

ERIOCAULON MEENACHILENSE, A NEW TUBEROUS SPECIES OF ERIOCAULACEAE FROM THE SOUTHERN WESTERN GHATS, INDIA

P. B. Anoop^{1,2*} & A. J. Robi¹

Eriocaulon meenachilense, a new species of the family Eriocaulaceae from the southern Western Ghats, India, is described and illustrated. The new species is similar to *Eriocaulon idukkianum* and *E. tuberiferum* but differs in its short, linear-subulate, stiff leaves, solitary 6-angled peduncle, inflexed involucre bracts, eglandular petals, and yellow anthers and seeds.

Keywords. *Eriocaulon*, India, Kerala, new species, pipewort, root tuber, Western Ghats.

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Introduction

Eriocaulaceae, the pipewort family, is distributed mainly in tropical and warm temperate regions and comprises approximately 1400 species across about 10 genera (Giulietti et al., 2012). Members of this family are often difficult to identify in the field because there are few diagnostic vegetative characters and the floral parts are minute. *Eriocaulon* L. is represented by approximately 400 species worldwide, with centres of diversity in South America, Africa and the Indian subcontinent (Leach, 2017).

Eriocaulon is the sole representative of the family in India. Ansari & Balakrishnan (2009) recognised 80 species from the country, of which 54 are endemic, with the greatest concentration in Peninsular India. Ansari & Balakrishnan's list omitted species described earlier by Bole & Almeida (1986) and Yadav et al. (2008) and species recorded by Myrthong et al. (1983). Several new species have been described from India since publication of the list (Shimpale et al., 2009; Shimpale & Yadav, 2010; Vivek et al., 2010; Nampy et al., 2011; Biju et al., 2012; Swapna et al., 2012; Sunil et al., 2013; Rashmi & Krishnakumar, 2014; Sunil et al., 2014; Manudev et al., 2015; Sunil & Naveen Kumar, 2015; Anto & Reshma, 2017; Biju et al., 2017; Darshetkar et al., 2017; Manudev et al., 2017; Naveen Kumar et al., 2017; Paithane et al., 2017; Sunil et al., 2017; Chandore et al., 2019; Darshetkar et al., 2019; Khanna & Kumar, 2019; Francis et al., 2020), and in India the genus is currently represented by 109 species, including the species newly described here.

During the course of a recent botanical exploration of the Illikkal Hills in the southern Western Ghats of India, an interesting specimen of *Eriocaulon* with root tubers was collected. In Indian *Eriocaulon*, the presence of a subterranean tuber was previously known only in *E. idukkianum* Manudev, Robi & Nampy and *E. tuberiferum* A.R.Kulk. & Desai, both of

¹ Department of Botany, Bishop Abraham Memorial College, Thuruthicad, Pathanamthitta, Kerala, India.

² KSCSTE–Malabar Botanical Garden and Institute for Plant Sciences, P.B. No. 1, Kozhikode, Kerala, India.

* Corresponding author. E-mail: anooppb01@gmail.com.

which are endemic to the Western Ghats of India. On critical examination of the specimens and comparison with the protologues of related species, the plant is found to be distinct from both the tuberous taxa and other members of the genus, and it is described and illustrated here as a new species.

Species description

Eriocaulon meenachilense Anoop & Robi, sp. nov.

Eriocaulon meenachilense resembles *E. tuberiferum* A.R.Kulk. & Desai in its root tubers, short, linear leaves and free female sepals. However, the new taxon differs in its solitary, 6-angled peduncle, short sheath, white inflorescences, inflexed involucre bracts, free male sepals, eglandular petals, yellow anthers and unappendaged yellow seeds. It also similar to *Eriocaulon idukkianum* Manudev, Robi & Nampy, another tuberous species from the Western Ghats that has linear leaves, white inflorescences, male flowers with free sepals and unappendaged seeds, but differs from that species in the absence of a root stock, its hairy, not glabrous root tubers, its solitary, 6-angled peduncle, and its glabrous receptacle, eglandular petals and yellow anthers and seeds. – Type: India, Kerala, Kottayam District, Meenachil, Illikkal Hills, c.1000 m a.s.l., 7 x 2019, Anoop. P. B. & A. J. Robi 15934 (holotype MH!, isotype BAM!, MBGH!). Figures 1, 2.

