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Ophiorrhiza shidiensis & Ophiorrhiza pemae (Rubiaceae): Two new species from Arunachal Pradesh, India

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ABSTRACT: Two new species of *Ophiorrhiza* (Rubiaceae)*, Ophiorrhiza shidiensis* Sahani, Chowlu & Lalnunfeli and *Ophiorrhiza pemae* Chowlu, Lalnunfeli & Sahani, are described from Changlang, Arunachal Pradesh, India. Detailed morphological descriptions, notes on their distribution and habitat, colour plates, provisional IUCN conservation assessments and comparisons with allied species are provided. *Ophiorrhiza shidiensis* is morphologically similar to *Ophiorrhiza wallichii*, but can be distinguished by its larger habit, variation in leaf lamina size, abaxially pale green leaves, presence of both axillary and terminal inflorescences, longer peduncles and pedicels, a pink corolla, and a vesicular stigma. *Ophiorrhiza pemae* is closely allied to *O. himadrica*, but can be distinguished by its taller habit, longer pilose-villous petioles, larger leaf blades with cuneate to rounded base, undulate margins and acute to attenuate apex, pale green abaxial surface, larger ovate bifid stipules, longer inflorescence in simple cymes, longer peduncles, ensiform to falcate bracts, light pink to purplish corolla, and micropunctate stigma.

KEY WORDS: Indo-Burma, new taxa, *Ophiorrhiza*, *Ophiorrhiza himadrica*, *Ophiorrhiza wallichii*, taxonomy.

INTRODUCTION

The family Rubiaceae is one of the largest families of angiosperms, comprising approximately 13,000 species worldwide and exhibiting a predominantly tropical and subtropical distribution (POWO, 2026). Members of the family are ecologically significant components of forest ecosystems and display considerable morphological diversity. Within this family, the genus *Ophiorrhiza* L. is one of the species-rich taxa, primarily distributed in tropical and subtropical regions, and currently comprises 386 accepted species (POWO, 2026). Members of the genus are annual or perennial herbs, erect or creeping, sometimes woody at base, typically characterised by opposite, occasionally unequal leaves, epigynous flowers with a five-lobed fused corolla, and a compressed hypanthium containing numerous seeds (Deb and Mondal, 1997; Taher *et al*., 2020; Chanu *et al*., 2025).

The taxonomy of *Ophiorrhiza* remains complex due to subtle morphological differences and overlapping diagnostic characters among species. In India, the genus is well represented, with earlier accounts documenting 52 species distributed mainly in the Northeastern region and the Western Ghats (Hareesh *et al*., 2017). Of these, 16 species are endemic to peninsular India and 6 to North East India (Jeyaprakash and Balachandran, 2023). This number has since risen through a combination of newly described species and new distributional records for India, bringing the total number of recognised species in India to 66 (Bawri *et al*., 2024; Chanu *et al*., 2025; Lalnunfeli *et al*., 2025; Khanal *et al*., 2026). These findings indicate that the diversity of the genus in northeastern India remains incompletely documented and continues to expand with ongoing botanical exploration.

The state of Arunachal Pradesh, located in the Eastern Himalaya and forming part of the Indo-Burma biodiversity hotspot, harbours rich and largely unexplored floristic diversity. During a recent floristic survey conducted in the Changlang district of Arunachal Pradesh, populations of two unusual Ophiorrhiza taxa were collected. One resembled *O. wallichii*, and the other *O. himadrica*; however, detailed examination of herbarium specimens and relevant literature indicated that neither taxon matched any known species.

Therefore, the present study aims to describe two new species of *Ophiorrhiza* from Arunachal Pradesh. Detailed morphological descriptions, comparison with allied taxa, and notes on their ecology, phenology, and distribution are provided to facilitate their identification and taxonomic placement.

MATERIALS AND METHODS

Field surveys were conducted in Vijoynagar, Changlang district of Arunachal Pradesh, during 2025-2026. Populations of two different *Ophiorrhiza* taxa (described here as *O. shidiensis and O. pemae*) were first observed in March 2025 in early flowering stage; however, specimens could not be collected at that time. The locality was revisited in April 2026, and specimens were collected. Specimens were documented using a Nikon Z50 camera. Geographic coordinates were recorded using the NoteCam application and a location map was generated using ArcGIS 10.8. Morphological

observations were based on fresh and dissected materials, and measurements were taken from fresh specimens. Diagnostic characters were assessed through comparison with morphologically allied taxa.

