NORDIC JOURNAL OF
BOTANY

Research Article

Ophiorrhiza echinata, a new species of Rubiaceae from the southern Western Ghats, India

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Nordic Journal of Botany
2025: e04979
doi: 10.1002/njb.04979
Subject Editor: Ranee Prakash
Editor-in-Chief: Torbjörn Tyler
Accepted 17 August 2025
Published 18 September 2025

A new species of the genus *Ophiorrhiza* (Rubiaceae) is described and illustrated from the Idukki District of Kerala, Western Ghats, India. The new species is allied to *Ophiorrhiza caudata* C.E.C.Fisch. and *Ophiorrhiza munnarensis* C.E.C.Fisch, but differs in having echinate young stem, leaf lateral nerve pairs 8–14, triangular, caducous stipules, 14.0–23.0 mm long homostylous flowers, dissimilar bract and bracteole without midrib, ovate calyx lobes, stamens adnate to the base of corolla tube, 4.5–5.0 mm long filaments, oblong stigma, and oblate seed. A detailed description, colour photographs, comparison, phenology, distribution, conservation status, and key to allied taxa are provided.

Keywords: Idukki, new species, *Ophiorrhiza,* Western Ghats

Introduction

The genus *Ophiorrhiza* belongs to the tribe *Ophiorrhizeae* in Rubiaceae (Bremer and Manen 2000, Bremer and Eriksson 2009). The genus comprises of 378 species in the world, distributed primarily from the Tropical and Subtropical Asia to the Pacific (POWO 2025). The genus was first described by Linnaeus in Flora Zeylanica and includes herbaceous members (Linnaeus 1747). Hooker (1880) reported 31 species and 10 varieties in Flora of British India and 47 species and 9 varieties were reported from the Indian subcontinent by Deb and Mondel (1997). However, recent research by Hareesh et al. (2017) documented 52 taxa in India, which are mainly distributed in north-eastern states and Western Ghats. 21 taxa and 7 varieties belonging to this genus are distributed in the Western Ghats (Deb and Mondal 1997, Nayar et al. 2014, Balan et al. 2020, Hareesh et al. 2015, 2018, Nair et al. 2022, Nair 2023).

As part of the botanical collection conducted at Devikulam in Idukki district, Kerala, the authors came across an interesting specimen of *Ophiorrhiza* which was morphologically similar to *O. caudata* C.E.C.Fisch. and *O. munnarensis* C.E.C.Fisch. After detailed taxonomic examination of this specimen and consultation with nomenclatural types and protologues of the allied species, as well as relevant literature (Deb

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and Mondal 1997, Joseph and Joseph 2009, Nair 2023), the collected specimen was revealed to belong to a hitherto undescribed species which is described here as new to science.

Material and methods

Specimens of the new species were collected during 2024–2025 from Devikulam, Idukki district, Kerala. The morphological characters of the collected specimens were analysed and the descriptions were prepared based on the live collections and standard terminologies (Beentje 2016). Photographs of the specimens were taken using Nikon D500 DSLR camera and the microphotographs were captured using Cooling Tech digital microscope. Voucher specimens were prepared based on Forman and Bridson (1991) and were deposited in CALI, DSAH and STC. The conservation status of the new species was assessed using the standard IUCN categories and criteria (IUCN Standards and Petitions Committee 2024).

Taxonomic treatment

Ophiorrhiza echinata Ebin, Sreehari & Joby sp. nov. (Fig. 1)

Diagnosis

A species morphologically similar to *O. munnarensis* C.E.C.Fisch., but differing in being 30–142 cm heigh (versus 5–16 cm), and having echinate young stem (versus brown-pubescent), leaf lateral nerve pairs 8–14 (versus 6–8), triangular, caducous stipules (versus ensiform, persistent), 14.0–23.0 mm long lilac flowers (versus 8.5–10.5 mm long white to pink), dissimilar bract and bracteole without midrib (versus similar with prominent midrib), ovate calyx lobe (versus triangular), stamens adnate to the base of corolla tube (versus adnate to middle of corolla tube), 4.5–5.0 mm long filaments (versus 2.00–2.25 mm long), oblong stigma (versus linear), and oblate seed (versus irregularly angled).

