

Three new species of *Plectranthus* L'Hér. (Lamiaceae) from south Western Ghats, India

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Abstract

Three new species of *Plectranthus* (Lamiaceae) from south Western Ghats are here recognised for the first time, viz., *Plectranthus petricola* J.Mathew & B.J.Conn, *Plectranthus idukkianus* J.Mathew, Yohannan & B.J.Conn and *Plectranthus saxorum* J.Mathew, Yohannan & B.J.Conn. Taxonomic descriptions, morphological comparisons with allied taxa, and colour images are provided to facilitate easy identification in the field.

Introduction

Plectranthus L'Hér. is a large genus of the Lamiaceae comprising about 300 species of evergreen herbs and subshrubs that are widely distributed in tropical and subtropical regions of Africa, Asia and Australia (Harley et al. 2004). Fourteen species of *Plectranthus* have been recorded from India (Smitha and Sunojkumar 2015), of which 11 species are forest plants. Among those, *P. anamudianus* Smitha & Sunojk., *P. beddomei* Raizada and *P. deccanicus* Briq. are endemic to the south Western Ghats (Sasidharan et al. 2013, Smitha and Sunojkumar 2016).

Botanical exploration of the forests of Kerala, part of south Western Ghats, during 2010–2016, yielded some interesting specimens of the genus *Plectranthus*. Critical analysis of the literature, as well as examination of herbarium specimens, revealed that some of the collected specimens do not match any of the previously described species. These specimens are sufficiently distinct to warrant taxonomic recognition as new species and are here described and illustrated.

Since the herbarium of the *M.S. Swaminathan Research Foundation* (Kalpatta, Wayanad, Kerala, India) has not been formally registered with *Index Herbariorum* (Thiers [continuously updated]), it is here referred to as “MSSRF”.

1. *Plectranthus petricola* J.Mathew & B.J.Conn, **sp. nov.**

Diagnosis: Similar to *Plectranthus glabratus* (Benth.) Alston but differing by its exceptional dwarf growth habit of up to 40 cm in height and spreading (sub prostrate) to 75 cm diameter (compared to subshrubs of *P. glabratus* that are up to 2 m high); cylindrical older stem (versus quadrangular); petioles up to 25 mm long (versus up to 100 mm long); rounded leaf base and obtuse leaf apex (versus cordate leaf base and acute leaf apex); smaller leaves 5–40 mm long, 3–30 mm wide (versus 60–180 mm long, 40–120 mm wide);

inflorescence a simple panicle c. 200 mm long (versus basally branched panicle c. 250 mm long) and with glandular hairs 0.9–1.2 mm long (versus 0.5–0.7 mm).

Type: India: Kerala: Idukki District, 10 km away from Udumbanchola, Chemmannar Hills, alt. 1602 m a.s.l., 20 Feb 2010, *J. Mathew 4417* (holo: TBGT!, iso: MSSRF!)

Dwarf, branched, perennial subprostrate herb, slightly woody basally (bark grey), up to 40 cm tall and spreading (subprostrate) to 75 cm diam. Stem succulent, moderately spreading, cylindrical, c. 15 mm diam.; internodes 10–600 mm long; eglandular hairs 10-celled, up to 2 mm long; stalked glands much shorter. Leaves pleasantly aromatic (when crushed), simple, petiolate; petiole up to 25 mm long and 3 mm diam., fleshy, with divaricated 5–8-celled hairs; lamina broadly ovate, succulent, 5–40 mm long, 3–30 mm wide; base rounded; margin crenate with 10–12 teeth on each side of margin (mature leaves), secondary teeth absent; apex rounded to subacute; abaxial surface silver-green, veins raised 4 or 5 pairs, with dense eglandular hairs c. 0.7 mm long and glandular hairs c. 0.4 mm long; adaxial surface olive-coloured (greenish), mid-vein impressed, with dense eglandular hairs 2 mm long and glandular hairs 0.5 mm long. Inflorescence terminal, upto 200 mm long, simple panicle, side branches cymose; axis slender, round in cross-section, with divaricate 0.8 mm long eglandular hairs and 0.4 mm long glandular hairs; floral internodes 9–15 mm long (hence nodes distant), cymes shortly pedunculate, lax, 4–7-flowered; peduncle 10–20 mm long, hairy; bracts rhombic, 7 mm long, 5 mm wide, abaxial surface pubescent, margin entire, apex acute; prophylls absent; pedicel slender, 4–6 mm long (not enlarged in fruit), pubescent. Calyx deep purple, campanulate, c. 3–4 mm long, c. 2–3 mm diam. (enlarged in fruit: 5–7 mm long, 3–4 mm diam.), with scattered hairs; tube 10-nerved, pubescent on nerves; abaxial (anterior) lobes narrowly ovate, 1.7–2 mm long; lateral lobes triangular, c. 1.5 mm long; adaxial (posterior) lobe broadly ovate, 1.8–2 mm long. Corolla 10–11 mm long, c. 5 mm diam., pale purple, pubescent; tube 5–6 mm long, sigmoid below middle, gradually dilated towards base, widely expanded at throat, inner surface glabrous; abaxial (anterior) lip pale purple, ovate, boat-shaped, 5 mm long, concave, simple hairs present on adaxial surface, with sessile glands on abaxial surface; adaxial (posterior) lip 4-lobed, lobes rounded at apex, pubescent, median lobes (3 mm long, 2 mm wide) larger than lateral lobes (2 mm long, 1 mm wide). Stamens 4, adaxial pair attached just below abaxial pair but not united; filaments included in abaxial (anterior) corolla lip, filaments of abaxial pair 5 mm long, those of adaxial pair 4 mm long; appendages absent; anthers bilobed, dorsifixed, c. 1 mm long, yellowish, longitudinally dehiscent. Style filiform, with stigmatic lobes pointed and pressed together. Mericarps suborbicular, c. 1 mm long, c. 1 mm diam., glossy brownish, with surface smooth. **Figs 1, 2.**