A critical review of relevant literature (Hooker, 1880; Li, 1980; Lo, 1990; Deb and Mondal, 1997; Bremer and Manen, 2000; Hareesh *et al*., 2015, 2017; Hareesh and Sabu, 2018, 2022; Balan *et al*., 2020; Bhuyan *et al*., 2021; Nair *et al*., 2023; Bawri *et al*., 2024; Chanu *et al*., 2025; Lalnunfeli *et al*., 2025; Joy *et al*., 2026) and examination of specimens and digital images from herbaria [APFH, ARUN, ASSAM, BSHC, CAL, LBG, BM, E, K, P] were undertaken. Morphological terminology follows Beentje (2016). Specimens were processed following standard herbarium techniques, dried, and mounted on herbarium sheets. Holotypes were designated from the collected material and deposited at CAL, with isotypes deposited at ARUN. Extent of occurrence (EOO) and area of occupancy (AOO) were calculated using GeoCAT (Bachman *et al*., 2011), with the default setting of 2 × 2 km grid. Conservation status was assessed following the IUCN Red List Categories and Criteria and accompanying guidelines (IUCN, 2022).

TAXONOMIC TREATMENT

Ophiorrhiza shidiensis Sahani, Chowlu & Lalnunfeli, ***sp. nov.*** **Figs. 1, 2 & 3A,B**

Type**:** INDIA**,** Arunachal Pradesh, Changlang district, Vijoynagar, 27°16′00″N 96°56′41″E, 1,156 m elevation, 11 April 2026, *Vinay Kumar Sahani 57301* (holotype: CAL!; isotype: ARUN!)

Diagnosis: *Ophiorrhiza shidiensis* shares morphological characters with *O. wallichii*, but can be easily distinguished by its taller habit (up to 1 m vs. 30–60 cm), leaves with attenuate–acute apex and obtuse–cuneate base (vs. caudate–acuminate apex and cuneate–round base), and papery lamina that is abaxially pale green (vs. coriaceous and pale reddish beneath). It further differs in having terminal and axillary cymes up to 3.5 cm long (vs. terminal corymbose cyme 1.5–4.5 cm across), larger bracts 3–25 mm long (vs. 2.5–3 mm) and longer pedicels 2–5 mm long (vs. 1–2 mm). The new species is also characterised by a longer corolla tube (3–3.5 cm vs. 2.3– 3 cm) with light pinkish–rose pink coloration (vs. white–pinkish–purple corolla), as well as longer filaments and an obovate–oblong, vesicular stigma in long-styled flowers (vs. lanceolate, acute, glabrous). *Ophiorrhiza shidiensis* also shares similarities with *O. mizoramensis* in its tall habit (up to 1 m), persistent stipules, and broadly ovate corolla lobes, but differs by its much shorter petiole (1–2 cm vs. 4–6 cm), smaller leaves (5–17.5 × 2.5–7.5 cm vs. 11–22 × 5–9 cm) with an attenuate-acute apex and obtuse-cuneate base (vs. acuminate apex and attenuate base), and axillary and terminal cymes up to 3.5 cm long (vs. terminal biparous helicoid cymes 10–12 cm long). It further differs in its shorter pedicels (2–5 mm vs. 5–10 mm), longer and pinkish to rose-pink corolla tube (3–3.5 cm vs. 1.6–1.8 cm, dark purplish pink and white at apex), and obovate–oblong, vesicular stigma (vs. oblanceolate).