It also resembles *O. caudata* C.E.C.Fisch., but differs in having echinate young stem (versus glabrous), ovate-lanceolate leaves with 8–14 pairs of lateral nerves (versus elliptic-lanceolate with 7–9 pairs of lateral nerves), triangular, caducous stipules without midrib (versus ovate-lanceolate, persistent, with prominent midrib), homostylous, 14.0–23.0 mm long, lilac flowers (versus heterostylous, 9.0–13.3 mm long, white to pink), dissimilar bract and bracteole without midrib (versus similar with prominent midrib), ovate calyx lobes (versus broadly ensiform), stamens adnate to base of corolla tube with 4.5–5.0 mm long filaments (versus adnate a little below the middle of the corolla tube with 0.30–0.35 mm or 3.3–3.4 mm long filaments), oblong stigma (versus rounded or lanceolate), and oblate seeds (versus irregularly angled).

Type: India, Kerala: Idukki district, ecotone region between grass land and evergreen forest near Devikulam, 10°04′18″N, 77°05′42″E, 1630 m, a.s.l., 21 Sept. 2024, Ebin & Sreehari 2821 (holotype: MH; isotypes: CALI, DSAH, STC).

Etymology

The specific epithet 'echinata', refers to the echinate hairs on the young stem.

Description

Herb, 30–142 cm heigh, erect; stem branched, terete, echinate when young and glabrous on maturity, dark red; internodes 1.1–8.6 cm long. Stipules caducous, 3.0–5.0 × 1.5–2.0 mm, triangular, entire, without midrib, puberulent, echinate at the base inside, pale green. Petiole 0.8–2.6 cm long, glabrous, pale green. Lamina 3.8–14.4 × 1.4–3.9 cm, ovate–lanceolate, attenuate at apex, attenuate–obtuse at base, glabrous, dark green above and pale green below; with entire margin, puberulent. Lateral nerves 8–14 pairs, extending to the margin. Inflorescence an axillary or terminal capitate cyme, 4.0–4.4 cm wide, glabrous. Peduncle 4.3–7.3 cm, thick, terete, glabrous. Bracts 8.0–10.0 × 3.0–4.0 mm, lanceolate, acute at apex, without midrib, pale green, glabrous. Bracteoles 4.0–7.0 × 1.0–1.5 mm, falcate, acute at apex, without midrib, pale green, glabrous. Pedicels 2.0–3.0 mm long, glabrous, pale green. Flowers homostylous, 14.0–23.0 mm long, lilac. Hypanthium 1.1–1.3 × 1.1–1.2 mm, cupuliform, glabrous, pale green. Calyx lobes 1.0–2.0 mm long, ovate, acute at apex, without keel, glabrous, pale green with lilac tinge. Corolla tube 10.0–14.0 mm long, infundibuliform, with villous hairs (1.0 mm long) at just above the base within the insertion of filaments inside the corolla tube, and glabrous outside. Corolla lobes 2.0–3.0 mm, ovate, acute at apex, glabrous. Stamens inserted, adnate to the base of the corolla tube; filaments 4.5–5.0 mm, slender, glabrous; anther 1.2–1.5 mm, inserted, linear, pale yellow. Stigma bilobed, 1.25–1.30 mm long, oblong, glabrous; style 2.00–2.25 mm long, slender, glabrous; ovary 1.8–2.0 × 1.4–1.5 mm, obovoid, glabrous; disc 0.9–1.0 mm wide. Capsule bilocular, 4.0–5.0 × 8.0–9.0 mm, glabrous; locules ovate. Seeds 0.50–0.75 mm, oblate, ornamented, sepia.

Phenology

Flowering and fruiting in August–December.

Distribution and ecology

Ophiorrhiza echinata is currently known only from the type locality, Devilukam, Kerala, India. The species is growing in the ecotone region between evergreen forest and grassland vegetation at an elevation of 1630 m a.s.l. Only a few populations have been observed in the type locality. This species is found associated with *Hedyotis leschenaultiana* Wight & Arn., *Impatiens maculata* Wight, *Ligustrum robustum* subsp. *perrottetii* (A.DC.) de Juana, *Osbeckia parvifolia* Arn. Pogostemon, *Ficus guttata* (Wight) Wight ex King, *Strobilanthes kunthiana* (Nees) T.Anderson ex Benth., *Sphaeropteris crinita* (Hook.) R.M.Tryon., and *Hypericum wightianum* Wall. ex Wight & Arn.

