

Three new species and two new records of *Utricularia* L. (Lentibulariaceae) from Northern Thailand

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ABSTRACT. Additional occurrences of *Utricularia* L. in Thailand are documented. Three new species, *U. inthanonensis* Suksathan & J. Parn., *U. phusoidaoensis* Suksathan & J. Parn. and *U. spinomarginata* Suksathan & J. Parn. are described and illustrated. *Utricularia babui* Yadav, Sardesai & Gaikwad and *U. furcellata* Oliver are reported as new records and an extension for the range of *U. garrettii* P. Taylor is documented.

INTRODUCTION

Utricularia L. is a genus of small carnivorous plant comprising 215–220 species worldwide. Since Taylor's monograph (Taylor, 1989) was published, a few new taxa have been discovered and described (Guang-Wan et al, 2007; Lowrie et al 2008; Parnell, 2005; Yadav et al, 2000 & 2005). Recently, Parnell (2005) revised and published an updated account of the genus in Thailand wherein 23 native species are listed, including a single new species, *U. jackii* J. Parn. Unfortunately, though 995 herbarium sheets representing 580 separate collections were studied for this revision the specimens kept uniquely at the herbarium of Queen Sirikit Botanic Garden (QBG) were not included. Parnell (2005) suggested that further study of the Thai spathulate-leaved, lithophytic *Utricularia* might reveal some new species. This group of *Utricularia* form section *Phyllaria* (Taylor, 1989); a group which Taylor (1989) describes as a 'very distinct and natural section'. In *Utricularia* section *Phyllaria*, species are most easily delimited on the basis of minute characters of the seed surface, the shape and degree of lobing of the corolla and the shape and size of the spur.

During field work in Northern Thailand undertaken by the first author between August 1999 and July 2007, several botanically poorly explored mountains were visited and many *Utricularia*

specimens were collected and stored in QBG. After detailed study of these additional collections a number of new species and new records are discovered and are presented below.

TAXONOMY

The new records

1. *Utricularia babui* Yadav, Sardesai & Gaikwad, Rheede 15(1): 71. 2005. Type: India, Maharashtra, Kolhapur, Suleran, 4 April 2004, *Sardesai* 3045 (holotype **CAL**; isotypes **BLATT**, **BSI**, **K**, **SUK**). Figs. 4C, 5E–F.

Terrestrial, lithophyte. Stolons few, filiform. Rhizoids infrequent, filiform. Floats absent. Leaves 4–5 or more, linear-oblong, 5–15 × 1.0–1.5 mm, 1–3 nerved, present at flowering; petiole short, indistinct. Auricles absent. Traps numerous on rhizoids, stolons and leaves, subglobose, ca 0.5–0.8 mm long, stalked, the mouth basal with 2 dorsal, simple, subulate, shortly stipitate-glandular appendages. Internal hairs 2-armed. Inflorescence erect, 1–3 per clump, 2.0–6.5 cm long; peduncle glabrous; 1–4-flowered. Scale basifixed, 1–2, similar to the bracts, ca 1 mm long. Bracts basifixed, lanceolate, ca 2 mm long, apex acuminate. Bracteole much smaller, narrowly triangular, ca 1.3 mm long. Pedicels 3–5 mm in flower, usually

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spreading. Calyx lobes dull purple, unequal, the upper larger, ca 4 mm long on flowering, ovate with acuminate apex; the lower ovate, ca 3 mm long, with acute apex. Corolla blue, rarely pale purple; upper lip obovate, apex rounded or shortly 2-lobed, ca 5 mm long; the lower lip broadly obovate to circular, 4–6 mm long, galeate, the base conspicuously swollen, light blue with dark reticulate veins, apex rounded or retuse or irregularly toothed, palate with a slightly raised rim, fringed with hairs; spur dull purple, short, conical, ca 5 mm long, with apex acute, straight or slightly curved, downward-pointing. Stamens ca 1 mm long. Ovary oblong, ca 1 mm, style short but distinct; stigma 2-lipped, apex truncate. Capsule ovoid with two lateral keels, ca 2.5 mm long. Seeds ovoid-globose ca 0.4 mm long, testa reticulate.

Thailand.— NORTHERN: Chiang Mai [Doi Hua Suea, Doi Inthanon National Park, Chom Thong, 22 Oct. 2005, *Suksathan* 3591 (**QBG**); same locality, 16 Oct. 2007, *Suksathan* 4363 (**QBG**, **TCD**)].

Distribution.— W. India (Maharashtra).

Ecology.— Among mosses on an open, wet rock face along a cliff, ca 1,650 m altitude, locally abundant.

Notes.— *U. babui* was first described from the forest of Kolhapur in the Western Ghats of India where it grows along small streams in open places. This species is easily recognized by its blue flowers with short conical straight spur, long linear leaves, and ovoid-globose seeds with a reticulate testa. Thai material differs somewhat from the Indian in probably being annual, with 1–3-veined leaves (rather than 1 veined), and shorter inflorescences (2.0–6.5 cm rather than 6–20 cm long). The difference in leaf venation may reflect the fact that close scrutiny of the leaves is required to detect the three veins; only one vein being immediately apparent.