Description: Erect, perennial herb, branched, up to 1 m tall. Stem terete, green, sparsely puberulent when young, becoming glabrous and woody with age, internodes 1–11.5 cm long. Stipules intrapetiolar, 3–11 × 2–5 mm long, broadly subulate to lanceolate, light purplish-brown, puberulent, apex acute, persistent. Leaves opposite, decussate; petiole 1–2 cm long, terete, sparsely hirsute; lamina 5–17.5 × 2.5–7.5 cm, elliptic-ovate to broadly lanceolate, base obtuse to cuneate, margin entire, apex attenuate to acute, papery, slightly undulate; adaxially green, glabrous; abaxially pale green with sparse hairs along primary and secondary veins; lateral veins 6–12 pairs, midrib prominent abaxially. Inflorescences terminal and axillary cymose up to 3.5 cm long including peduncle; peduncle up to 3 cm long, terete, puberulent, dark purplish to brownish; bracts 3–25 × 2– 5 mm, linear-lanceolate, apex acute, minutely hairy in early stages, light brown to green; bracteoles numerous. Flowers 16–18 per inflorescence, distylous; pedicels 2–5 mm long, terete, puberulent, purplish-brown to green. Calyx puberulent, greenish to purplish-brown; lobes ovate, 1–1.5 mm long. Hypanthium 2–3 mm long, infundibuliform, minutely puberulent, pale green to purplish-brown. Corolla sympetalous, tubular, slightly swollen near base, 3–3.5 cm long, white at base, pale pink in the middle, Rose-pink towards the mouth; exterior glabrous; interior densely hairy above the insertion of stamens in long-styled flowers and above the position of stigma in short-styled flowers; lobes 5, occasionally 4 or 6, ovate, 5–6 × 3–4 mm, spreading, apex acute, glabrous outside, minutely hairy inside. Long-styled flowers with stamens 5, filaments ca. 1 mm long, inserted in the middle of the corolla tube; anthers linear, 2.5–3 mm long, pale yellow; style 20–21 mm long, filiform, exserted; stigma deeply bilobed, vesicular, obovate-oblong, 2–3 mm long. Short-styled flowers with stamens 5, filaments ca. 2 mm long, inserted near the throat of the corolla tube; anthers linear, ca. 4 mm long; style 10–11 mm long, included; stigma bilobed, lanceolate, 4–5 mm long. Capsules urceolate to subturbinate, 4–5 mm long, minutely puberulent, greenish to dark purplish-brown.

Etymology: The specific epithet is derived from "Shidi," the traditional name of Gandhigram used by the Lisu (Yobin) community, referring to the type locality from where the species was collected.

Preliminary conservation assessment: *Ophiorrhiza shidiensis* is currently known from three locations (*sensu* IUCN, 2022) within the Vijoynagar valley, Arunachal Pradesh, India. The species has an extent of occurrence

