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## RESEARCH ARTICLE

***Nymphoides balakrishnanii* SP. NOV. (MENYANTHACEAE), A NEW SPECIES FROM THE LATERITIC PLATEAU OF SOUTHERN WESTERN GHATS, INDIA.**

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**Abstract**

A new species *Nymphoides balakrishnanii*, collected from seasonal pond in the Southern Western ghats, India is described and illustrated. The new species is related to the *Nymphoides parvifolia* in the habit, tetramerous flowers and tuberculate seeds but differs in broad wings and long hairs on the petals, oblique and introrse anthers, included stigma, bearded hypogynous glands and larger fruiting calyx.

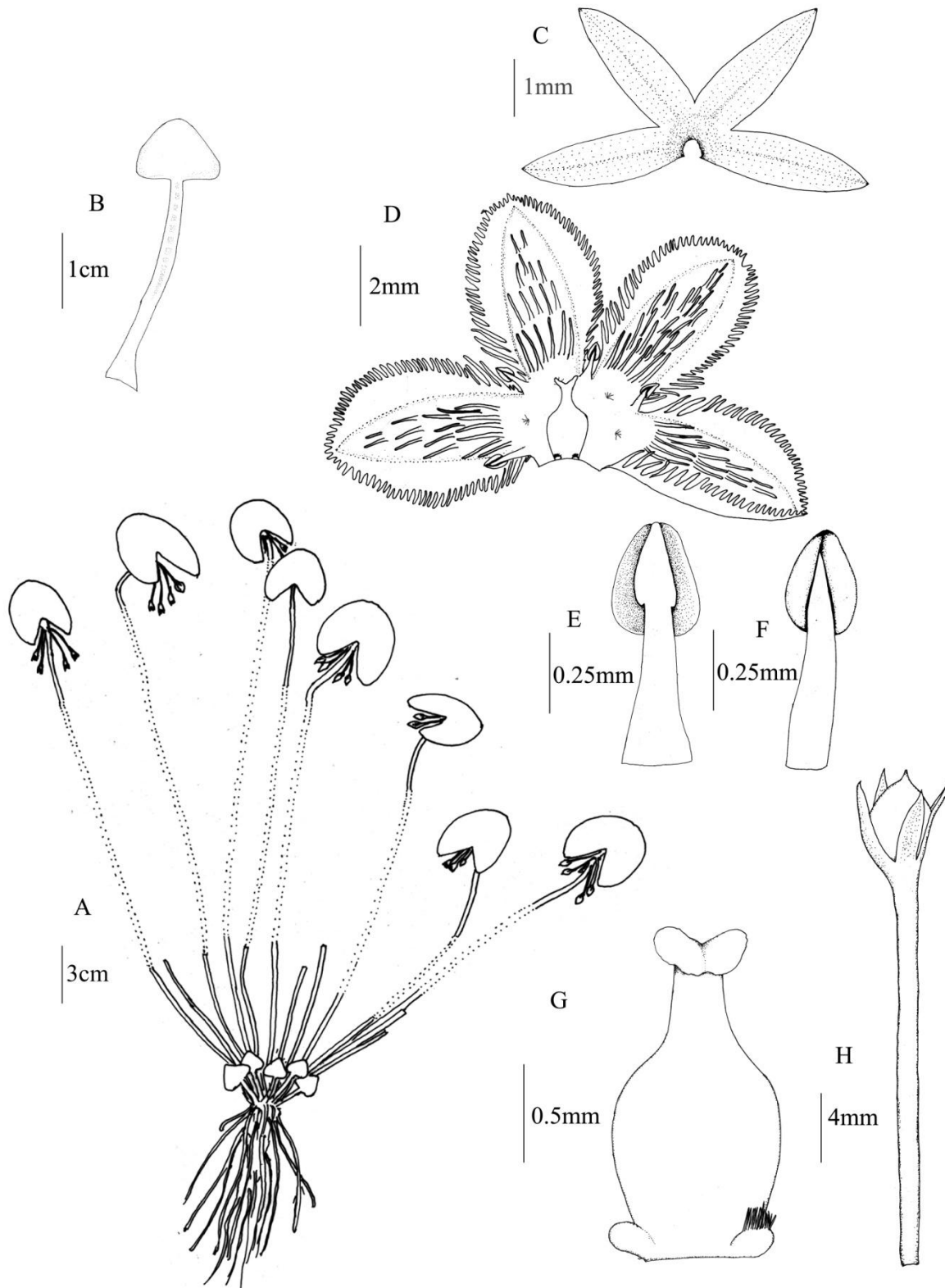
**Introduction:-**

*Nymphoides* Séguier. is the largest genus of the family Menyanthaceae with 40 species (Li et al. 2002) distributed in the tropical and temperate regions of the world. The genus is represented by eight species in India (Sivarajan et al.1993, Gupta et al. 2000). The *Nymphoides* resembles with Nymphaeaceae members in the floating leaves, but easily distinguished from the later using floral characters. In India, the genus *Nymphoides* Séguier. is represented by both dioecious species and bisexual species. The