Phenology: Flowering and fruiting recorded in February.

Etymology: The specific epithet (*viz. petricola*) refers to the rocky habitat amongst which this species grows.

Additional specimen examined: INDIA: KERALA: Idukki District, Chemmannar, Senapathi Road, 11 km away from Udumbanchola, alt. 1604 m a.s.l., 20 Feb 2011, *J. Mathew 4419 & 4421* (TBGT!).

Distribution, habitat and ecology: *Plectranthus petricola* grows amongst rocks in grass-dominated dry deciduous forests of the Chemmannar Hills of southern Western Ghats at an altitude of about 1600 m above sea level. Common associates include *Smithia conferta* Smith, *Osbeckia parvifolia* Arn., *Chlorophytum indicum* (Willd. ex Schult. & Schult.f.) Dress, *Impatiens goughii* Wight and *Burmannia coelestis* D. Don, in association with some ferns.

Conservation status: Field surveys have located about nine individuals within the Chemmannar Hills covering an area of 2 km². The threat status of this species has been assigned as ‘Critically Endangered’ as per the guidelines of IUCN (2001). Based on the above observations, adequate measures should be adopted to ensure the protection of this species in its natural habitat. Moreover, further surveys for this species are required. Apart from habitat destruction caused by anthropogenic intervention and wild fires during the summer, no other specific threats were determined during the field studies.

Comparison with morphologically similar species: *Plectranthus petricola* is morphologically similar to *P. glabratus*, especially the paniculate inflorescence and hairy floral parts. However, these species can be readily distinguished from each other (morphological differences are listed in Table 1). There are other species that have a paniculate inflorescence and also occur in peninsular India, namely, *Plectranthus beddomei* Raizada and *P. deccanicus* Briq. *Plectranthus petricola* differs from both of these species by the dwarf, cylindrical stem, rounded leaf base and rounded to subacute leaf apex (versus large herbs with quadrangular stems and ovate leaves with base round to cordate and apex acuminate for both *P. beddomei* and *P. deccanicus*). *Plectranthus petricola* shares some vegetative morphological similarities with *P. barbatus* Andr., an Afro-southern Asian element, but it differs in its paniculate inflorescence (versus simple thyse for *P. barbatus*), calyx inner surface glabrous (versus calyx inner surface with a ring of hairs).



Fig. 1. *Plectranthus petricola*: **a**, habit, in situ; **b**, **c**, leafy twigs; **d**, single leaf; **e**, internode; **f**, filiform style and stigma in flower (J. Mathew 4421). Images: J. Mathew.