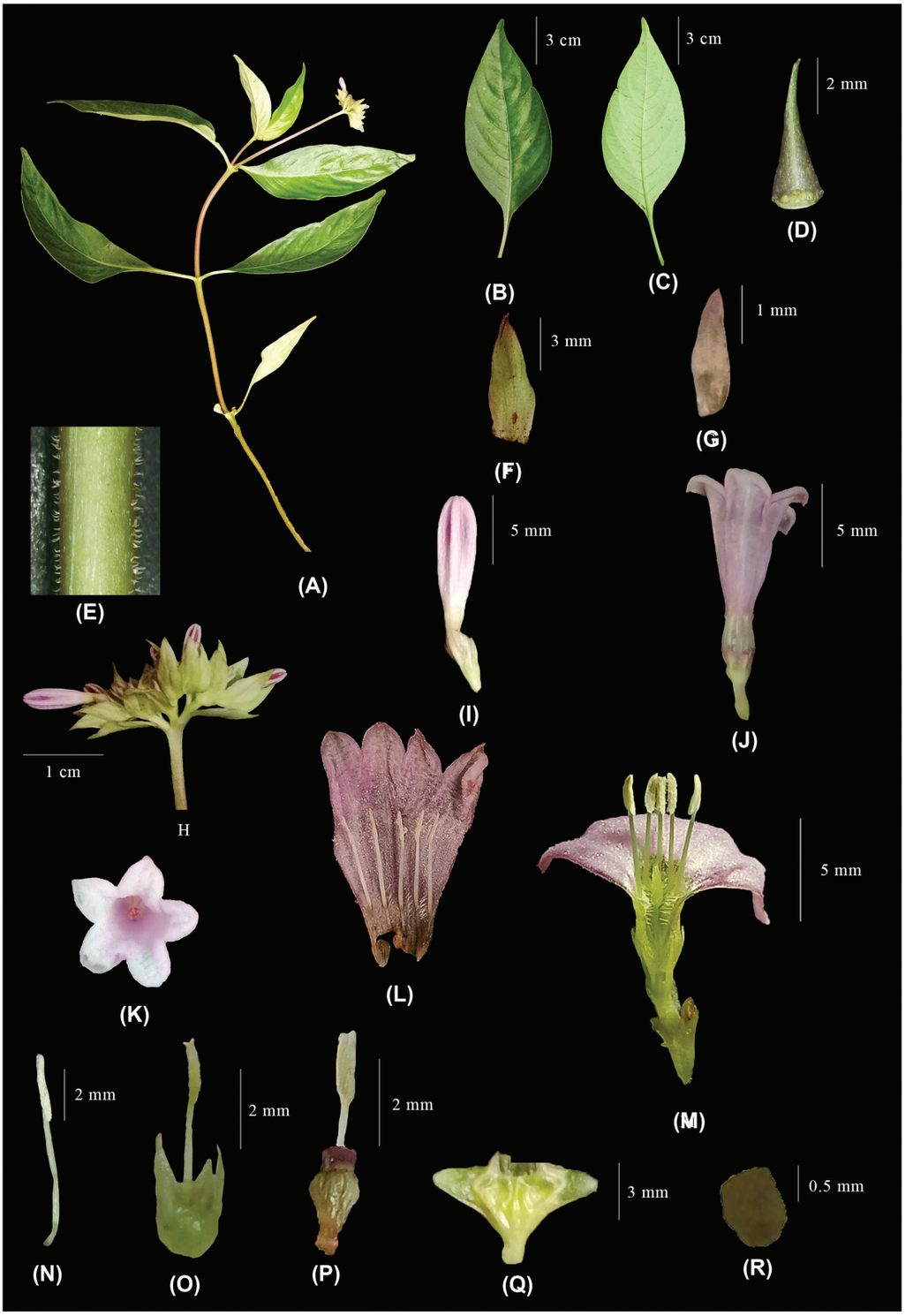


Figure 1. *Ophiorrhiza echinata* Ebin, Sreehari & Joby sp. nov. (A) Habit, (B) adaxial side of leaf, (C) abaxial side of leaf, (D) stipule, (E) young stem, (F) bract, (G) bracteole, (H) inflorescence, (I) flower bud, (J) flower, (K) corolla lobes, (L) corolla tube showing adnation of stamens, (M) flower L.S., (N) stamen, (O) hypanthium with gynoecium, (P) gynoecium, (Q) fruit, (R) seed.

