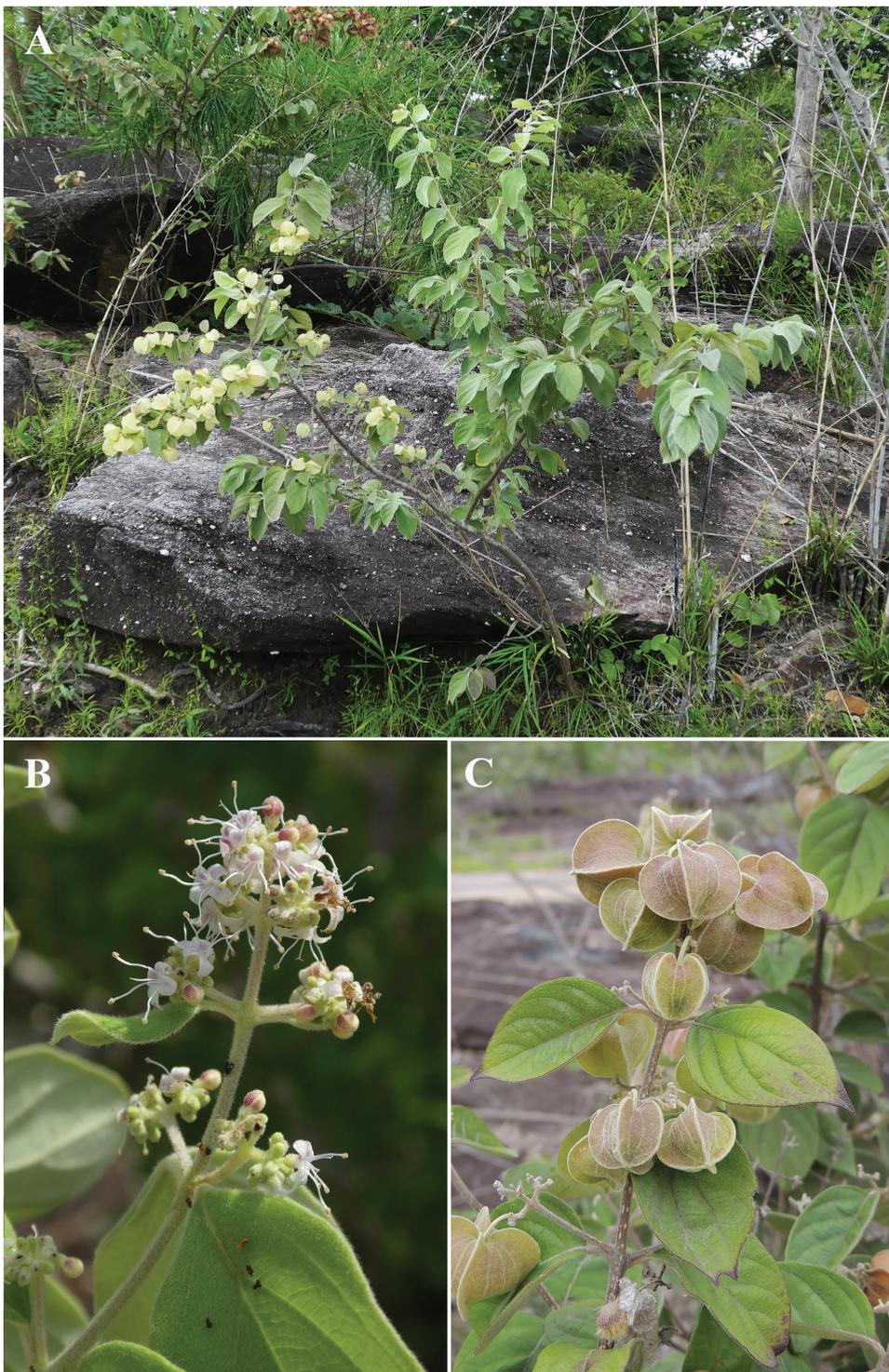


Figure 2. *Hymenopyramis sabuletorum* Bongch. & A.J.Paton: A. Habit with green fruiting calyces; B. Inflorescence; C. Infructescence with reddish green fruiting calyces. Photos by B. Bongcheewin.

long, apex bifid, glabrous; branches 0.1–0.2 mm long. *Ovary* obovate-elliptic, 0.2–0.3 mm long, apex glandular. *Fruit* a nut, not dividing, ovate, 5–6 × 4–5 mm, densely villose with minute yellowish glands; pedicel 10–15 mm long, pubescent with subadpressed hairs and yellowish glands. *Seed* exalbuminous, 1, oblong, trigonous.