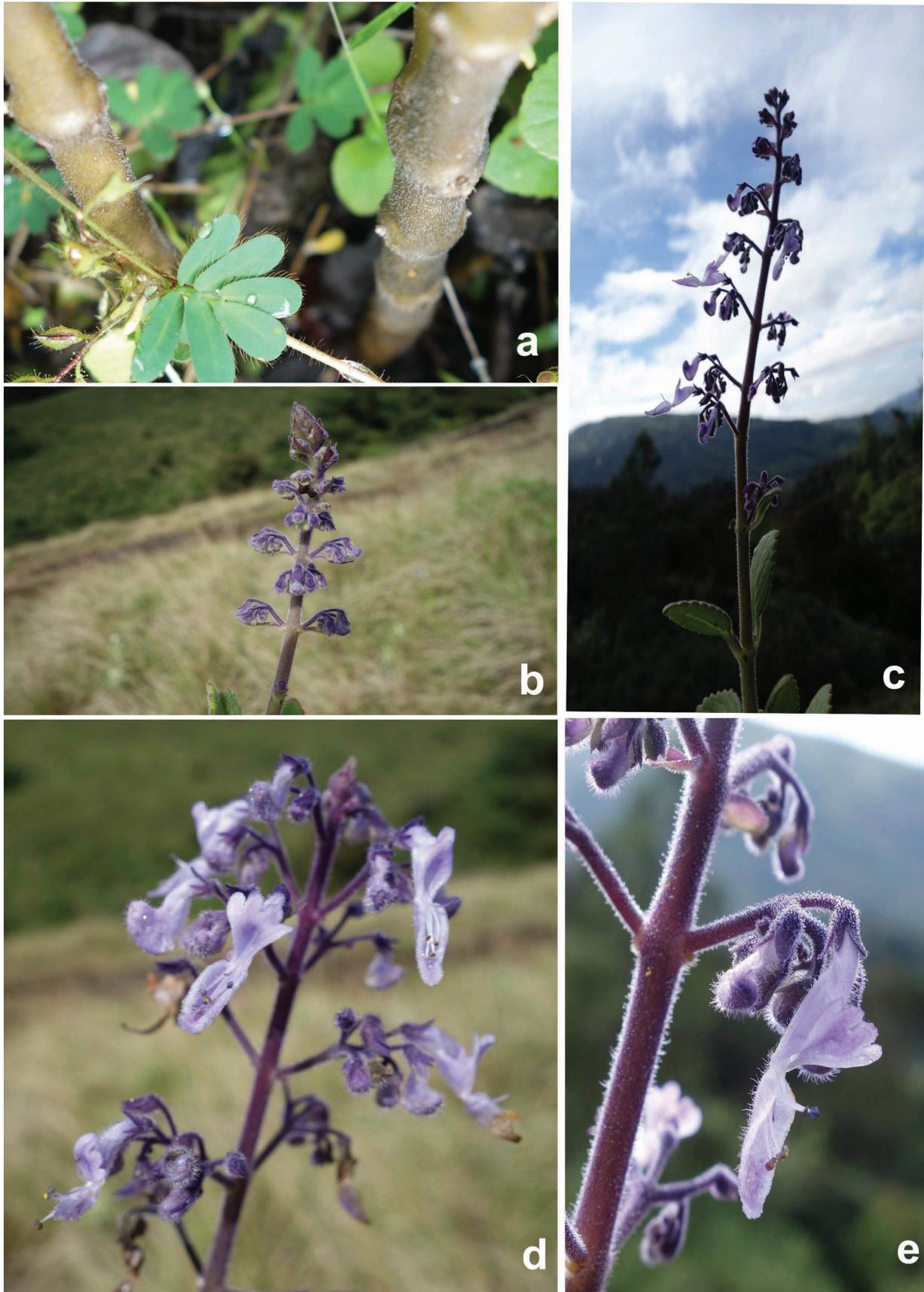


Fig. 2. *Plectranthus petricola*: a, cylindrical stem; b, c, inflorescence; d, e, flowers in panicle (J. Mathew 4419). Images: J. Mathew.

Plectranthus petricola is also morphologically similar to the recently described *P. anamudianus* Smitha & Sunojk. (Smitha & Sunojkumar 2016) but differs from this species as indicated in Table 1.

Table 1. Diagnostic morphological comparison of *Plectranthus petricola*, *P. glabratus* and *P. anamudianus*

Characters	<i>P. petricola</i>	<i>P. glabratus</i>	<i>P. anamudianus</i>
Size in cm	40 cm	200 cm	60 cm
Mature stem	cylindrical	quadrangular	quadrangular-cylindrical
Young bark	grey	purple	green
Internode length(mm)	10–600	40–60	5–10
Petiole			
form	fleshy	slender	fleshy
size (mm)	5–25 x 2–3	40–100 x 2–4	5–10
Leaf			
base shape	rounded	cordate	truncate to cuneate
apex shape	rounded to subacute	long acute	acute
veins	4 or 5	6–8	6–8
teeth	20–24	numerous	14–16
size (mm)	5–40 x 3–30	60–180 x 40–120	20–50x10–30
Inflorescence	simple panicle	basally branched panicle	simple panicle
glandular hairs in flowers (mm)	0.9–1.2	0.5–0.7	0.3–0.7
corolla tube length (mm)	5–6	8–9	8–10
Stigma	acute by lobes pressed	bifid	bifid

2. *Plectranthus idukkianus* J.Mathew, Yohannan & B.J.Conn, **sp. nov.**

Diagnosis: Similar to *Plectranthus malabaricus* (Benth.) J.H.Willemse (Fig. 3.) by its overall appearance and leaf form but differing by its woolly tomentose whitish stem with purple streaks (versus slightly puberulus, purple coloured stem without streaks); petiole to 200 mm long (versus up to 100 mm long); cordate leaf base, (versus truncate or subcordate); leaves lower surface whitish (versus purple lower surfaces with red glandular dots); larger leaf size to 200 x 140 mm (versus 130x 70 mm); inflorescence a simple thyrse c.50 cm long (versus basally branched thyrse of c. 30 cm long); woolly tomentose peduncle (versus slightly puberulus) and condensed dichasia with 4 or 5 flowers (versus lax dichasia with 5–7 flowers).