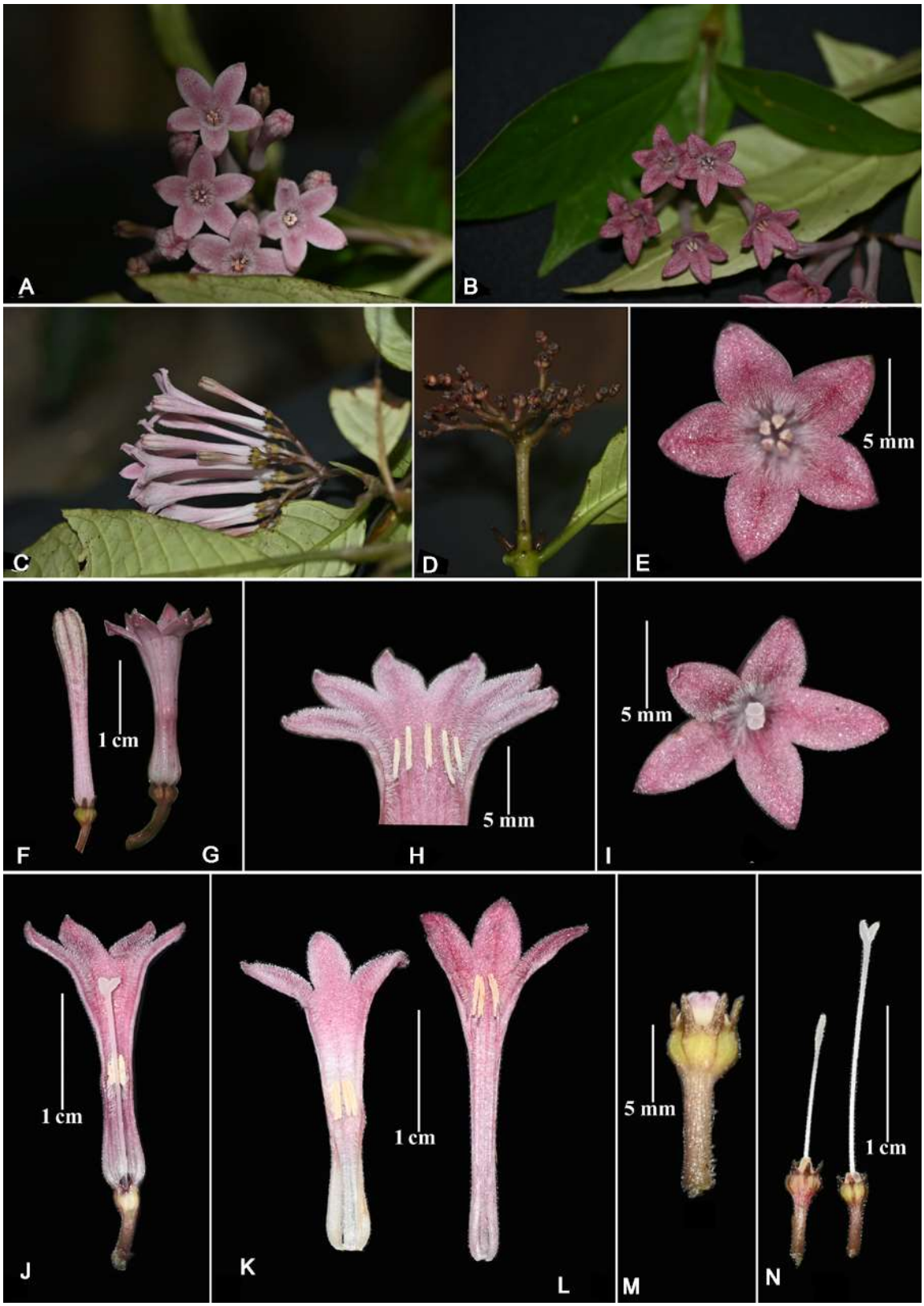

Fig. 1. ***Ophiorrhiza shidiensis*** **A-B.** Top views of inflorescence, **C.** Lateral view of inflorescence, **D.** Stipules, bracts, mature fruits, **E.** Top views of short-styled single flower, **F-G.** Lateral view of flower bud and flower, **H.** Corolla split open, **I.** Top view of long-styled flower, **J.** Dissected long-styled flower, **K-L.** Dissected short- and long-styled flowers, **M.** Hypanthium, **N.** Short- and long-style pistils respectively. Dissections by Vinay Kumar Sahani & photographs by Krishna Chowlu.

