

# *Utricularia sainthomia* (Lentibulariaceae), a new remarkable carnivorous species from the lateritic plateau of northern Kerala, India

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**Abstract:** A new species of Lentibulariaceae, *Utricularia sainthomia* collected from the lateritic plateau of northern Kerala, India is described and illustrated. It is compared with similar species, *U. malabarica* Janarth. & A.N.Henry and *U. lazulina* P.Taylor based on vegetative, floral and seed morphology. A key to the violet flowered species in India are provided.

**Keywords:** New species, *Utricularia*, *Utricularia* sect. *Oligocista*.

## Introduction

The carnivorous genus *Utricularia* L. (“bladderworts”, Lentibulariaceae) is widely distributed in the lateritic plateau in India. The gregarious flowering of *Utricularia* gives characteristic colour pattern to the plateau at the end of monsoon season. Taylor (1989) in his monograph recognized 214 species while Fleischmann (2012) reported 228 species in the world. Janarthanam and Henry (1992), in their taxonomic revision, reported 35 species in India. Since then, five more species were described from India (Yadav *et al.*, 2000, 2005; Kumar *et al.*, 2018; Sindhu *et al.*, 2020).

During an enumeration of monsoon plants in the lateritic plateau in Kerala, the authors found several populations of an interesting *Utricularia* among tiny grass patches at different places in Kannur and Kasaragod districts. Detailed morphological observation and discussions with the experts revealed its novelty. Hence it is described here as a new species.