Conservation status

Ophiorrhiza echinata has so far only been collected from the type locality. The area of occupancy is estimated to be less than 4 km^2 and the known populations contain a maximum of 35 plants. This species is currently assigned as 'Data Deficient' (IUCN Standards and Petitions Committee 2024). Further studies and more surveys have to be conducted for this species. The ex situ planting strategy of the species was successful.

Similar species

Ophiorrhiza echinata is similar to *O. munnarensis* and *O. caudata* in its herbaceous erect habit, glabrous leaves, glabrous bracteole, acute bracteole apex, hypanthium 0.90–1.30 × 0.90–1.60 mm, glabrous calyx lobes, infundibuliform corolla, glabrous stamen, slender filaments and 1.2–1.5 mm long anther. But the new species differs from the latter by several morphological characters. The morphological comparison of the three species is summarized in Table 1.

Specimen examined

O. caudata: India, Kerala: Travancore High Range, Kalaar, May 1937, E. Barnes 1560 (K, K0000174141, digital image); same locality, May 1937, E. Barnes 1520 (K, K005222746, digital image); same locality, May 1937, E. Barnes 1599 (K, K005222747, digital image); Kallar, 15 Nov. 2008, Jinu Joseph 86952 (CALI). *O. echinata*: India, Kerala: Idukki Dist., ecotone region between grass land and evergreen forest near Devikulam, 4 Oct. 2024, Ebin & Sreehari 2830 (paratype: DSAH). *O. munnarensis*: India, Kerala: Munnar ghat Road, Travancore high range, Sept. 1935, E. Barnes 2005 (K, K000031235, digital image); Perambikulam Hills, Cochin, Dec. 1934, E. Barnes 2004 (K, K005222754, digital image).

Conclusion

This study describes *Ophiorrhiza echinata*, a new endemic species from the Idukki District of Kerala in the southern Western Ghats, along with its ecological context and taxonomic significance. As a narrowly distributed taxon restricted to the montane evergreen forests, *O. echinata* adds to the growing number of endemic Rubiaceae in the region and draws attention to the ecological uniqueness of its habitat. The species' limited distribution and specialized habitat preference underscore the vulnerability of such forest ecosystems to anthropogenic pressures. This discovery underscores the importance of ongoing field-based botanical research in the Western Ghats and the urgent need for conservation measures to safeguard its floristic diversity. The present work contributes to the taxonomy of the genus *Ophiorrhiza* and reinforces the critical role of systematic documentation in revealing and preserving India's botanical heritage.

Table 1. Morphological comparison of *O. echinata* sp. nov. with *O. munnarensis* and *O. caudata*.

Character	*O. echinata*	*O. munnarensis*	*O. caudata*
Plant height	30–142 cm	5–16 cm	38–75 cm
Young stem indumentum	echinate	brown pubescent	glabrous
Leaf	3.8–14.4 × 1.4–3.9 cm, ovate-lanceolate, apex attenuate, base attenuate-obtuse, glabrous, lateral nerve pairs 8–14; petiole 0.8–2.6 cm long, glabrous	2.50–6.50 × 1.00–4.00 cm, elliptic-lanceolate, apex acute to caudate-acuminate, base tapering or shortly decurrent, scabrid, nerve pairs 6–8; petiole 0.30–1.40 cm long, puberulous	5.0–12.0 × 1.5–3.5 cm, elliptic-lanceolate, apex caudate-acuminate, base acuminate, glabrous, lateral nerve pairs 7–9; petiole 0.5–1.5 cm long, glabrous
Stipule	triangular, caducous, midrib absent	ensiform, persistent, midrib absent	ovate-lanceolate, persistent, midrib prominent
Inflorescence	4.0–4.4 cm wide, peduncle 4.3–7.3 cm long	1.0–1.5 cm wide, peduncle 2.5–3.7 cm long	1.0–2.0 cm wide, peduncle 3.0–4.5 cm
Flower	homostylous, 14.0–23.0 mm long, lilac	homostylous, 8.5–10.5 mm long, white to pink	heterostylous, 9.0–13.3 mm long, white to pink
Bract and Bracteole	dissimilar, bract 8.0–10.0 mm long, lanceolate, midrib absent, bracteole 4.0–7.0 mm long, falcate, midrib absent	similar, 5.0–8.0 mm long, linear-lanceolate, midrib prominent	similar, 5.5–9.5 mm long, lanceolate to ovate-lanceolate, midrib prominent
Pedicel	2.0–3.0 mm long	0.75–1.00 mm long	1.0–1.5 mm long
Calyx lobe	1.0–2.0 mm long, ovate	0.75–1.60 mm long, triangular	0.75–1.10 mm long, ovate-lanceolate
Corolla tube	10.0–14.0 mm long	7.50–9.25 mm long	8.0–12.0 mm long
Stamen	adnated to base of corolla tube, filaments 4.5–5.0 mm long	adnated to middle of corolla tube, filaments 2.00–2.25 mm long	adnated a little below the middle of the corolla tube, filaments 0.30–0.35 mm or 3.3–3.4 mm long
Ovary	1.8–2.0 × 1.4–1.5 mm	0.8–1.0 × 0.8–0.9 mm	0.75–1.00 × 0.40–0.60 mm
Stigma	1.25–1.30 mm long, oblong	1.50–1.75 mm long, linear	1.12–2.10 mm long, rounded or lanceolate
Capsule	4.0–5.0 × 8.0–9.0 mm	1.5–1.6 × 4.0–4.2 mm	3.20–3.40 × 6.45–7.70 mm
Seed	0.50–0.75 × 0.41–0.55 mm, oblate	0.30–0.40 × 0.30–0.35 mm, irregularly angled	0.43–0.46 × 0.30–0.32 mm, irregularly angled