Type: India: Kerala: Idukki District, 10 km away from Kuttikkanam, Panchalimedu Hills, alt. 1300 m a.s.l., 14 Dec 2015, *J. Mathew 4821* (holo: TBGT!, iso: MSSRF!).

Branched perennial herb, up to 175 cm tall. Stem succulent, quadrangular, woolly, tomentose whitish stem with purple streaks; internodes to 300mm long. Leaves pleasantly aromatic (when crushed), simple, often crowded at ends of branches, petiolate; petiole up to 200mm long and 4 mm diam., fleshy; upper side of the petiole purplish, abaxial side greenish; lamina broadly ovate, to 200 x 140 mm, base cordate; margin crenate with numerous teeth on each side of margin, secondary teeth absent; apex acute, abaxial surface greenish white, veins raised, 5 or 6 veins; adaxial surface greenish, mid-vein impressed. Inflorescence terminal, up to 500 mm long, simple thyrse with cymose clusters; axis slender, quadrangular in cross-section, with divaricate 0.3 mm long eglandular hairs; floral internodes 2cm long (hence nodes distant), cymes condensed, 4- or 5-flowered; peduncle 10 mm long, minute hairy; bracts 2–3 mm long, 1–2 mm wide;; pedicel slender, 2–3 mm long (not enlarged in fruit), pubescent. Calyx purple, campanulate, c. 3–4 mm long, c. 2–3 mm diam. (5–7 mm long, 3–4 mm diam. in fruit), with scattered hairs; anteriorlobes narrowly ovate, 1.8 mm long; lateral lobes triangular, c. 1.5 mm long; adaxial lobe broadly ovate, 2 mm long. Corolla 10mm long, tube c. 5 mm diam., light purple, glabrescent; tube 5–6 mm long, gradually dilated towards base, widely expanded at throat, inner surface glabrous; abaxial (anterior) lip white to pale purple, ovate, boat-shaped, 5 mm long, concave, simple hairs present on adaxial surface; adaxial (posterior) lip 4-lobed, lobes rounded at apex, minutely pubescent, median lobes (2 mm long, 1 mm wide) smaller than lateral lobes (3 mm long, 2 mm wide). Stamens 4, adaxial pair attached just below abaxial pair but not united; filaments included in abaxial (anterior) corolla lip, filaments of abaxial pair 5 mm long, those of adaxial pair 4 mm long; appendages absent; anthers bilobed, dorsifixed, c.1 mm long, purplish, longitudinally dehiscent. Style filiform, with stigmatic lobes pressed together. Mericarps 4, obloid, smooth. **Figs 4, 5.**