2. *Utricularia furcellata* Oliver, Journ. Linn. Soc. Bot. 3: 189. 1859; C.B. Clarke in J. D. Hooker, Fl. Brit. Ind. 4: 334. 1884, partly. Type: India, Khasia Mts., Boga Pani, *J.D. Hooker* 2534 (lectotype **K**; isotypes **G**, **M**). Figs. 4A, 5A–B.

Small epiphyte, rarely terrestrial. Stolons few, filiform. Rhizoids infrequent filiform. Floats

absent. Leaves 3–5, circular to transversely elliptic, 1.5–3.0 mm long, present at flowering; petiole 1–4 mm long, Auricles absent. Traps few on rhizoids, ovoid, stalked, ca 1 mm long, the mouth lateral with a dorsal bifid appendages, internal hairs 4-armed. Inflorescence erect, 1 per clump, 0.9–2.0 cm long; peduncle glabrous; 1–2 flowered; scale absent. Bracts attached just above the base, lanceolate, ca 0.5 mm long, both ends free, apex and base acute; bracteole similar, but slightly larger. Pedicels usually spreading, up to 4 mm in flower. Calyx lobes purplish red, unequal, the upper much larger, ca 2 mm long on flowering, circular with emarginate apex; the lower ovate, with emarginate apex. Corolla pale purple or white, with a narrow white horseshoe-shaped band and a yellow patch at the base of the lower lip, upper lip transversely widely oblong, with apex shortly 2-lobed, ca 1 mm long, slightly shorter than the upper calyx lobe; lower lip depressed obovate in outline, 4-lobed, ca 3 × 4 mm, the lateral lobes distinctly smaller than the apical pairs, palate with a slightly raised rim, fringed with hairs; spur short, subulate, with apex acute straight or slightly curved ca 4 mm long. Stamens ca 0.5 mm long. Ovary globose, style very short; stigma lower lip circular, the upper lip ± obsolete. Capsule globose with a ventral keel, ca 1.5 mm long. Seeds obovoid, ca 0.1 mm long, covered with minute glochidiate processes.

Thailand.— NORTHERN: Chiang Mai [Kew Mae Pan, Doi Inthanon National Park, Chom Thong district, 22 Aug. 1999, *Wattana*, *Suksathan* & *Argent* 611 (**QBG**); Doi Patido, Ban Pang Kia, Mae Chaem district, 19 Aug. 2007, *Suksathan* 4332 (**QBG**, **TCD**)]; Chiang Rai [Doi Phi Pan Nam, Mae Chedi, Sept. 2005, *Suksathan* (pers. obs.)].

Distribution.— India (Sikkim, Darjeeling, Meghalaya).

Ecology.— Mossy wet tree boles and rocks in lower montane forest above 1,700 m altitude, locally common.

Notes.— *U. furcellata* is the smallest species in section *Phyllaria* (Taylor 1986), characterized by its pale purple or white 4-lobed corolla, spatulate leaves, and small obovoid seeds with glochidiate hairs. Sometimes it can be confused with the small forms of *U. striatula*, but its 4-lobed corolla which is never broader than twice the width of the upper

calyx lobes is distinctive. However, there is considerable variation in the degree and depth of lobing of the corolla of *U. striatula* and further examination of the differences between these species is needed – a view echoed by Taylor (1989).

The range extension

1. *Utricularia garrettii* P. Taylor, Kew Bull. 41: 13. 1986.

Specimen examined: Thailand, Phitsanulok, Phu Soi Dao National Park, open sandstone platform, 17 Sept. 2007, *Suksathan* 4643 (**QBG**, **TCD**). Figs. 4E, 5L.

Utricularia garrettii was only known from 2 collections made by H.B.G. Garrett on the same day from Doi Inthanon. Material collected at 2,100 m altitude on Phu Soi Dao (Phitsanulok) by the first author has seeds and most other features identical to material from Doi Inthanon; however, the lower lip of the corolla is variable and may be of a radically different shape. In material from Doi Inthanon the lower lip of the corolla is very shallowly 5 lobed with the top lateral lobes small but distinct and the three lower lobes confluent to form a single large lip. In contrast, some material from Phu Soi Dao the lower lip of the corolla bears a distinct, though small, central lobe flanked on either side by two confluent lateral lobes which look rather like emarginate wings lying on either side of the middle lower lobe (Fig. 4E). Other material from Phu Soi Dao appears identical in the form of its corolla to that from Doi Inthanon; indeed one plant carries flowers of both types. Therefore, species identification in Section *Phyllaria* cannot rely solely on the depth of lobing in the corolla; a combination of characters is necessary.

The new species

1. *Utricularia inthanonensis* Suksathan & J. Parn. **sp. nov.** *Utricularia garrettii* affinis sed corolla quinquilobis profunde notato, semenibus ellipsoideis, utriculi pedicellis appendicibus filiformis obsito differt. Type: Thailand, Chiang Mai, Doi Hua Suea, Doi Inthanon National Park, wet rock-face along cliff, 16 Oct. 2007, *Suksathan* 4365

(holotypus **QBG**!; isotypi **BKF**!, **TCD**!). Figs. 1, 4B, 5C–D.