dioecious species are very rare, they are *Nymphoides krishnakeasra* Joseph & Sivar. and *Nymphoides macrospermum* Vasudevan. The bisexual species are *Nymphoides aurantiaca* (Dalz.) Kuntze., *Nymphoides hydrophylla* (Lour.) kuntze., *Nymphoides indica* (L.) Kuntze., *Nymphoides parvifolia* Kuntze., *Nymphoides sivarajanii* Joseph. and *Nymphoides peltata* (S. G. Gmel.) Kuntze.

During the study of ponds in the lateritic hillocks Southern Western Ghats, India, the authors collected a different specimen of *Nymphoides*. Detailed study of the specimen showed its novelty. Hence this new specimen is described here as new species.

**Taxonomy:-**

*Nymphoides balakrishnanii* Biju, Josekutty, Haneef & Augustine J. sp. nov. **Type:**—INDIA. Kerala: Kasaragod District, Koovapara lateritic plateau, N 12°00'46.8", E 075°34'06", 190 m, 18 July 2014, Biju & Jomy 2470 (Holotype CAL!, Isotype MH!). Figures 1 & 2.



**Figure 1:-** *Nymphoides balakrishnanii* (A) Habit. (B) Basal leaf. (C) Calyx. (D) Corolla spread out. (E) Stamen ventral view. (F) Stamen dorsal view. (G) Carpel with hypogynous bearded gland. (H) Fruit.



**Figure 2:-** *Nymphoides balakrishnani* (A) Habit. (B) Rhizome. (C) Basal leaf (D) Carpel with hypogynous bearded gland. (E) Fruit.