Thailand.— EASTERN: Ubon Ratchathani [Khong Chiam, Na Pho Klang, Wat Tham Patihan, Pha Taem NP, 249 m alt., 30 July 2015, *Bongcheewin* 1025 (BKF, K, PBM); *ibid*, 13 Apr. 2017, *Bongcheewin* 1069 (BKF, K); *ibid*, 3 Sept. 2022, *Bongcheewin* 1145 (BKF); *ibid*, 25 Aug. 2023, *Bongcheewin* 1196 (holotype BKF; isotypes K, PBM); *ibid*, *Bongcheewin* 1197 (BKF, K); *ibid*, *Bongcheewin* 1198 (BKF, K); Khong Chiam, along the road to Pha Chanadai, Dong Na Tham Forest, Pha Taem NP, 230 m alt., 1 Mar. 2007, *Suddee et al.* 3105 (BKF)].

Distribution.— Endemic to Thailand.

Ecology.— *Hymenopyramis sabuletorum* is the only species growing in sandy soil on open

sandstone outcrops in deciduous dipterocarp forest. Flowering April, fruiting July to March.

Vernacular name.— Kha pia phalan hin (ขาเปียพลาญหิน) (Kha pia - a Thai common name for *Hymenopyramis* species; Phalan hin - a term for the sandstone plateau in Northeastern Thailand, where the species grows).

Etymology.— The specific epithet refers to its sandstone habitat where the new species collected.

Conservation.— *Hymenopyramis sabuletorum* has been found from only one known population since 2007. To assess the potential threat from tourism activity in the area, the first author has revisited the location several times. Based on the findings showing no decline in the species population, and as the species seems to be protected by the activities of the National Park, the species is provisionally assessed as Least Concern according to IUCN (2024).

Table 1. Comparison of characters between *Hymenopyramis sabuletorum* and similar species.

characters	<i>H. sabuletorum</i>	<i>H. siamensis</i>	<i>H. acuminata</i>	<i>H. brachiata</i>
ecology	open sandstone outcrop in deciduous dipterocarp forest	open margins of dry evergreen forest and mixed deciduous forest	deciduous dipterocarp or mixed deciduous forest	mixed deciduous or deciduous dipterocarp forest, limestone area
leaf				
shape	ovate or elliptic-ovate	elliptic-ovate	elliptic-ovate or elliptic	elliptic-ovate or ovate
size (mm)	55–100 × 45–60	(40–)100–150 × (20–)50–100	40–70 × 20–50	60–150 × 20–80
Base	rounded or obtuse	cuneate	rounded or cuneate	broadly cuneate or rounded
upper side	densely villose with long adpressed whitish hairs	glabrous or sparsely pubescent	sparsely pubescent or glabrous	sparsely pubescent
lower side	densely pubescent with adpressed and interwoven yellowish white hairs and numerous yellowish glands not totally covered by hairs	villose with long patent hairs, and easily visible numerous yellowish glands and small veins underneath hairs	pubescent with both adpressed and fluffy yellowish white hairs and hardly visible brownish yellow glands underneath hairs	pubescent with short adpressed white or yellowish white hairs and usually visible yellowish brown or reddish glands underneath hairs
corolla				
colour	white with reddish markings	white	white or yellowish white	white
fruiting calyx				
shape	ovate or elliptic-ovate	elliptic or elliptic-ovate	conical-ovate	ovate or elliptic-ovate
size (mm)	20–35 × 20–30	20–50 × 15–30	20–30(–40) × 15–25	7–15 × 5–12

***Hymenopyramis acuminata*** H.R.Fletcher, Bull. Misc. Inform. Kew 1938: 206 & 438. 1938; Moldenke, Phytologia 50: 436. 1982. Type: Chantaburi [Chanthaburi] Province, Krat [Trat], Khao Saming, under 50 m, 2 Jan. 1930, *Kerr 17917* (lectotype E [E00284143], selected here; isolectotypes **BK** [BK233507], **BM** [BM000950231], **K** [K000933639], **SING** [SING0068744] photo seen). Fig. 4.