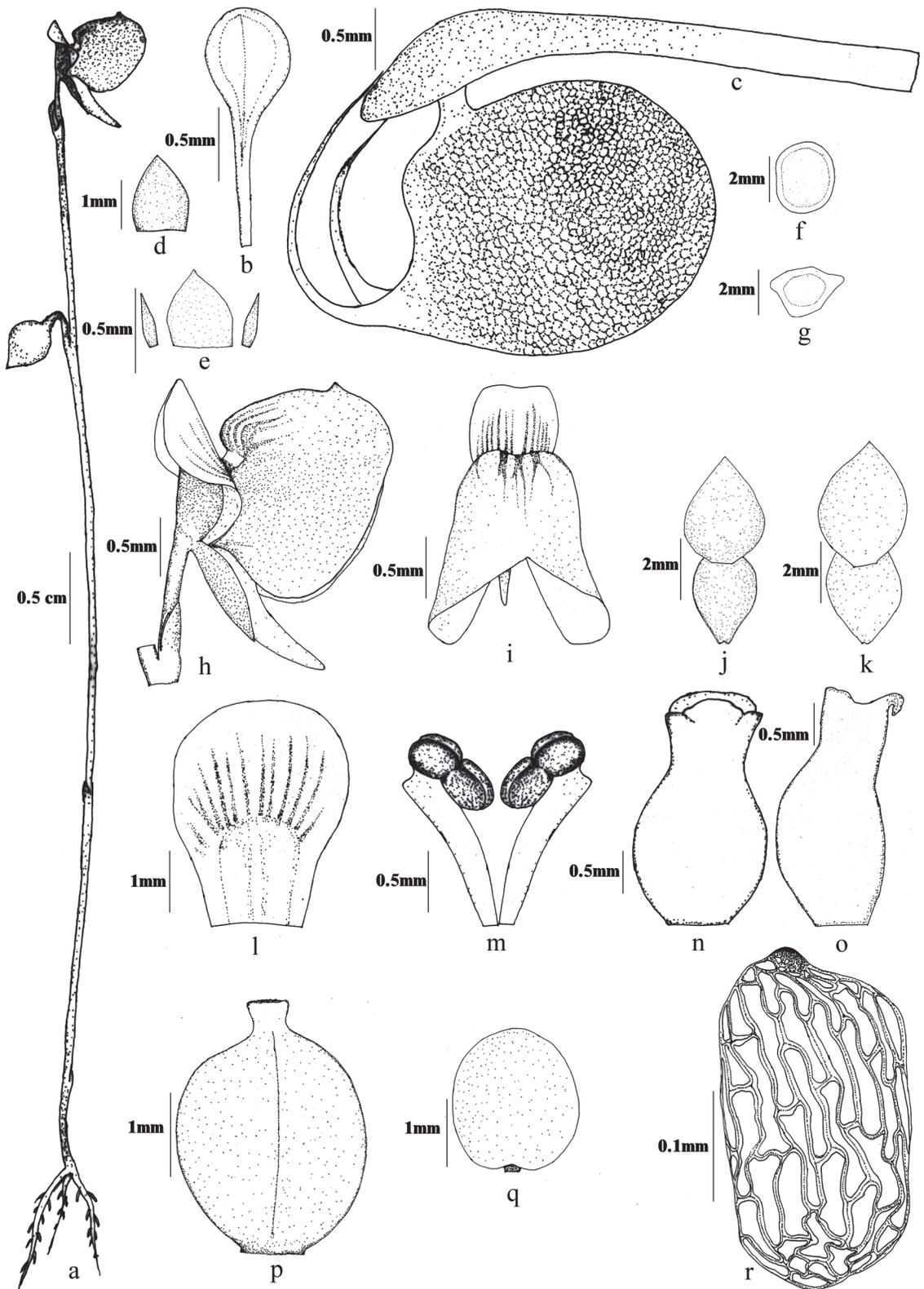
## Material and Methods

Fresh specimens of *Utricularia* were collected from seven localities in Kannur and Kasaragod districts and examined under a stereo microscope (Olympus, Japan). Morphology of the specimens was compared with allied species. Seed characters of the new species were studied with the help of a scanning electron microscope (Sigma 300, Zeiss, USA). Herbarium specimens were prepared as per Bridson and Forman (1991). Novelty of the taxon was confirmed by critical morphological analysis of the specimens, comparison with relevant literature and on discussion with experts.

## Taxonomic treatment

*Utricularia sainthomia* P.Biju, Josekutty, Janarth. & Augustine, **sp. nov.** **Figs. 1–3**

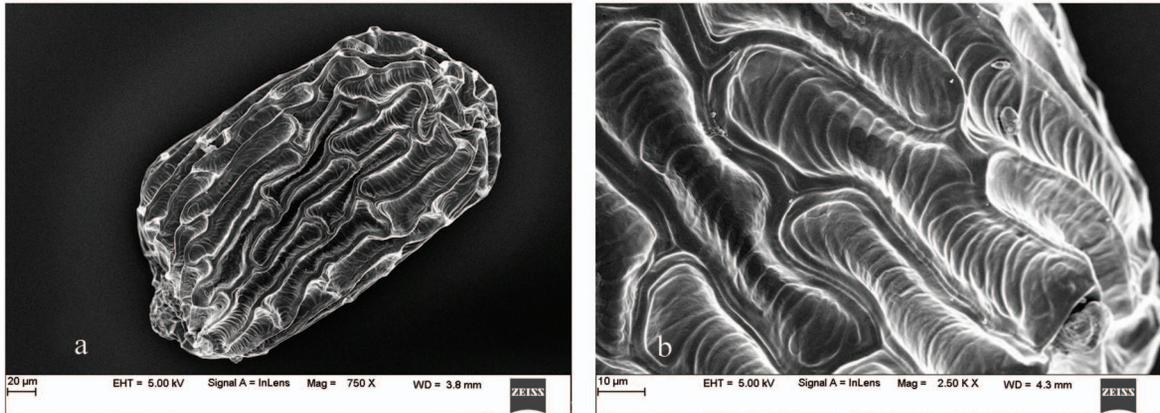
This new species is morphologically similar to *U. malabarica* Janarth. & A.N.Henry and *U. lazulina* P.Taylor in its 3-nerved leaves, basifixed bracts, shorter peduncles, recurved fruiting pedicels (absent in *U. lazulina*), papillate calyx lobes



**Fig. 1.** *Utricularia sainthomia* P.Biju, Josekutty, Janarth. & Augustine: **a.** Habit; **b.** Leaf; **c.** Leaf with trap; **d.** Scale; **e.** Bracts & bracteoles; **f.** Transverse section of scape; **g.** Transverse section of pedicel; **h.** Flower—lateral view; **i.** Flower—front view; **j.** Flowering calyx; **k.** Fruiting calyx; **l.** Corolla—upper lip; **m.** Stamens; **n.** Pistil—adaxial view; **o.** Pistil—lateral view; **p.** Capsule; **q.** Placenta; **r.** Seed (from Biju & Jomy 1008; drawn by P. Biju).