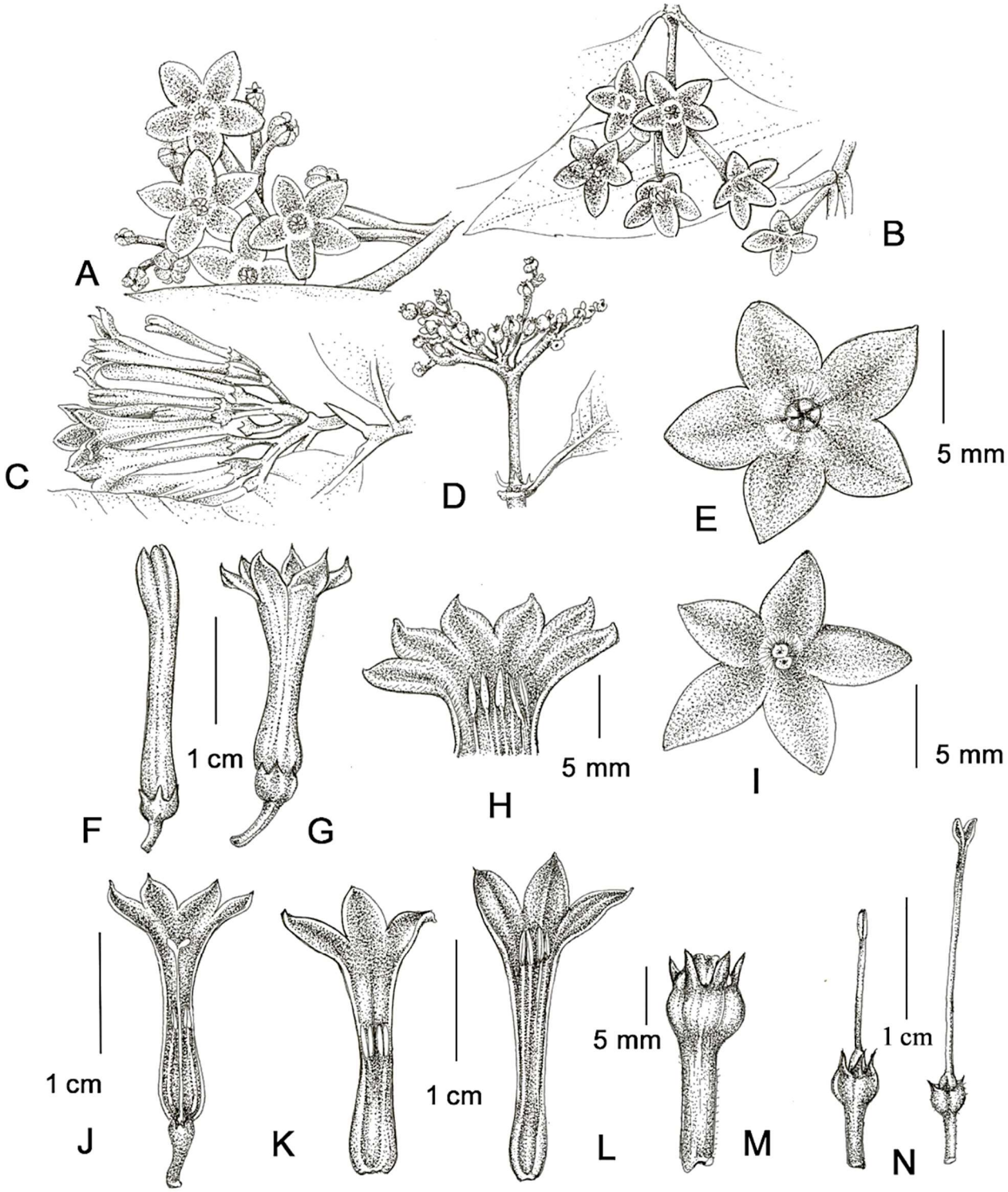

Fig. 2. ***Ophiorrhiza shidiensis*** **A-B.** Top views of inflorescence, **C.** Lateral view of inflorescence, **D.** Stipules, bracts, mature fruits, **E.** Top views of short-styled single flower, **F-G.** Lateral view of flower bud and flower, **H.** Corolla split open, **I.** Top view of long-styled flower, **J.** Dissected long-styled flower, **K-L.** Dissected short- and long-styled flowers, **M.** Hypanthium, **N.** Short- and long-style pistils respectively. Drawed by O Suresh.

Fig. 3. ***Ophiorrhiza shidiensis*** (A, B) and ***Ophiorrhiza pemae*** (C, D). **A.** Habit. **B.** Close-up view of inflorescence. **C.** Habit. **D.** Close-up view of flowers. Photos by Vinay Kumar Sahani.

Table 1. Morphological comparison between ***Ophiorrhiza shidiensis***, ***Ophiorrhiza wallichii***, & ***Ophiorrhiza mizoramensis***