Freshwater rhizomatous annual; rhizome vertical, cylindrical,  $2-2.4 \times 0.4-0.7$  cm, densely covered by roots. Roots many, thick, spongy, unbranched or rarely branched. Leaves dimorphic; submerged sterile leaves in rosettes. Lamina deltate-ovate,  $8-10 \times 7-8$  mm, glabrous, veins obscure, margins entire, acute-obtuse at apex, truncate at base; petiole spongy, 4-5 cm long, terete, sheathing at the base. Fertile branches many, arise from the axils of sterile leaves, 6-30 cm long, green, length variable with depth of the water, uniphyllous. Fertile leaves  $4.5-5 \times 4.4-4.8$  cm; lamina orbicular-obovate, deeply cordate at base, margins distantly crenate, veins palmately reticulate; petioles short, up to 2-2.2 mm long, base dilated with two triangular membranous wings protecting the flower buds. Flowers in fascicles of 4-10 at the junction of petiole and branches, opening centripetally, bisexual, 9-12 mm across, tetramerous, pedicellate; pedicels 3-9 mm long, greenish, glabrous; bracts membranous triangular; calyx lobes 4, basally fused, linear-lanceolate, green, margins hyaline,  $3-3.5 \times 0.9-1.2$  mm; corolla white, rotate, corolla tube 2-2.2 mm long, throat yellow, corolla lobes 4; lobes  $4-5.5 \times 1.2-1.5$  mm, distinctly winged; wings 0.5-0.75 mm, involute, margins with long whip like glandular hairs; hairs up to 1.4 mm, papillate, corolla lobes dorsally covered by long multicellular glandular hairs, ventral side covered by short unicellular glandular hairs. Stamens 4, arising from the sinus of the corolla lobes, epipetalous, introrse, oriented obliquely downwards so as to touch the stigma; filaments 0.5-0.6 mm long, hyaline, base broad; anther ovoid, bithecous,  $0.3-0.4 \times 0.2-0.25$  mm, black along the dorsal side, yellow on the ventral side; connective broad, conical, projects above the anther lobes; pollen grains yellow; clusters of glandular hairs alternates with the stamens, 3-6 hairs in each cluster, hair up to 0.4 mm long. Carpels bottle shaped; ovary obovoid, green, glabrous,  $1-1.2 \times 0.8-1$  mm, unilocular with parietal placentation; style terminal, 0.4-0.6 long; stigma bipartite, lobes flattened, semicircular, covered by glandular hairs, included, yellow. Fruit, oblong-obovoid,  $4-5 \times 2-2.5$  mm, stalk 2.2 cm, style persistent; fruiting calyx equal or exceeds the fruit. Seeds brownish black, 1-1.2 mm across, tuberculate; tubercles in clusters, faveolate.

### Diagnosis:-

*Nymphoides balakrishnanii* is allied to *Nymphoides parvifolia* in the habit, tetramerous flowers and tuberculate seeds but differs in broad wings and long hairs on the petals, oblique and introrse anthers, included stigma, bearded hypogynous glands and larger fruiting calyx.

### Etymology:-

The new species is named to honor Mr. V. C. Balakrishnan, a dedicated conservation biologist in Northern Kerala.

### Similar species:-

The *Nymphoides balakrishnanii* is similar to *Nymphoides parvifolia* in the tetramerous flowers and tuberculate, but differs in many characters. Table 1.

**Table 1:-** Comparison of characters of *Nymphoides parvifolia* and *Nymphoides balakrishnanii*.

Characters	<i>Nymphoides parvifolia</i>	<i>Nymphoides balakrishnanii</i>
Rhizome	Obconical	Cylindrical
Sterile leaves	Ovate-rhomboid	Deltate-ovate
Fertile leaves	Ovate-orbicular, $4-4.5 \times 3-3.5$ cm, green with pinkish tinge, petiole 2-4 mm long	Obovate-orbicular, $4.5-5 \times 4.4-4.8$ cm, green, petiole 2-2.2 mm long.
Flower	Small, 5-6 mm in diameter	Larger, 9-12 mm in diameter
Calyx	Calyx lobes $2 \times 1$ mm, pinkish at the apex	Calyx lobes $5 \times 1$ mm, greenish at the apex
Corolla	Margins fimbriately toothed towards the apex, wings absent, a ring of hairs present at the throat, ventral side glabrous.	Broadly winged with long papillate hairs along the margin, long hairs present all along dorsal side, Short glandular hairs present on the lower side.
Stamen	Vertically oriented, filaments long, anther cream-yellow	Obliquely oriented, filaments short, anther yellow-black
Carpel	Stigma projects above the corolla tube, hypogynous glands not bearded	Stigma included in the corolla tube, hypogynous glands bearded.
Capsule	Capsule project much beyond the fruiting calyx	Capsule equal or slightly shorter than the fruiting calyx.

**Distribution:-**

The new species is restricted to a seasonal pond in the lateritic hillocks of Koovapara, Kasaragod, Kerala, India.

**Conservation status:-**

The new species shows small populations in the seasonal pond at the type locality. The local people use the seasonal pond as a water source. The uncontrolled human interactions is a threat to the existence of this endemic species.

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