**Fig. 2.** *Utricularia sainthomia* P.Biju, Josekutty, Janarth. & Augustine: **a.** Habit; **b.** Habitat; **c.** Rhizoids; **d.** Stamens; **e.** Pistil; **f.** Trap—different views (from *Biju & Jomy* 1008; photos by P. Biju).



**Fig. 3.** *Utricularia sainthomia* P.Biju, Josekutty, Janarth. & Augustine: **a.** Scanning electron micrograph of seed; **b.** Scanning electron micrograph of testa cells with transverse striations.

and bigibbous corolla but differs in having large oblate traps (1.5–2.5 mm) with a lateral mouth, traps confined to the expanded portion of the leaves, 1.5–2.5 mm long non-glandular trap appendages, terete brownish green peduncles, papillate scales, bracts and bracteoles, broad obovate upper lip of corolla, deep violet lower lip of corolla, shallowly trilobed upper lobe of stigma, globular capsules, terminal hilum, elongated overlapping testa cells with raised anticlinal boundaries and periclinal walls transversely striated.

**Type:** INDIA, Kerala, Kasaragod district, Koyithatta lateritic plateau, N 12° 19' 43.7", E 075° 15' 11.9", 155 m, 12.07.2015, *Biju & Jomy* 1008 (holo CAL; iso MH).

Small, erect, terrestrial plants, 3.5–7 cm tall. Rhizoids 2–3 from the base of the peduncles, 6–20 × 0.1–0.4 mm, tapering towards apex, branches capillary, distichous, pale purple, glandular. Stolons filiform, 15–25 mm long, 0.1–0.3 mm in thickness, internodes 3–3.5 mm long, branched. Leaves only on the stolons, 1 or 2 at the internodes, obovate-spathulate, 3-nerved, 4.5–7 × 1.2–2.3 mm, rounded at apex. Traps oblate, 1.5–2.5 × 1.2–1.6 mm, found only on the lower side of expanded portion of the leaves, solitary, rarely two; stalk 0.1–0.2 mm long, attached at the longer side of the bladder, 0.3–0.8 mm apart from the mouth; mouth lateral, round; appendages two, subulate, 1.5–2.5 mm long, recurved, non-glandular. Racemes erect; peduncles 3.5–7 cm long, 0.3–0.5 mm thick, brownish green, terete, shallowly grooved on one side, glabrous.

Scales 3–4, adpressed on the peduncle, ovate, faintly 1-nerved, 1–1.5 × 0.7–1.2 mm, papillate. Bracts ovate, basifixed, 1.5–1.8 × 1–1.2 mm, nerves obscure, acute, papillate. Bracteoles 2, lanceolate, 0.8–1.2 × 0.2–0.25 mm, shorter than the bract, partially concealed, acute at apex, papillate. Flowers 1–4; pedicels 3–3.3 mm long, brownish-purple, winged, erect, recurved in fruit. Calyx lobes unequal; lower lobe ovate, smaller, 2.8–3 × 2–2.3 mm (3–3.5 × 2.5–2.8 mm in fruit), brownish purple, papillate, emarginate at apex, faintly 11-nerved; upper lobes ovate, 2.9–3.4 × 2.2–2.8 mm (3.5–3.8 × 3.2–3.7 mm in fruit) brownish purple, faintly 11-nerved, persist in fruit, acute, papillate. Corolla violet, bi-lipped; upper lip 3–4 × 2.3–3.7 mm, broader than calyx lobe, obovate, rounded at apex, light purple with dark stripes; lower lip 3–4 mm across, broadly oblong or rectangular, narrowly bigibbous at middle with a flat rectangular yellowish region in between mouth and inflated region, palate ciliate, deep violet with a few purplish longitudinal striations on the inflated region; margins slightly undulate, 6–9 × 4.5–6.5 mm when spread out; spur tubular, subulate, 4–5 mm long, light violet, slightly curved, acute, directed obliquely down wards, shorter than the lower lip of corolla. Stamens 2; filaments flattened, 1–1.2 × 0.2–0.25 mm, truncate at apex, pale green; anther bitheous, dorsifixed, 0.5–0.6 × 0.25–0.3 mm, brownish, minutely papillate. Pistil 1.4–1.6 mm