Characters	*O. shidiensis*	*O. wallichii*	*O. mizoramensis*
Habit	Up to 1 m tall.	30–60 cm tall.	Up to 1 m tall.
Petiole	1–2 cm long.	0.5–2 cm long.	4–6 cm long.
Leaves	Elliptic–ovate to broadly lanceolate, 5–17.5 × 2.5–7.5 cm, attenuate–acute at apex, obtuse–cuneate at base, papery, pale green beneath.	Elliptic–lanceolate, 6–15 × 2–6 cm, caudate–acuminate at apex, cuneate–round at base, coriaceous, pale reddish beneath.	Elliptic to ovate, 11–22 × 5–9 cm, acuminate at apex, attenuate at base glabrous, attenuate at base, abaxial color not observed.
Stipules	Persistent, lanceolate.	Deciduous, subulate, minute.	Persistent, ovate deeply bifid.
Sec. veins	6–12 pairs.	6–11 pairs.	11–19 pairs.
Inflorescence	Axillary and terminal, cyme up to 3.5 cm long, puberulent.	Terminal, corymbose cyme, 1.5–4.5 cm across, puberulous.	Terminal, biparous helicoid cyme, 10–12 cm long, pubescent.
Peduncles	Up to 3 cm long.	2 cm long.	3–5 cm long.
Bracts	Deciduous, linear–lanceolate, 3–25 × 2–5 mm, minutely hairy.	Deciduous, linear, 2.5–3 mm long, puberulous.	Linear to lanceolate; 3.1–3.8 × 1.3–1.7 mm, pubescent on both sides.
Pedicels	2–5 mm long, puberulent.	1–2 mm long, puberulous.	5–10 mm long, puberulent.
Corolla Tube	Light pinkish– rose pink, 3–3.5 cm long, glabrous outside, internally villous middle of tube to throat.	White–pinkish– purple, 2.3–3 cm long, glabrous outside, internally villous either at throat or middle of tube.	Dark purplish pink and white at apex, 1.6–1.8 cm long, glabrous outside and minutely pubescent inside.
Corolla lobes	Ovate, acute at apex, glabrous outside, minutely hairy inside.	Broadly ovate, acute and incurved at apex, shortly keeled at back.	Ovate–elliptic, mucronate at apex, slightly recurved.
Stamens	Filaments ca. 1–2 mm long inserted near the throat or in the middle of the corolla tube.	Filament ca. 0.5 mm long, adnate at throat or at middle of tube.	Filament 0.2 cm long, inserted at the middle of the corolla tube.
Stigma	Long-styled: Obovate–oblong, vesicular.	Lanceolate, acute, glabrous.	Oblanceolate, not seen.

Table 2. Morphological comparison between ***Ophiorrhiza pemae***, ***Ophiorrhiza himadrica***, & ***Ophiorrhiza medogensis***

Characters	*O. pemae*	*O. himadrica*	*O. medogensis*
Habit	25–40 cm tall.	30 cm tall.	40–60 cm tall.
Petiole	1–2.4 cm long, pilose-villous	1–1.5 cm long, glabrous	1–2 cm long, pubescent
Leaves	Ovate-broadly lanceolate, 2–8.5 × 1.5–4.5 cm, acute-attenuate at apex, margin undulate-entire, cuneate-rounded at base, pale green beneath.	Ovate to oblong, 1.7–3.5 × 1–2.5 cm, obtuse to subacute at apex, margin entire, round at base, lighter beneath.	Elliptic or ovate to ovate-lanceolate, 3–11.5 × 1. 5–3.5 cm, acute or acuminate at apex, margin entire, cuneate or rounded to subcordate at base, pale green beneath.
Stipules	Ovate, incised-bifid apex, glabrous, 5–6 × 3–4 mm long.	Triangular, acute apex, sparsely pubescent or glabrous, 0.9–1 mm long.	Subulate or linear with 1-3 filiform lobes, pubescent, 3–6 mm long.
Sec. veins	4–9 pairs.	5–9 pairs.	7–16 pairs.
Inflorescence	Simple cyme.	Corymbose.	Terminal corymb.
Peduncles	1–2.4 cm long.	0.5–1 cm long.	3–5 mm long.
Bracts	Ensiform–falcate, 5–6 × 1–1.5 mm.	Oblanceolate–lanceolate, 5–10 × 1–2 mm.	Lanceolate, 6–10 × ca. 1 mm.
Pedicels	1–2 mm long.	1–3 mm long.	2–2.5 mm long.
Corolla Tube	Light pink-purplish, 2.3–2.5 cm long.	White, 2.2–2.6 cm long.	White with pale pink tinge, 20–23 mm long.
Stamens	Filaments ca. 1 mm long attached in neck and middle portion of corolla tube; anthers linear.	filaments 2.5–3 mm long, exserted beyond corolla throat or villous ring; anthers linear-oblong.	filaments 0.50–0.75 mm long; anthers oblong-linear.
Stigma	Long-styled: style ca. 15 mm long, stigma 1–1.5 mm long, deeply bilobed, micropunctate, Obovate-oblong. Short style: style ca. 10–11 mm long, stigma 3 mm long, micropunctate, bilobed, lanceolate.	Long-style: style ca. 16–18 mm long, stigma 1.5–1.7 mm long, bifid, glabrous, ovate. Short style: style ca. 6–9 mm long, stigma 2.9–3.1 mm long, glabrous, bilobed, oblong.	Long-styled: style ca. 12–13 mm long stigma c. 3.5 mm long, glabrous, linear to oblanceolate. Short styled: style ca. 5–5.5 mm long, stigma 2.5–3 mm long, glabrous-papillose, oblanceolate.