Key to the similar species

1. Flowers heterostylous……..2
– Flowers homostylous……..4
2. Petiole 0.5–1.5 cm long; inflorescence 1.0–2.5 cm wide; calyx lobes ovate-lanceolate; corolla tube 7.00–8.75 mm long……...3
– Petiole 1.5–3.0 cm long; inflorescence 3.00–5.75 cm wide; calyx lobes subulate; corolla tube 9.5–15.0 mm long……..……..*O. pectinata*
3. Stem and petiole glabrous; stipule ovate-lanceolate and persistent; peduncle 3.0–4.5 cm long; pedicel 1.0–1.5 mm long; stigma rounded or lanceolate; capsule 3.20–3.40 × 6.45–7.70 mm……*O. caudata*
– Stem and petiole brown-pubescent; stipule subulate and caducous; peduncle 2.0–3.0 cm long; pedicel 0.5–1.0 mm long; stigma linear; capsule 2.00–2.50 × 4.50–6.25 mm……..……*O. incarnata*
4. Stipule ensiform and persistent; bract and bracteole similar; flowers 8.5–10.5 mm long; stamens adnate to the middle of corolla tube, filaments 2.00–2.25 mm long; capsule 1.5–1.6 × 4.0–4.2 mm……*O. munnarensis*
– Stipule triangular and caducous; bract and bracteole dissimilar; flowers 14.0–23.0 mm long; stamens adnate to the base of corolla tube, filaments 4.5–5.0 mm long; capsule 4.0–5.0 × 8.0–9.0 mm……*O. echinata*

Acknowledgements – Ebin Padiyara Joy sincerely acknowledges the support extended by the Management of Sacred Heart College (Autonomous), Thevara. Sreehari Sivan Nair is thankful to the Management of St. Teresa's College (Autonomous), Ernakulam, the Department of Botany, and the Curator of DSAH for their valuable assistance. Joby Paul gratefully recognizes the institutional support provided by the STC Herbarium and the Department of Botany, St. Thomas College (Autonomous), Thrissur.

Author contributions

Ebin Padiyara Joy: Conceptualization (lead); Data curation (lead); Formal analysis (equal); Investigation (equal); Methodology (equal); Resources (equal); Software (equal); Visualization (equal); Writing – original draft (equal); Writing – review and editing (equal). **Sreehari Sivan Nair**: Conceptualization (equal); Data curation (equal); Formal analysis (equal); Investigation (equal); Methodology (equal); Resources (equal); Software (equal); Visualization (equal); Writing – original draft (equal); Writing – review and editing (equal). **Joby Paul**: Conceptualization (equal); Data curation (equal); Investigation (supporting); Methodology (supporting); Resources (supporting); Software (supporting); Supervision (lead); Validation (lead); Visualization (supporting); Writing – original draft (supporting); Writing – review and editing (lead).

Data availability statement

This article has no additional data.

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