**Table 1.** Diagnostic characters of *Utricularia sainthomia*, *Utricularia malabarica* and *Utricularia lazulina*.

Characters	<i>U. sainthomia</i> P.Biju, Josekutty, Janarth. & Augustine	<i>U. malabarica</i> Janarth. & A.N.Henry	<i>U. lazulina</i> P.Taylor
Trap	Located only on the ventral side of the expanded portion of the leaves, large sized, 1.5–2.5 mm across, oblate, mouth lateral, appendages long and non-glandular	Located on stolons, stalk and expanded portion of the leaves, medium sized, 0.9–1.5 mm across, globose, mouth basal, appendages short and glandular	Located on stolons, stalk and expanded portion of the leaves, medium sized 0.7–1.2 mm across, sub-globose, mouth basal, appendages short and glandular
Scale, bract, bracteole	Papillate	Papillae absent	Papillae absent
Calyx	Calyx lobes unequal, brownish-purple	Calyx lobes equal, yellowish-green	Calyx lobes unequal, bluish-violet
Upper lip of corolla	Obovate, broader than calyx lobe, light purple with dark stripes	Oblong, narrower than calyx lobe, white-cream	Oblong, narrower than calyx lobe, bluish-violet
Lower lip of corolla	Deep violet, broadly oblong, inflated portion deep violet	Blue with white tinge, sub-orbicular to obovate, inflated portion white	Blue, narrowly oblong to sub-orbicular, inflated portion white
Spur	Shorter than lower lip of corolla, light violet	Longer than lower lip of corolla, white	Shorter than lower lip of corolla, violet
Seed	Obliquely ovoid, cylindrical, hilum terminal, testa cells longer, irregularly shaped, junctions sinuate, periclinal walls transversely striated	Ovoid, hilum sub-terminal, testa cells shorter, polygonal, junctions angular, periclinal walls smooth	Obovoid, hilum sub-terminal, testa cells shorter, polygonal, junctions angular, periclinal walls verrucose

long; ovary ovoid-globular, 0.8–0.9 × 0.7–0.8 mm; style short; stigma 2-lipped, lower lip semi-orbicular and recurved, upper lip shallowly three lobed, middle lobe large. Capsules globular, 2–2.5 × 2–2.5 mm, uniformly membranous; placenta globular 1.5–1.7 × 1.5–1.7 mm, dehisce by a vertical slit. Seeds obliquely ovoid-cylindrical, 0.3–0.35 × 0.2–0.25 mm, golden brown, testa cells elongated, irregular, margins raised and sinuate, periclinal walls transversely striated; hilum terminal.