Terrestrial, lithophyte. Stolons few, filiform. Rhizoids infrequent, filiform. Floats absent. Leaves in a rosette, 6–10, spatulate, 1–2 mm long, present at flowering; petiole 1–2 mm long. Auricles absent. Traps numerous, on rhizoids, obliquely ovoid, very broadly stalked, 1–1.5 mm long, the stalk frequently covered with long numerous filiform appendages lying between the body and axis, the mouth lateral with two dorsal subulate, sparsely branched appendages. Internal hairs 4-armed. Inflorescence erect, 1–2 per clump, 1.2–3.5 cm long; peduncle glabrous; 1–2(–3) flowered, scale absent; bracts attached just above the base, lanceolate, 1.5 mm long, both ends free, apex and base acute. Bracteoles similar to the bract, but slightly larger. Pedicels 2–4 mm in flower, usually spreading. Calyx lobes unequal, the upper much larger, ca 2 mm long on flowering, broadly cordate; the lower broadly ovate, with emarginate apex, ca 1 mm long. Corolla pale pink with a yellow patch at the base of the lower lip; upper lip small, fan shaped, ca 1 mm long, margin subentire to shortly 2–4-lobed; lower lip approximately reniform in outline, deeply 5 lobed, ca 7 × 10 mm, midlobe broadly obovate, distinctly larger than the lateral and basal lobes, palate with rims raised, almost glabrous with small projections at either side of its distal margin; spur subulate, 6 mm long, slightly curved, usually shorter than the lower corolla lobe. Ovary subglobose, ca 1 mm in diameter, style very short; stigma lower lip depressed obovate, apex round, margin ciliate, the upper lip obsolete. Capsule globose with a ventral keel, ca 2 mm long. Seeds ellipsoid, covered with patent cylindrical hairs throughout except at the very base; testa sparsely verrucose.

Thailand.— NORTHERN: Chiang Mai [Doi Hua Suea, Doi Inthanon National Park, 2 Oct. 2005, *Suksathan* 3598 (**QBG**); same locality, 16 Oct. 2007, *Suksathan* 4365 (holotype **QBG**; isotypes **BKF**, **TCD**)].

Distribution.— Endemic. Known only from the type locality.

Ecology.— Open, wet granite rock face along cliff, ca 1,650 m altitude, rare.

Conservation status.— IUCN red list category: CR B2a, b (IUCN 2001).