Acaulescent herb. Rootstock absent; root tubers 2 or 3, subglobose, 5–6 × 4–5 mm, villous, cream-coloured. Leaves rosulate, linear-subulate, stiff, 2.5–3.5 × 0.1–0.2 cm, glabrous, 3- or 4-nerved, nervules inconspicuous. Peduncle solitary, 12–20 cm high, 0.4–0.5 mm across, 6-angled, twisted, glabrous; sheaths 2–3 cm long, glabrous, striate; limb 1.5–2.5 mm long, incised. Inflorescence hemispherical, 5–6 × 4–5 mm, white. Receptacle convex, glabrous. Involucre bracts inflexed, obovate, acute at apex, 1.2–1.5 × 0.8–1 mm, black-hyaline, entire, chartaceous, glabrous. Floral bracts oblanceolate, acuminate, 1.2–1.5 × 0.6–0.8 mm, black, hoary towards apex. Staminate flowers: pedicels 0.1–0.2 mm long, glabrous; sepals 3, free, broadly oblanceolate, 1–1.2 × 0.3–0.4 mm, hyaline, hoary towards apex; corolla hyaline; stipe of corolla 0.8–1 mm long; lobes 3, subequal, obtuse and hoary towards apex, 0.3–0.4 × 0.1–0.2 mm, eglandular. Stamens 6, exserted; filaments 0.2–0.3 mm, white; anthers subglobose, 0.25 × 0.2 mm, yellow. Pistillate flowers: pedicels 0.1–0.2 mm; sepals 3, free, oblanceolate, 1.3–1.5 × 0.4–0.5 mm, keeled along back, obtuse and hoary towards apex, hyaline. Petals 3, almost equalling sepals, oblanceolate, obtuse and hoary towards apex, 1–1.2 × 0.2–0.3 mm, eglandular. Ovary sessile, ovoid, trigonous, 0.3–0.4 × 0.2–0.3 mm; style 0.2–0.3 mm; stigmas 3, 0.8–1 mm long. Seeds obovoid-ellipsoid, 0.3–0.4 × 0.2–0.3 mm, golden yellow; cells of seed coat transversely elongated, aligned in vertical rows; appendages absent.

Distribution. *Eriocaulon meenachilense* is known only from the type locality, the Illikkal Hills in the southern Western Ghats, India (Figure 3).