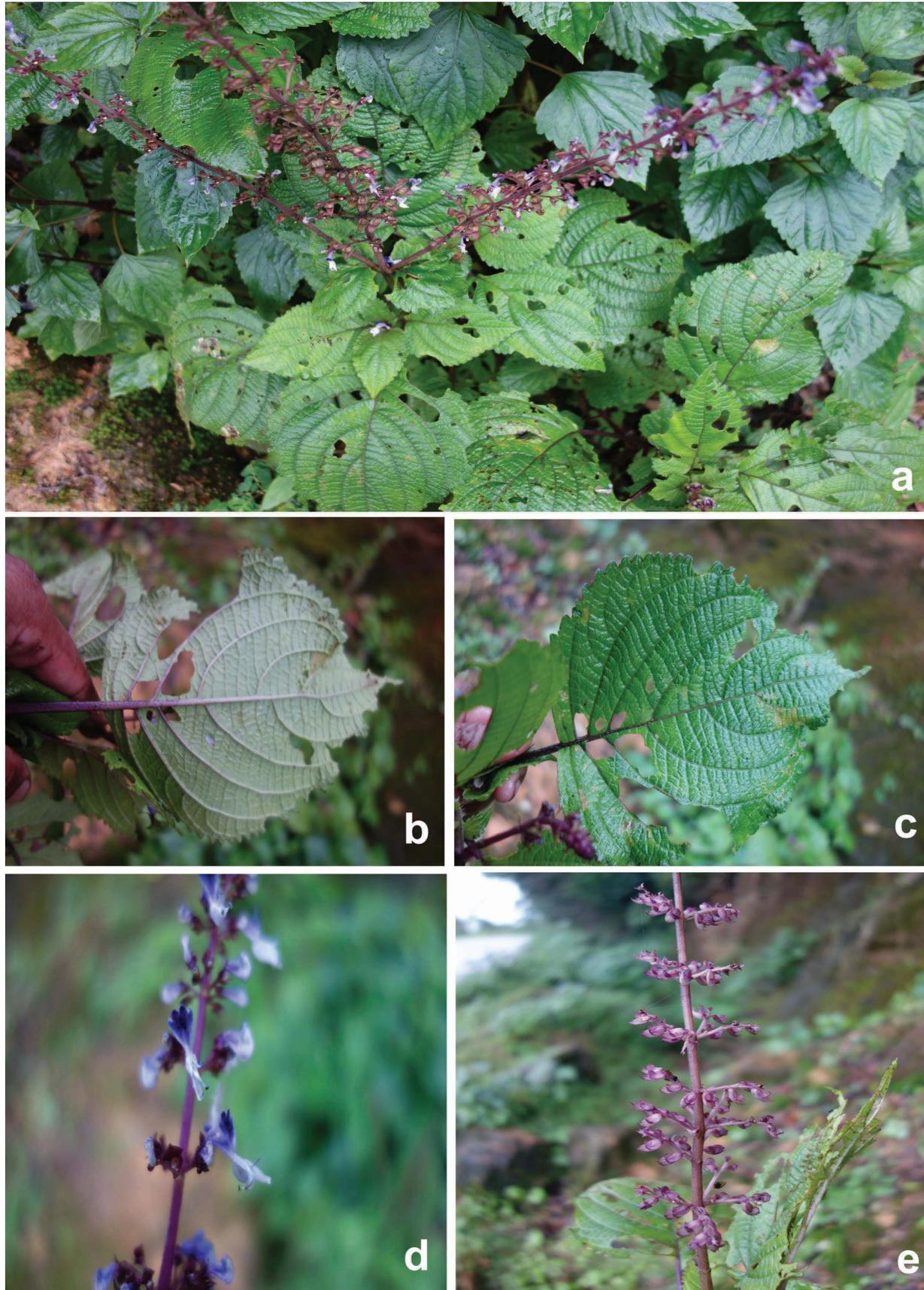


Fig. 3. *Plectranthus malabaricus*: **a**, habit, in situ; **b-c**, leaves; **d**, inflorescence; **e**, fruitification (J. Mathew 3125). Images: J. Mathew.