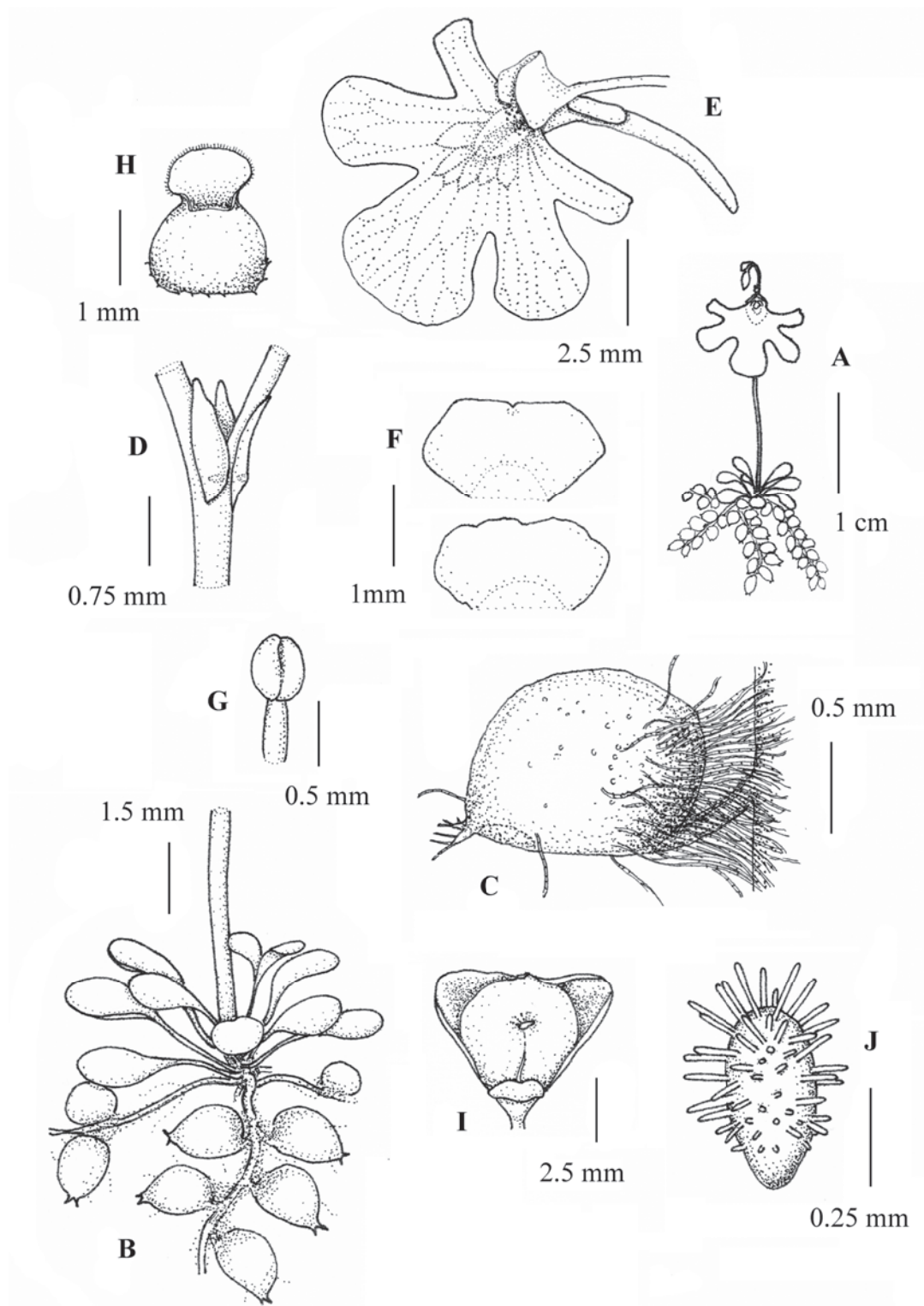


Figure 1. *Utricularia inthanonensis* Suksathan & J. Parn.: A. habit; B. base of plant with leaves & traps; C. trap; D. bract & bracteoles; E. flower; F. upper lip of corolla; G. stamen; H. pistil; I. capsule with calyx, ventral view; J. seed.

Notes.— *Utricularia inthanonensis* belongs to section *Phyllaria* (Taylor 1986). It is closely related to *U. garrettii* but differs in its deeply 5-lobed corolla, ellipsoid seeds, the presence of filiform appendages between the body and axis of its traps and in the exceptional width of the trap's stalk. At Doi Hua Suea, *U. inthanonensis* shares the same habitat with *U. striatula* but they are still easily distinguished by their flowers and seeds. (Figs. 4B, 5C–D, K).

2. *Utricularia phusoidaoensis* Suksathan & J. Parn. sp. nov. *Utricularia garrettii* affinis sed corolla quinqui- vel hexalobis instructis, foliis reniformibus et utriculi pedicellis appendicibus cornu servi differt. Type: Thailand, Phitsanulok, Phu Soi Dao, open sandstone cliff near summit, 17 Sept. 2007, *Suksathan* 4641 (holotypus **QBG!**; isotypi **BKF!**, **TCD!**). Figs. 2, 4D, 5G–H.

Terrestrial, lithophyte. Stolons few, filiform. Rhizoids infrequent, filiform. Floats absent. Leaves 4–8, blade reniform, 3–6 × 4–9 mm, present at flowering, petiole 1–2 mm long. Traps numerous, on rhizoids, obliquely ovoid, stalked, the body sparsely covered with minute globose glands, ca 1.2 mm long, the mouth lateral with two long dorsal, subulate, sparsely branched appendages, ca 1 mm long. Internal hairs 4-armed. Inflorescence erect, simple, rarely with a single branch, 1–3 per clump, (2–)5.5–7.5 cm long; peduncle glabrous, 3–5-flowered. Scales absent. Bracts attached just above the base, lanceolate, 1.0–1.2 mm long, both ends free, apex acute, base round. Bracteoles similar to the bracts, but slightly larger. Pedicels 2.0–4.5 mm in flower, usually spreading. Calyx lobes unequal, the upper much larger, ca 1.7 mm long on flowering, transversely elliptic, with apex emarginate; the lower narrowly ovate to deltoid, with apex emarginate, ca 1 mm. Corolla purple with a yellow patch at the base of the lower lip, upper lip small, transversely oblong in outline, ca 1 mm, apex 2-lobed, apex of each lobe slightly emarginate, truncate; lower lip spreading, 4-lobed with 2 broader midlobes, or 6 subequal lobes, ca 4 × 6 mm, palate with horseshoe-shaped raised rim, glabrous; spur subulate, ca 7 mm long, slightly curved and downward-pointing, slightly longer than lower corolla lobe. Stamens ca 1 mm long. Ovary broadly ellipsoid, ca 1 mm long, style very short, stigma lower lip

triangular, apex acute, upper lip obsolete. Capsule globose with a ventral keel, ca 2 mm long. Seeds obovoid, ca 0.5 mm long, with cylindrical patent hairs in the upper half; testa surface verrucose on the upper half, the lower half smooth.

Thailand.— NORTHERN: Phitsanulok [Phu Soi Dao, 17 Sept. 2007, *Suksathan* 4641 (holotype **QBG**, isotypes **BKF**, **TCD**)].

Distribution.— Endemic. Known only from the type locality.

Ecology.— Open wet mossy cliff near summit, ca 2000 m altitude, uncommon.

Conservation status.— IUCN red list category: CR B2a, b (IUCN 2001).