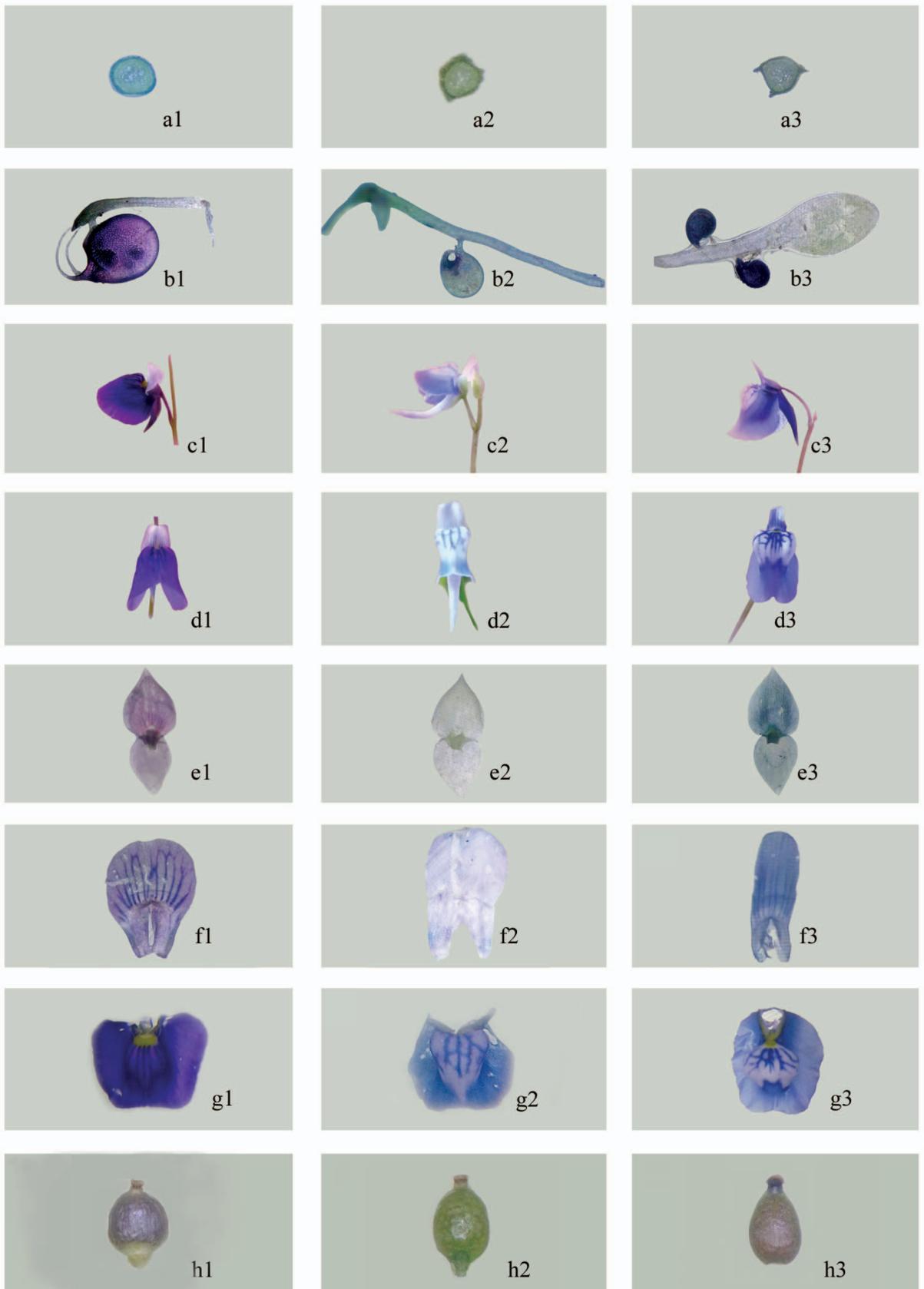
*Flowering & fruiting:* Flowering and fruiting from June to August.

*Etymology:* The species is named after the educational institution Saint Thomas College, Pala, Kerala, India, where one of the authors pursuing research work.

*Distribution:* Endemic to the lateritic plateau in Kerala, India.

*Specimens examined:* INDIA, **Kerala**, Kasaragod district, Adukkam, N 12° 26'44.8", E 075° 00'23.6", 102 m, 16.08.2015, *Biju & Jomy* 1028; Ayampara, N 12° 28'45.6", E 075° 13'15.9", 180 m, 18.08.2015, *Biju & Jomy* 1045; Karindalam, N 12° 19'35.1", E 075° 14'59.3", 187 m, 20.07.2016, *Biju & Jomy* 1241; Kayyur, N 12° 16'25.1", E 075° 14'17.5", 96 m, 02.08.2016, *Biju & Jomy* 1250; Periya, N 12° 28'09.2", E 075° 06'44.5", 85 m, 18.07.2016, *Biju & Jomy* 1230 (St. Thomas College Herbarium, Pala, Kerala, India); Kannur district, Peringome, N 12° 04'06.7", E 075° 36'83.9", 86 m 03.08.2016, *Biju & Jomy* 1252 (CALI, St. Thomas College Herbarium, Pala, Kerala, India).