Notes.— *Hymenopyramis acuminata* has pubescent leaves with adpressed and interwoven yellowish white hairs and hardly visible brownish yellow glands underneath hairs on lower side, elliptic-ovate or elliptic leaves, and its leaf size not longer than 80 mm. It is similar to *H. vesiculosa* by having adpressed and interwoven hairs and fruiting calyx longer than 2 cm but that species has much bigger leaves, 8–16 cm long.

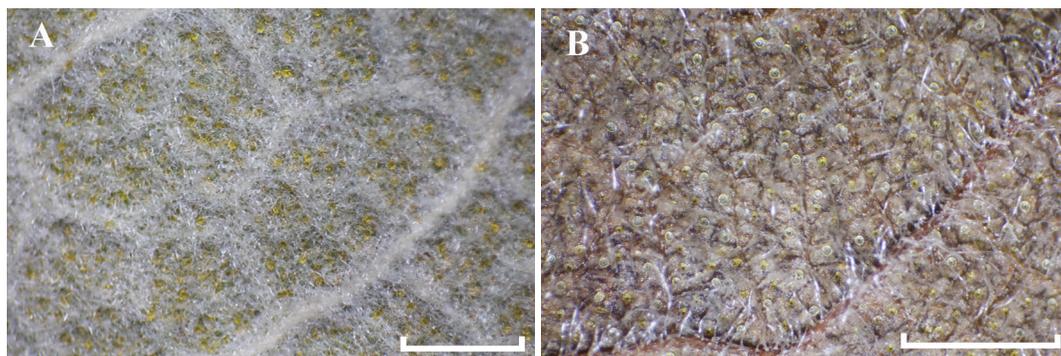


Figure 3. Lower leaf surface: A. *Hymenopyramis sabuletorum*; B. *H. siamensis*. (A: Bongcheewin 1196, **BKF**; B: Bongcheewin 1149, **BKF**). Scale bar = 1 mm.