Notes.— Another member of section *Phyllaria* (Taylor 1986), *U. phusoidaoensis* is easily recognized by its purple, shortly 4–6-lobed corolla, reniform leaves, and especially its stag's horn-like appendages on the traps. The seeds are like those of *U. garrettii*. At Phu Soi Dao, *U. phusoidaoensis* was found growing intermingled with *U. spinomarginata*.

3. *Utricularia spinomarginata* Suksathan & J. Parn. sp. nov. *Utricularia striatula* affinis sed corolla quinquelobis profunde notato et semenibus complanatus processis glochidiatis et patens marginalis ornatis differt. Type: Thailand, Phitsanulok, Phu Soi Dao, open sandstone cliff near summit, 17 Sept. 2007, *Suksathan* 4642 (holotypus **QBG!**; isotypi **BKF!**, **TCD!**). Figs. 3, 4F, 5I–J.

Terrestrial, lithophyte. Stolons few, filiform. Rhizoids infrequent, filiform. Floats absent. Leaves 4–6(–8), spatulate, 1–2 × 1–2 mm, present at flowering, petiole 1–3 mm long. Auricles absent. Traps numerous, on rhizoids, ovate, stalked, the body sparsely covered with minute globose glands, ca 1 mm long, the mouth lateral with a dorsal, deeply bifid appendages, the distal margin sparsely branched appendages. Internal hairs 4-armed. Inflorescence erect, solitary, 2.0–3.6 cm long; peduncle glabrous, 1–2-flowered; scale rarely present. Bracts attached just above the base, lanceolate, ca 0.7 mm long, both ends free, apex and base acute. Bracteoles similar to the bracts, but larger, ca 1 mm long, with emarginate base. Pedicels 2–6 mm in flower, usually spreading. Calyx lobes unequal, the