*Conservation status:* The new species has so far been known only from seven localities in Kasaragod and Kannur districts in Kerala, India. More extensive collections in similar habitats in other parts of



**Fig. 4.** Comparison of transverse section of scape, floral parts and capsule of *Utricularia sainthomia* with similar species: a1-h1. *Utricularia sainthomia* P.Biju, Josekutty, Janarth. & Augustine; a2-h2. *Utricularia malabarica* Janarth. & A.N.Henry; a3-h3. *Utricularia lazulina* P.Taylor.

northern Kerala are needed to confirm its conservation status. However, there exist some threats as the populations are located near to laterite mining sites. Based on the available data, the species could be categorized as Data Deficient (DD) according to IUCN Criteria (2019).

*Notes:* This new species falls under *U.* sect. *Oligocista* based on leaf, trap, bract, flower and seed characters (Taylor, 1989). It is close to *U. malabarica* and *U. lazulina* but differs in many morphological characters (Table 1, Figure 4).

It also shows affinities with other species of this section such as *U. ceciliae* P.Taylor, *U. purpurascens* J.Graham (*U. arcuata* Wight), *U. praeterita* P.Taylor and *U. albocaerulea* Dalzell in having tri-nerved leaves, basifixed bracts and broader upper lip of corolla, but differs in having large oblate traps with lateral mouth, traps which are located only on the expanded portion of the leaves, long (1.5–2.5 mm) and non-glandular trap appendages, papillate scales, bracts and bracteoles, deep violet corolla, globular capsule, elongated overlapping testa cells with raised anticlinal boundaries and periclinal walls transversely striated.

Key to the violet flowered species of *Utricularia* in India

- 1. Plants epiphytic; leaves orbicular ..... *U. striatula*
- 1. Plants terrestrial; leaves not orbicular ..... 2
- 2. Racemes twining ..... 3
- 2. Racemes erect ..... 4
- 3. Pedicels up to 4 mm long ..... *U. foveolata*
- 3. Pedicels more than 4 mm long ... *U. reticulata*
- 4. Mouth of the trap terminal or lateral ..... 5
- 4. Mouth of the trap basal ..... 7
- 5. Upper lip of the mouth beaked ..... *U. caerulea*
- 5. Upper lip of the mouth not beaked ..... 6
- 6. Leaves linear, 1-nerved ..... *U. hirta*
- 6. Leaves peltate, dichotomously nerved ..... *U. pubescens*

- 7. Racemes winged ..... 8
- 7. Racemes not winged ..... 10
- 8. Pedicels more than 6 mm long; recurved in fruit ..... *U. albocaerulea*
- 8. Pedicels upto 5 mm long; erect or spreading in fruit ..... 9
- 9. Spur upto 3.5 mm long; seeds obovoid ..... *U. lazulina*
- 9. Spur 5–7 mm long; seeds ellipsoid ..... *U. praeterita*
- 10. Leaves 1-nerved ..... *U. polygaloides*
- 10. Leaves 3-nerved ..... 11
- 11. Fruiting pedicels recurved ..... 12
- 11. Fruiting pedicels spreading or erect ..... 13
- 12. Upper lip of the corolla oblong; spur extend beyond the lower lip ..... *U. malabarica*
- 12. Upper lip of the corolla obovate; spur shorter than the lower lip ..... *U. sainthomia*
- 13. Racemes angular ..... 14
- 13. Racemes terete or grooved ..... 15
- 14. Scales 1-nerved ..... *U. ceciliae*
- 14. Scales 3-nerved ..... *U. nayarii*
- 15. Leaves spatulate ..... *U. smithiana*
- 15. Leaves linear ..... 16
- 16. Pedicels not winged at anthesis ..... *U. sunilii*
- 16. Pedicels winged at anthesis ..... 17
- 17. Upper lip of corolla oblong, apex emarginate or truncate ..... *U. uliginosa*
- 17. Upper lip of the corolla linear, apex rounded ..... 18
- 18. Calyx with sub-equal lobes; capsule wall uniformly membranous ..... *U. wightiana*
- 18. Calyx 2-lipped; capsule wall not uniformly thickened ..... *U. graminifolia*

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