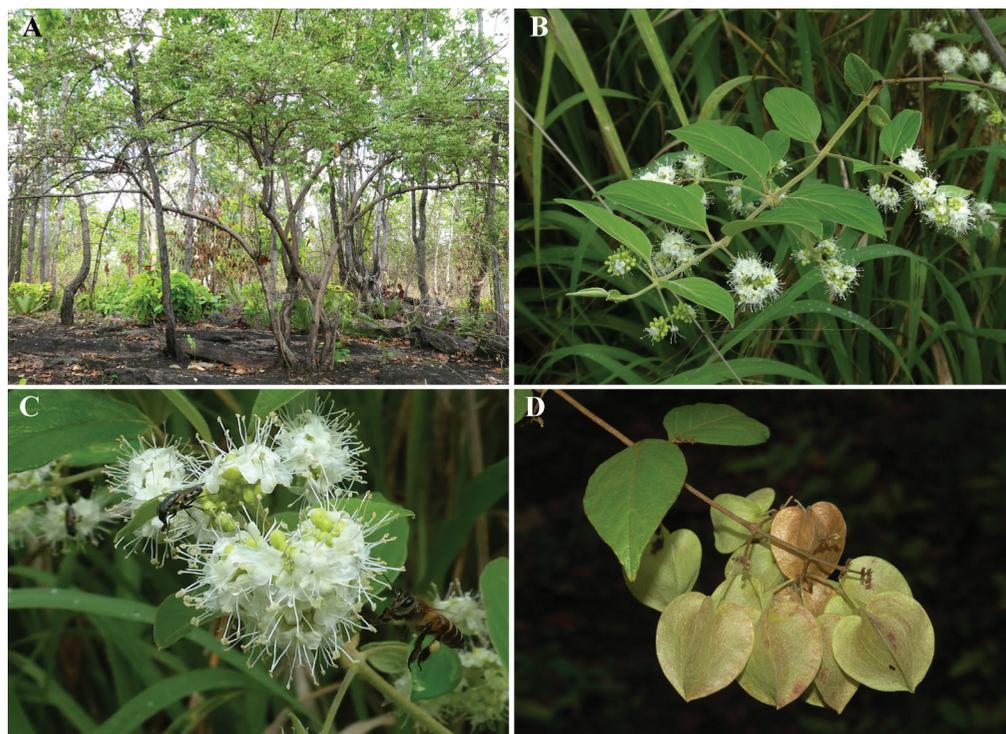


Figure 4. *Hymenopyramis acuminata* H.R.Fletcher: A. Habit; B. Inflorescence; C. Inflorescence with visiting pollinators; D. Infructescence. Photos: A–C, B. Bongcheewin; D, T. Phutthai.

Fletcher (1938) did not specify the herbarium for types, e.g. see the examples of *Glossocarya crenata* H.R.Fletcher and *G. longiflora* H.R.Fletcher (Bongcheewin & Paton, 2023), so lectotypification is necessary. The specimen at **E**, where Fletcher worked, is more complete than the others, and therefore is chosen as the lectotype.

**Hymenopyramis cana** Craib, Bull. Misc. Inform. Kew 1922: 240. 1922; Dop in Lecomte, Fl. Indo-Chine 4: 890. 1935; H.R.Fletcher, Bull. Misc. Inform. Kew 1938: 439. 1938; Moldenke, Phytologia 50: 440. 1982; Chen & Gilbert in C.Y.Wu & P.H.Raven, Fl. China 17: 16. 1994; Phuong in Hoc & Hoc, Fl. Vietnam 6: 225. 2007. Type: Thailand, Tak Province, Me Ping Rapids, Keng Soi, ca 400 m, 23 Nov. 1920, *Kerr 4637* (lectotype **K** [K000194305], selected here; isolectotypes **BK** [BK257571], **BM** [BM000950232]). Fig. 5.

Notes.— *Hymenopyramis cana* is recognised by having a fruiting calyx not longer than 2 cm long and pubescent leaves with adpressed and interwoven white hairs on the lower side. This species is very similar and likely to be a conspecific to *H. brachiata* Wall. ex Griff. because of its fruiting calyx size and leaf shape but that species has pubescent leaves with short adpressed hairs on the lower side. Although Craib worked in Aberdeen University since 1920, he usually came to Kew to undertake taxonomic work on Thai plants (Kerr, 1933, p. 411); furthermore, there is no duplicate of *Kerr 4637* at **ABD** (Hannah Clarke, University of Aberdeen, pers. comm.). The collection at **K** is designated as the lectotype.

**Hymenopyramis parvifolia** Moldenke, Phytologia 5: 339. 1956 & 50: 441. 1982. Type: Thailand, Khawnkaen [Khon Kaen] Province, Chum Phae, Pha Nok Khao, common in deciduous forest, ca 300 m, 29 Mar. 1952, *Bunpheng 519* (holotype **LL** [LL00375034] photo seen; isotypes **BKF**-3 sheets [SN064748, SN206826, SN206827], **K** [K000933666]).

— *Hymenopyramis parvifolia* var. *nitida* Moldenke, Phytologia 26(5): 355. 1973 & 50: 443. 1982, **syn. nov.** Type: Chaiyaphum Province, 15 km NE of Chaiyaphum, 15°50'N 102°05'E, open deciduous dipterocarp forest, 600 m, 14 Aug. 1972, *Larsen et al. 31821* (holotype **AAU**; isotypes **LL** [LL00375035] photo seen, **SING** [SING0125936]).

Notes.— *Hymenopyramis parvifolia* is recognised by having rather small leaf blades, 20–40 × 15–25 mm, and polymorphic leaf apices including obtuse or broadly acute or emarginate. In 1973, Moldenke named a collection in **AAU** from Chaiyaphum Province as a new variety, *H. parvifolia* var. *nitida* by having glabrous and shiny leaves on the upper side (Moldenke, 1973). However, the indumentum on the upper side has been examined from herbarium collections and field observations and found to be variable from pubescent to glabrous: glabrous leaves are common in the old plants or collections. Therefore, *H. parvifolia* var. *nitida* is placed as a synonym of *H. parvifolia*. *Hymenopyramis parvifolia* may be conspecific with *H. acuminata* due to the morphological variation of leaf shape and size, which may be affected by the maturity of the plant. Further study is needed to ascertain its status as a synonym of *H. acuminata*.