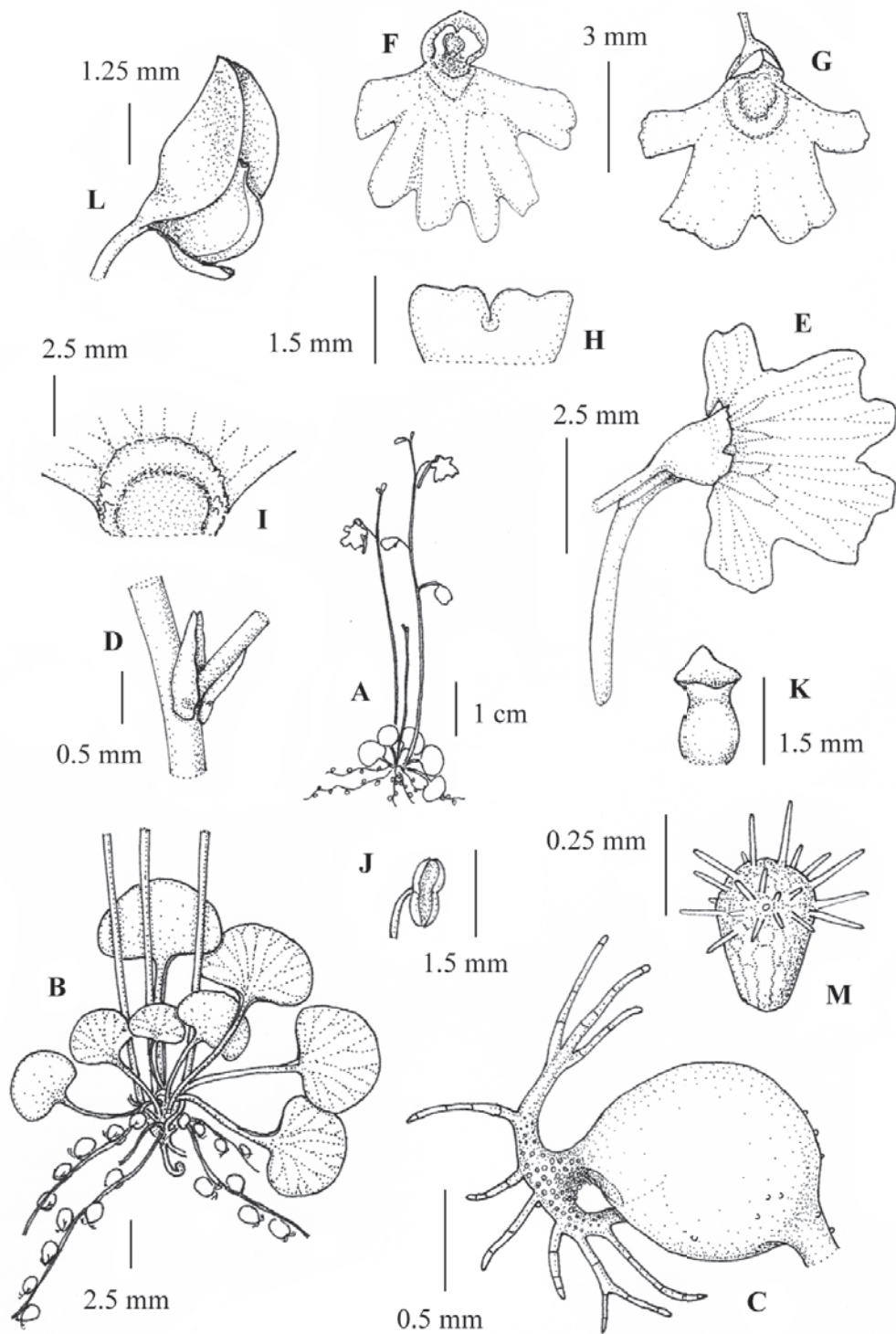


Figure 2. *Utricularia phusoidaoensis* Suksathan & J. Parn. : A. habit; B. base of plant with leaves & traps; C. trap; D. bract & bracteoles; E.-G. flower; H. upper lip of corolla; I. palate; J. stamen; K. pistil; L. capsule with calyx, lateral view; M. seed.

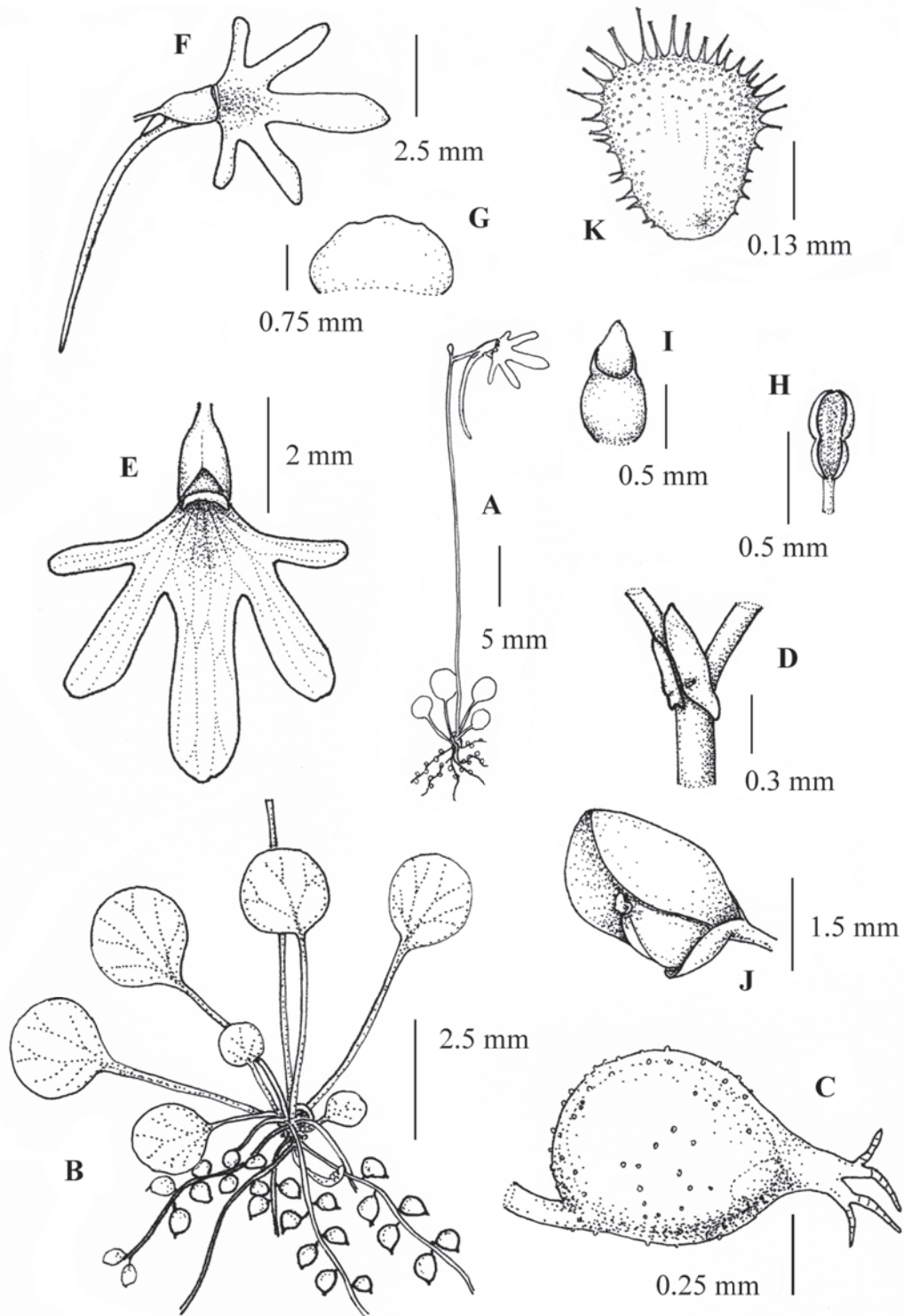


Figure 3. *Utricularia spinomarginata* Suksathan & J. Parn. : A. habit; B. base of plant with leaves & traps; C. trap; D. bract & bracteoles; E.–F. flower; G. upper lip of corolla; H. stamen; I. pistil; J. capsule with calyx, ventral view; K. seed.