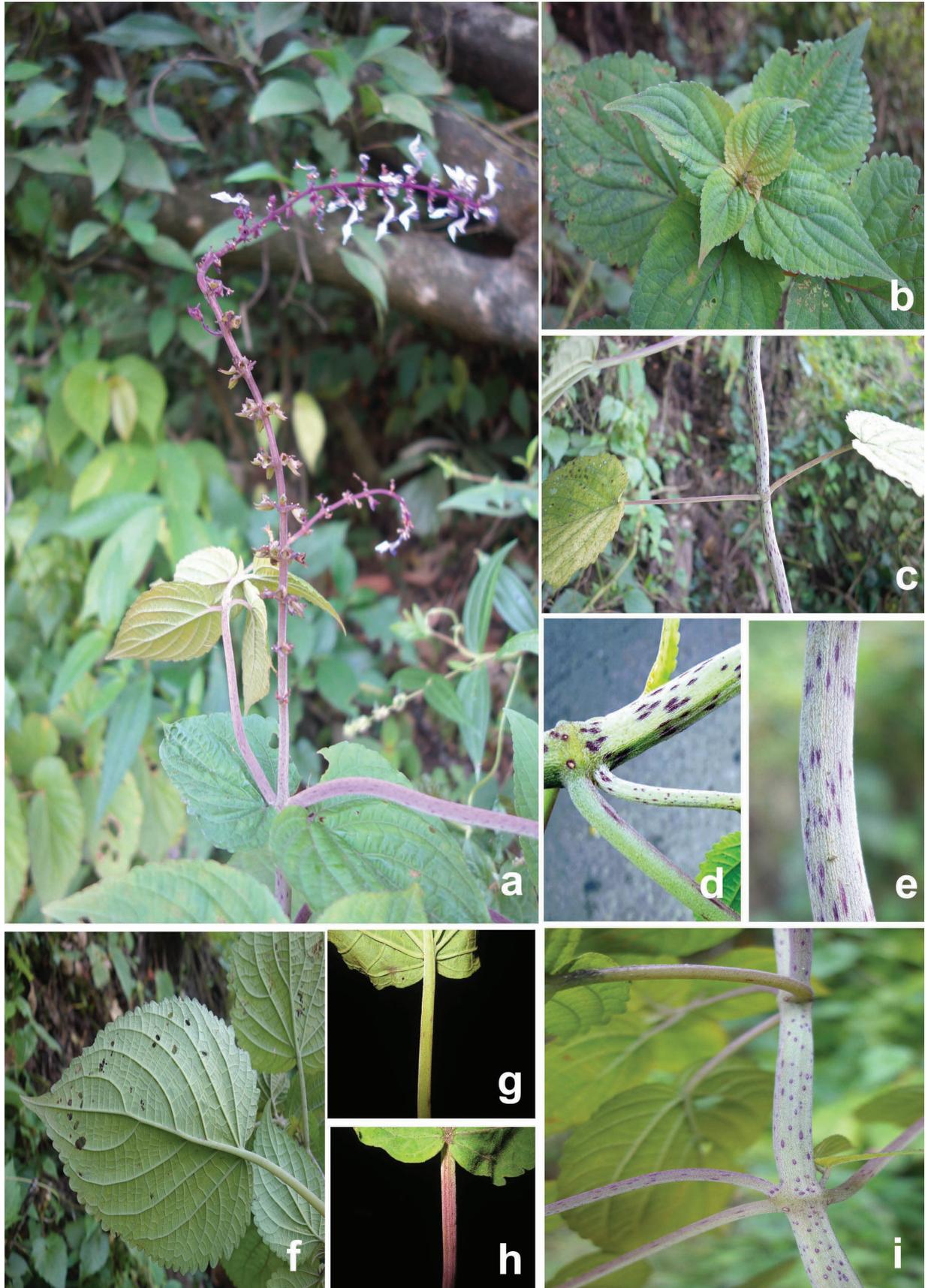


Fig. 4. *Plectranthus idukkianus*: **a**, habit, in situ; **b**, crowded leaves at branch apices; **c**, leaves in long petiole; **d**, **e**, stem with purple streaks; **f**, abaxial side of leaf; **g-h**, leaf bases; **i**, stem showing branching pattern (*J. Mathew 4832, 4833*). Images: J. Mathew.



Fig. 5. *Plectranthus idukkianus*: **a**, inflorescence; **b**, infructescence; **c**, **d**, flowers in dichasia; **e**, fruiting calyx (J. Mathew 4829). Images: R. Yohannan

Phenology: Flowering and fruiting were recorded in November–December.

Etymology: The specific epithet (viz. *idukkianus*) refers to Idukki District of Kerala, India, where the type specimen was collected.

Additional specimen examined: INDIA: KERALA: Idukki District, Murinjapuzha, Kuttikkanam Road, alt. 1254 m a.s.l., 17 December 2015, *J. Mathew* 4829–4833 (TBGT!).

Distribution, habitat and ecology: *Plectranthus idukkianus* grows amongst shola forests of Panchalimedu-Kuttikkanam Hills of south Western Ghats at an altitude of about 1250 m above sea level. Common associates for *P. idukkianus* include *Begonia malabarica* Lam., *Ixora nigricans* R. Br. ex Wight & Arn., *Pouzolzia wightii* Bennett var. *caudata* (Bennett) C.E.C. Fisch. and *Impatiens viscosa* Bedd.

Conservation status: Field surveys have located about ten individuals within the Panchalimedu-Kuttikkanam Hills covering an area of 5 km². The distribution is limited to a few plants at the three known /cited locations (each with c. 3 or 4 plants). The threat status of this species has been assigned as 'Critically Endangered' as per the guidelines of IUCN (2001). Its area of occupancy is <5 km². Based on the above observations, adequate measures should be adopted to ensure the protection of this species in its natural habitat. Moreover, further surveys for this species are recommended.

3. *Plectranthus saxorum* J.Mathew, Yohannan & B.J.Conn, **sp. nov.**

Diagnosis: Similar to *Plectranthus malabaricus* (Fig. 3.) but differing by its greenish stem with long glandular hairs to 3 mm long (versus slightly puberulus hairs of 1 mm long, purple stem); cordate leaf base (versus truncate or subcordate); leaves lower surface whitish (versus purple lower surfaces with red glandular dots); margin crenate with 12–22 teeth on each side of leaf margin (versus more than 30 teeth on each side of margin); hairs on the nerves beneath (versus glabrous nerves beneath); inflorescence a simple thyrse c. 500 mm long, white (versus basally branched panicle of c.300mm long, purple) and the greenish anterior calyx lobes on fructification (versus purplish anterior calyx lobes on fructification).

Type: INDIA: KERALA: Kozhikode District, Vellarimala, 10 km away from Muthappanpuzha, REC para, alt. 1800 m a.s.l., 30 Jan 2015, *J. Mathew* 4911 (holo: TBGT!, iso: MSSRF!).