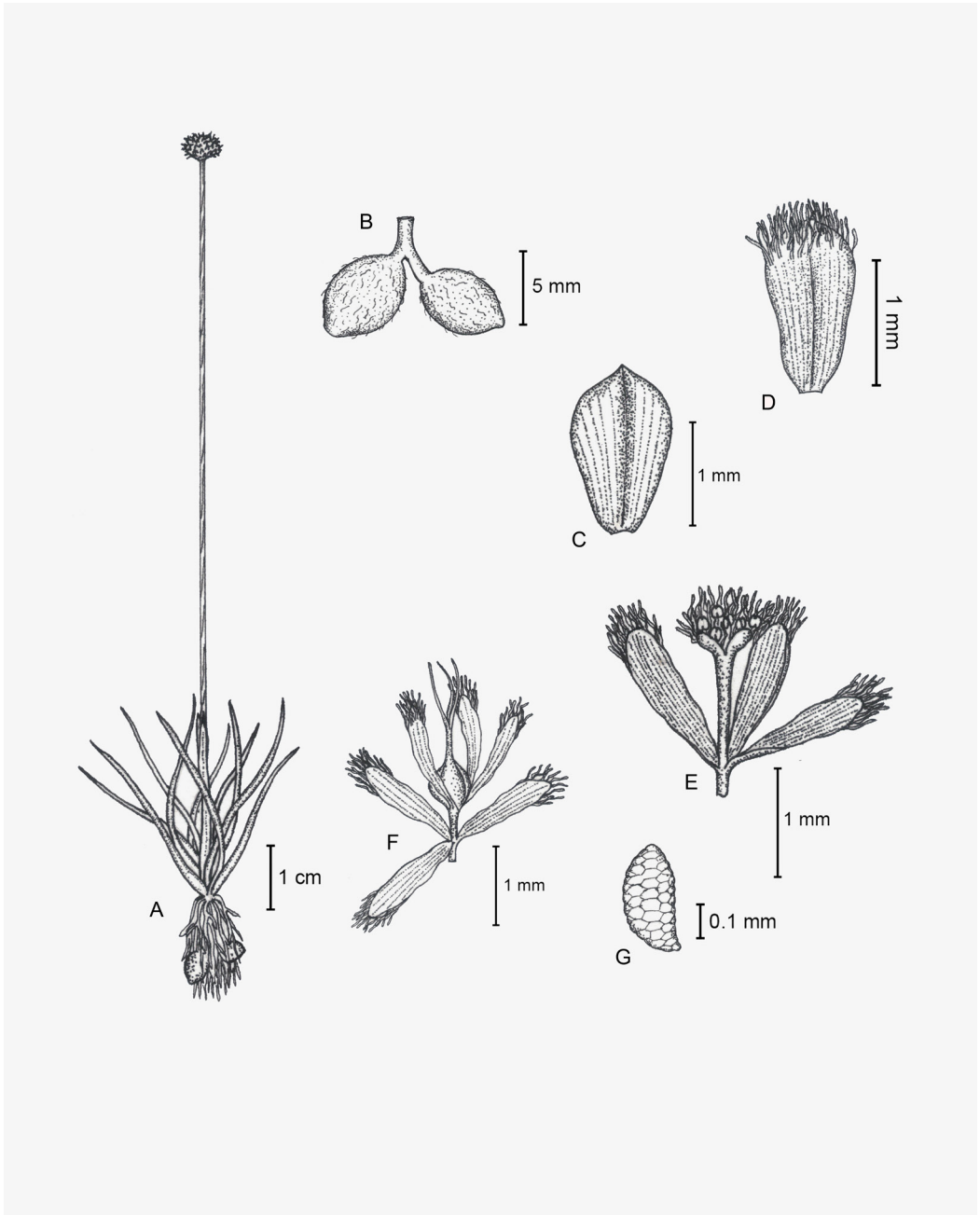


Figure 1. *Eriocaulon meenachilense* Anoop & Robi, sp. nov. A, Habit; B, root tubers; C, involucral bract; D, floral bract; E, male flower; F, female flower; G, seed. Drawn from the holotype, Anoop. P. B. & A. J. Robi 15934 (MH), by P. B. Anoop.



Figure 2. *Eriocaulon meenachilense* Anoop & Robi, sp. nov. A, Habit; B, root tubers; C, sheath; D, twisted peduncle; E, head (side view); F, head (lower view); G, involucral bract; H, floral bract; I, male flower; J, male sepal; K, anther; L, female flower; M, female sepal; N, female petal; O, light and scanning electron microscopic images of seed. All from Anoop. P. B. & A. J. Robi 15934.