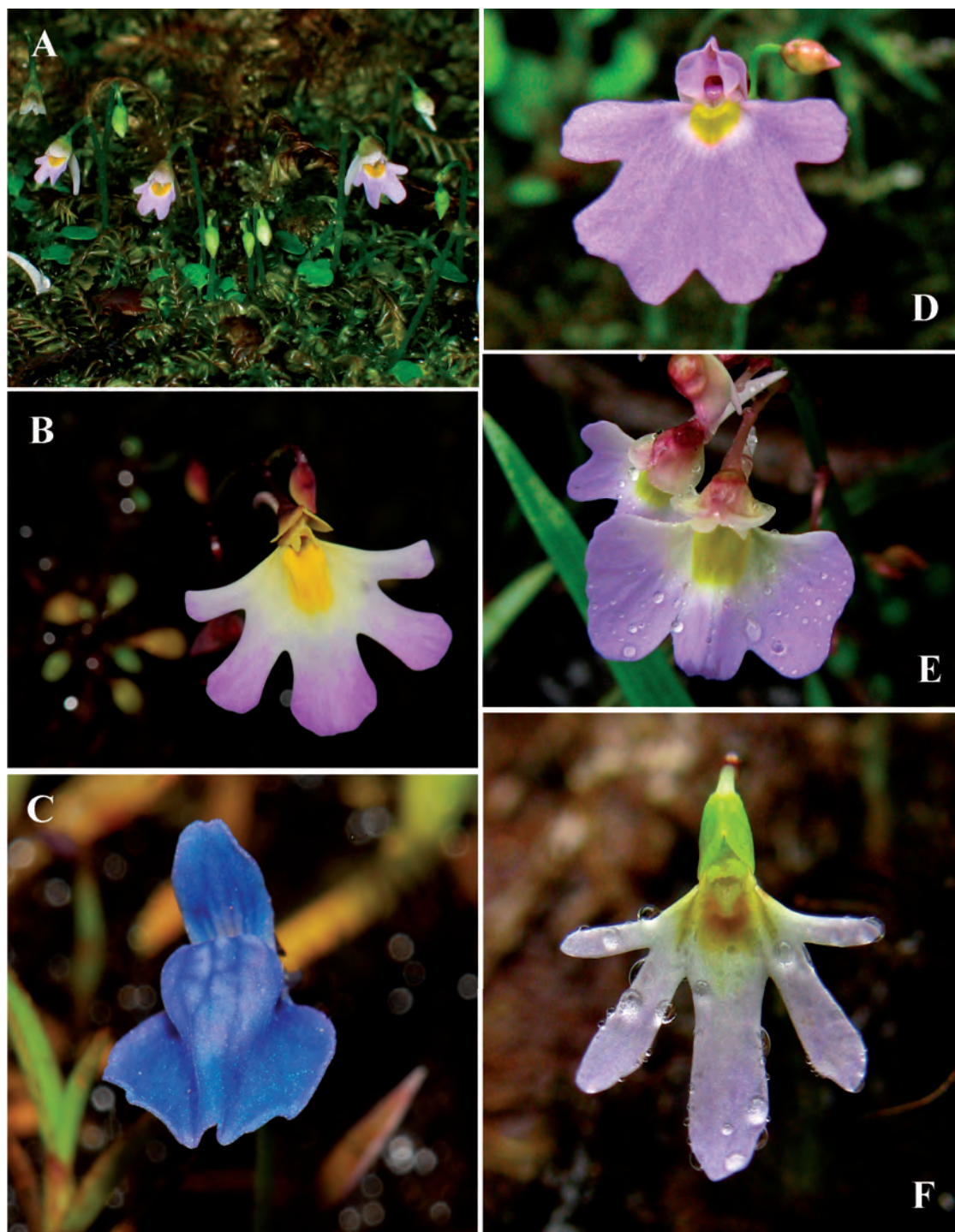


Figure 4. *Utricularia* flowers: A. *U. furcellata* Oliver; B. *U. inthanonensis* Suksathan & J. Parn.; C. *U. babui* Yadav et al.; D. *U. phusoidaoensis* Suksathan & J. Parn.; E. *U. garrettii* P. Taylor; F. *U. spinomarginata* Suksathan & J. Parn.