Branched perennial herb, up to 150 cm tall. Stem fleshy, quadrangular, green; densely hairy on young branches, hairs 1–2 mm long; internodes to 200 mm long. Leaves pleasantly aromatic (when crushed), simple, often crowded at ends of branches, petiolate; petiole up to 80mm long and 3 mm diam., fleshy; adaxial (upper) side of petiole purplish, abaxial side greenish white; lamina broadly ovate, to 140 x 90mm, base cordate; margin crenate with 12–22 teeth on each side of margin, secondary teeth absent; apex acute, abaxial surface greenish white, veins raised, 4–6 veins; adaxial surface greenish, mid-vein impressed; hairs on the nerves beneath. Inflorescence terminal, upto 500 mm long, simple thyrse with cymose clusters; axis slender, quadrangular in cross-section, with divaricate 0.3 mm long eglandular hairs; floral internodes to 20 mm long (hence nodes distant), cymes lax, 5–7-flowered; peduncle 10mm long, minute hairy; bracts 2–3 mm long, 1–2 mm wide pedicel slender, 2–3 mm long (not enlarged in fruit), pubescent. Calyx greenish purple, campanulate, c. 3–4 mm long, c. 2–3mm diam. (enlarged in fruit: 5–6 mm long, 3–4 mm diam.), with scattered hairs; anterior lobes narrowly ovate, 1.5 mm long; lateral lobes triangular, c. 1.5 mm long; adaxial lobe broadly ovate, 2 mm long. Corolla 10 mm long, tube c. 5 mm diam., pale purple, glabrescent; tube 5–6 mm long, gradually dilated towards base, widely expanded at throat, inner surface glabrous; abaxial (anterior) lip white to pale purple, ovate, flat-shaped, 5 mm long, concave, simple hairs present on adaxial surface; adaxial (posterior) lip 4-lobed, lobes rounded at apex, minutely pubescent, median lobes (2 mm long, 1 mm wide) smaller than lateral lobes (3 mm long, 2 mm wide), deep purple. Stamens 4, adaxial pair attached just below abaxial pair but not united; filaments included in abaxial (anterior) corolla lip, filaments of abaxial pair 5 mm long, those of adaxial pair 4 mm long; appendages absent; anthers bilobed, dorsifixed, c.1 mm long, purplish, longitudinally dehiscent. Style filiform, with stigmatic lobes pressed together. Mericarps with seeds 4. **Figs 6, 7.**

Phenology: Flowering and fruiting recorded in December–January.

Etymology: The specific epithet (viz. *saxorum*) refers to 'of the rocks', meaning to rocky habitat amongst which this species grows.

Additional specimen examined: INDIA: KERALA: Kozhikode District, Kanjippara, 8km away from Anakampoyil, alt. 1700 m a.s.l., 31 Jan 2015, *J. Mathew* 4912, 4913 (TBGT!).