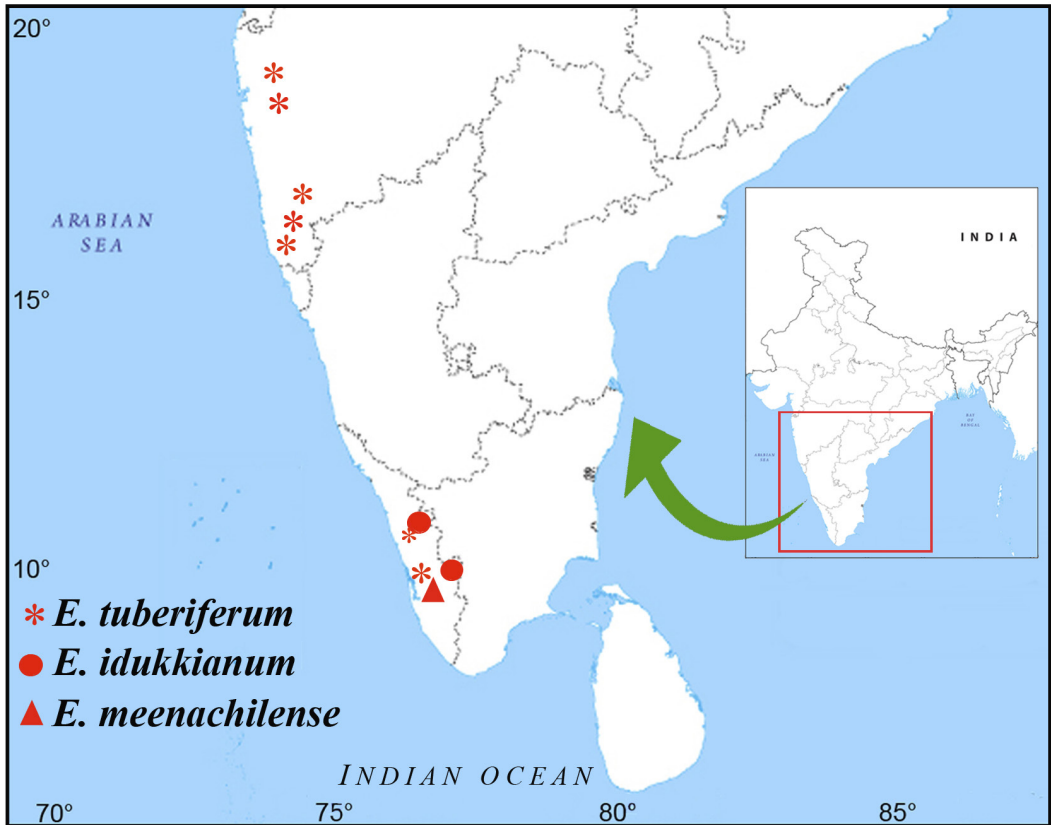


Figure 3. Map showing distribution of *Eriocaulon idukkianum*, *E. meenachilense* and *E. tuberiferum* in India.

Phenology. Flowering and fruiting from August to November.

Etymology. The specific epithet refers to the type locality, Meenachil Taluk in Kottayam District, Kerala, India.

Habitat and ecology. Wet rocky grasslands in association with *Eriocaulon thwaitesii* Körn., *Exacum sessile* L., *Impatiens stolonifera* Robi & Manudev, *Phyllocephalum scabridum* (DC.) K.Kirkman, *Smithia bigemina* Dalzell, etc.

Conservation status. *Eriocaulon meenachilense* is endemic to the southern Western Ghats, India. The authors located 42 plants in four groups within an area of 200 m². More extensive field surveys are required to better understand the true extent of occurrence and area of occupancy of this species. According to IUCN criteria, the species falls under the category Data Deficient (IUCN, 2012; IUCN Standards and Petitions Subcommittee, 2019).

Eriocaulon tuberiferum has so far been reported from the northern Western Ghats in

Maharashtra State and southern Western Ghats in Kerala State (Sunil *et al.*, 2018). The species is usually seen in the margins of puddles and open wet rocky slopes at 900–2100 m elevation. *Eriocaulon idukkianum* is confined to the southern Western Ghats in Kerala State and generally found at 2000–2300 m elevation in marshes near streams and rock crevices, in association with mosses. The major characters differentiating *Eriocaulon meenachilense* from the two other Indian tuberous species are listed in the Table.

Table. Comparison of the diagnostic morphological characters of *Eriocaulon meenachilense* sp. nov., *E. idukkianum* and *E. tuberiferum*

Character	<i>E. meenachilense</i>	<i>E. idukkianum</i>	<i>E. tuberiferum</i>
Rootstock	Absent	Present	Absent
Root tubers	2 or 3, hairy	Single, glabrous	2–15, hairy
Leaves	Linear-subulate, up to 3.5 cm long, 0.2 cm broad	Linear-oblong, up to 7 cm long, 0.4 cm broad	Linear-lanceolate, up to 5 cm long, 0.5 cm broad
Peduncle	Solitary, 6-angled, up to 20 cm long	1–9, 4-angled, up to 26 cm long	1–3, 4-angled, up to 10 cm long
Sheath	Up to 3 cm long	Up to 6 cm long	Up to 6 cm long
Heads	About 6 mm across, white	About 10 mm across, white	About 9 mm across, black or grey
Receptacle	Glabrous	Pilose	Glabrous
Involucral bracts	Inflexed, up to 1.5 mm long	Reflexed, up to 3.5 mm long	Reflexed, 2.5 mm long
Male sepals	Free	Free	Spathaceously fused except at the extreme tip
Male and female petals	Eglandular	With black gland	With black gland
Anthers	Yellow	White	White
Seeds	Yellow, appendages absent	Brown, appendages absent	Purple, cells of seed coat transversely elongated with ribbon-like bands

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