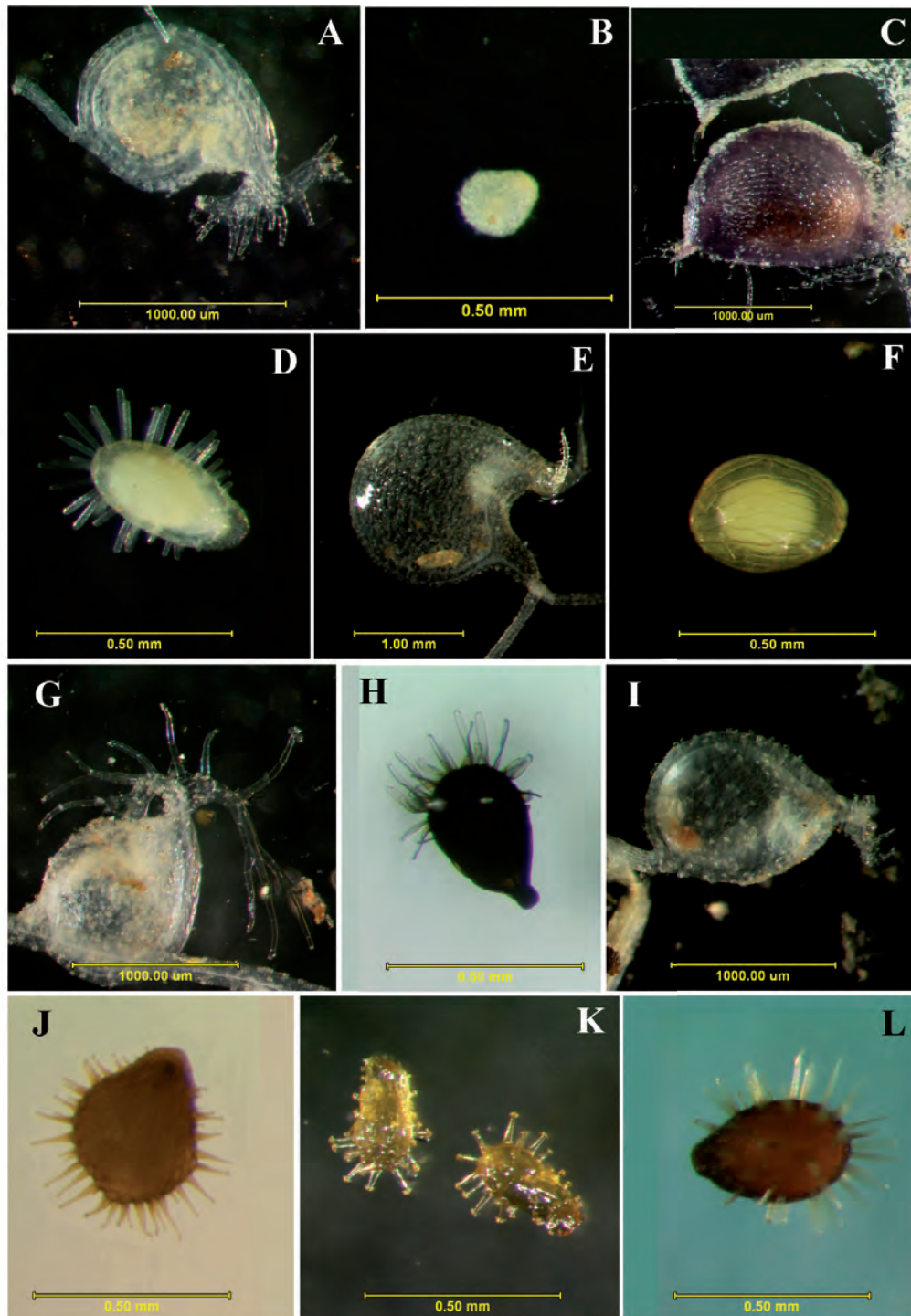


Figure 5. *Utricularia* traps & seeds: A.–B. *U. furcellata* Oliver; C.–D. *U. inthanonensis* Suksathan & J. Parn.; E.–F. *U. babui* Yadav et al.; G.–H. *U. phusoidaoensis* Suksathan & J. Parn.; I.–J. *U. spinomarginata* Suksathan & J. Parn.; K. *U. striatula* Sm., seeds; L. *U. garrettii* P. Taylor, seed.

upper larger 2–2.5 mm long on flowering, sub-circular; the lower, ovate, glabrous, ca 1 mm long. Corolla yellowish white to pinkish white with a yellow patch at the base of the lower lip; upper lip small, sub-reniform ca 0.6×1.5 mm; lower lip spreading, broadly ovate in outline, the apex deeply 5-lobed, the midlobe broadest, with round to broadly acute apex, palate smooth; spur subulate, ca 6 mm long, slightly curved, downward-pointing, distinctly longer than lower corolla lobe. Stamens ca 0.4 mm long. Ovary broadly ellipsoid, ca 0.5 mm long, style very short, stigma lower lip ovate, apex acute, upper lip obsolete. Capsule globose with a ventral keel, ca 2 mm long. Seeds obovoid, laterally compressed, ca 0.35 mm long, the rim fringed with narrowly conical \pm glochidiate hairs; testa microscopically verrucose.

Thailand.— NORTHERN: Phitsanulok [Phu Soi Dao, 17 Sept. 2007, *Suksathan* 4642 (holotype **QBG**; isotypes **BKF**, **TCD**)].

Distribution.— Endemic to N. Thailand. Known only from the type locality.

Ecology.— Open wet mossy cliff near summit, ca 2000 m altitude, rather rare.

Conservation status.— IUCN red list category: CR B2a, b (IUCN 2001).

Notes.— *Utricularia spinomarginata* also belongs to section *Phyllaria* (Taylor 1986). It is easily recognized by its unique combination of a very deeply 5-lobed corolla, and especially its compressed obovoid seeds with marginal patent, glochidiate spine-like hairs. Its specific epithet refers to this unique seed character. (Fig. 5J).

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