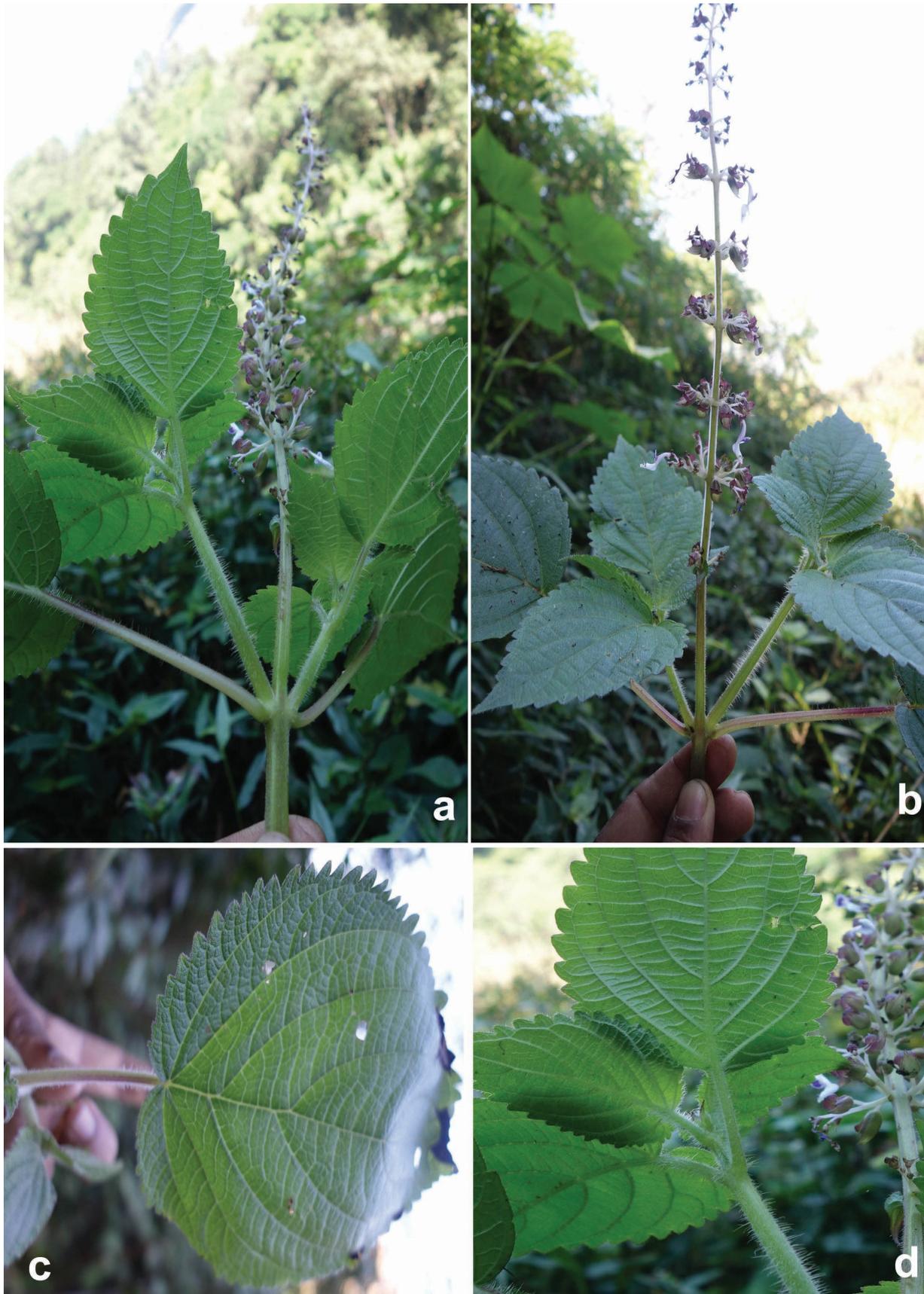


Fig. 6. *Plectranthus saxorum*: **a**, habit, in situ; **b**, flowering twig; **c**, leaf; **d**, young branch with long hairs (*J. Mathew 4913*). Images: J. Mathew.



Fig. 7. *Plectranthus saxorum*: a, opened flower on the inflorescence; b, fruiting calyx. (*J. Mathew 4914*). Images: J. Mathew.

Distribution, habitat and ecology: *Plectranthus saxorum* grows amongst rocks in shola forests of the Vellarimala Hills of south Western Ghats at an alt. of about 1600–1800 m a.s.l. Common associates for *Plectranthus saxorum* include *Meineckia longipes* (Wight) Webster, *Impatiens cordata* Wight, *Asparagus gonocladus* Baker and *Phyllanthus megacarpus* (Gamble) Kumari & Chadrab.

Conservation status: *Plectranthus saxorum* is currently known from 2 localities, separated by 2 km, within the Vellarimala forest area (Kozhikode District). Forty mature individuals were found in the area. The data gained from the field studies were evaluated according to the IUCN (2001) categorization and at least “vulnerable” status has been proposed for the species.

Comparison with morphologically similar species: *Plectranthus saxorum* is morphologically similar to *P. malabaricus*, especially in life form, leaf shape and floral parts (Table 2). However, these species can be readily distinguished from each other (refer diagnosis above). *Plectranthus saxorum* shares some vegetative morphological similarities with *Plectranthus inflatus* (Benth.) J.H.Willemse, an Indo-Srilankan element, but it differs in its greenish stem (versus purple for *P. inflatus*), ovate leaves with cordate bases (versus narrowly ovate leaves with acute base for *P. inflatus*) and thyrses inflorescence (versus panicle like inflorescence for *P. inflatus* by pedunculate laxer cymes) (Table 2).

Table 2. Diagnostic morphological comparison of *Plectranthus idukkianus*, *P. saxorum* and *P. malabaricus*

Characters	<i>P. idukkianus</i>	<i>P. saxorum</i>	<i>P. malabaricus</i>
Stem			
colour	whitish stem with purple streaks	greenish	purple
hairs	woolly, very minute	3 mm long	1 mm long
Petiole			
colour of abaxial side	green	green	purple
length (mature) (mm)	upto 200	upto 80	upto 100
Leaf			
Size (mm)	200 x 140	140 x 90	130 x 70
base shape	cordate	cordate	truncate to subcordate
colour of abaxial side	greenish white	greenish white	purplish
teeth	numerous	12–24 pairs	28–30 pairs
Inflorescence			
form	simple thyrses	simple thyrses	basally branched panicle
length(mm)	c. 500	c. 500	c. 300
Corolla adaxial lip			
colour	light purple with white marking in centre	white with light purple marking in centre	deep purple
median lobes	rounded	rounded	ovate

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