Figure 5. *Hymenopyramis cana* Craib: A. Inflorescence; B. Indumentum on lower leaf surface under the stereomicroscope (*Kerr 4637*, **BK**). Scale bar = 1 mm. Photos: A, M. Phumthum; B, B. Bongcheewin.

Moldenke (1956 & 1982) indicated that the type specimen of *H. parvifolia* kept in the Harold N. Moldenke Herbarium at Yonkers, New York, which is his personal herbarium. In 1984, he sold most of his herbarium specimens to University of Texas at Austin (The New York Botanical Garden, 2023), in which the type has been deposited at the Lundell Herbarium (**LL**)(JSTOR, 2023). There are duplicates at **BKF** and **K**, but there are inconsistencies in the label data. The collector is cited differently on the duplicates, and the holotype has a different locality to the duplicates. Dee Bunpheng was a plant collector based at **BKF**, whose first name sometimes cited on the label.

**Hymenopyramis siamensis** Craib, Bull. Misc. Inform. Kew 1912: 154. 1912; Dop in Lecomte, Fl. Indo-Chine 4: 890. 1935; H.R.Fletcher, Bull. Misc. Inform. Kew 1938: 439. 1938; Moldenke, Phytologia 50: 444. 1982. Type: Thailand, Chon Buri, Si Racha, Nawng Kaw [Nong Kao], 100 ft [30 m], 21 Sept. 1911, *Kerr 2087* (lectotype **K** [K000933670], selected here; isolectotypes **BM** [BM000950233], **E** [E00273680], **K** [K000933671]). Figs. 3B, 6.

—*Hymenopyramis pubescens* Moldenke, Phytologia 20: 78. 1970 & 50: 443. 1982, **syn. nov.** Type: Thailand, Nakhon Nayok, Sarika Falls, 300 m, 14 Aug. 1968, *Larsen et al. 3409* (holotype **AAU**; isotypes **K** [K000933674], **L** [L2764511] photo seen, **LL** [LL00375036] photo seen).

Notes.—*Hymenopyramis siamensis* is easily recognised by having villose leaves with long patent hairs and easily visible yellowish glands uncovered by hairs on the lower surface. The specimen at **K** was chosen as the lectotype, as worked at the Kew Herbarium at the time of the protologue's publication (Kerr, 1933, p.410).

Moldenke (1970) described a new species, *H. pubescens* from a collection kept in **AAU**. The characteristic leaf indumentum on the lower surface of the type and the other specimen, *Maxwell 93-459* (**AAU**, **BK**), cited in Moldenke (1982), are identical to that of *H. siamensis*, including the villose hairs and the glands. The size of fruiting calyx varies among the species. Therefore, this taxon is placed as a synonym of *H. siamensis*.

**Hymenopyramis vesiculosa** H.R.Fletcher, Bull. Misc. Inform. Kew 1938: 206. 1938a & 1938: 438. 1938b; Moldenke, Phytologia 50: 445. 1982. Type: Thailand, Nakawn Sawan [Nakhon Sawan], Ban Dan, near Paknampo [Pak Nampho], ca 40 m, *Kerr 3011* (lectotype **E** [E00284144], selected here; isolectotypes **BM** [BM000950234], **K** [K000933708], **SING** [SING0068745] photo seen). Fig. 7.

Notes.— The specimen at **E** is selected as the lectotype because Fletcher worked at E when the protologue was published.

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Figure 6. *Hymenopyramis siamensis* Craib: A. Habit with inflorescences; B. Inflorescence; C. Infructescence. Photos by B. Bongcheewin.



Figure 7. *Hymenopyramis vesiculosa* H.R.Fletcher: A. Thorns developed from inflorescence stalks; B. Inflorescence; C. Infructescence. Photos by B. Bongcheewin.

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