(EOO) of 50.71 km^2 and an area of occupancy (AOO) of 12.00 km^2, both of which fall below the Endangered thresholds under criteria B1 and B2, respectively. The supporting conditions (a) and (b)(iii) are also met, as the species is restricted to three locations and a continuing decline in habitat quality is inferred from ongoing shifting (jhum) cultivation affecting all three known locations. *Ophiorrhiza shidiensis* is therefore provisionally assessed as Endangered (EN) under Criteria B1ab(iii) + B2ab(iii) (IUCN, 2022).

Phenology: Flowering: March–May; fruiting: April–May.

Distribution: *Ophiorrhiza shidiensis* is currently known only from the Vijoynagar, Changlang district of Arunachal Pradesh, India. (Fig. 6)

Habitat: *Ophiorrhiza shidiensis* grows in damp, shaded habitats near small streams, on slopes and in the understory of evergreen forests. It occurs in humus-rich soils in abundant leaf litter and high moisture content, in mixed subtropical to subtemperate forest at elevations of 1,100–2,000 m a.s.l. in Vijoynagar, Changlang district. Associated species include *Achyrospermum densiflorum* Blume, *Lecanthus peduncularis* (Royle)Wedd., *Pilea insolens* Wedd., *Smilax myrtillus* A.DC., *Arisaema decipiens* Schott., *Arisaema consanguineum* Schott., *Persicaria* sp., *Selaginella* sp., *Begonia* sp., and members of Lauraceae and Urticaceae.

Other specimen examined (Paratypes): INDIA, Arunachal Pradesh, Changlang district, Vijoynagar, 27°11'9.9" N, 96°59'7.8" E, 1,678 m, 12 April 2026, *Vinay Kumar Sahani 57340* (ARUN!); 27°15'8.3"N 96°55'22.8"E, 1,978 m, 13 April 2026, *Vinay Kumar Sahani 57346* (ARUN!).

Ophiorrhiza pemae Chowlu, Lalnunfeli & Sahani, ***sp. nov.*** **Figs. 3C, D & 4, 5**

***Type*: INDIA,** Arunachal Pradesh, Changlang district, Vijoynagar, 27°14′22″N 97°02′18″E, 2,186 m, 17 April 2026, *Vinay Kumar Sahani 57302* (holotype: CAL!; isotype: ARUN!)

Diagnosis: *Ophiorrhiza pemae* is similar to *O. himadrica* but differs in its taller habit, 25–40 cm (vs. up to 30 cm tall); petioles 1–2.4 cm long, pilose-villous (vs. 1–1.5 cm long, glabrous); leaf blades 2–8.5 × 1.5–4.5 cm, base cuneate to rounded, margins undulate to entire, apex acute to attenuate, abaxially pale green (vs. 1.7–3.5 × 1–2.5 cm, apex obtuse to subacute, margins entire, base rounded, abaxially lighter); stipules ovate, 5–6 × 3–4 mm, apex incised, bifid, glabrous (vs. triangular, apex acute, sparsely pubescent or glabrous, 0.9–1 mm long); inflorescence 4–4.5 cm long, simple cymes (vs. 0.5–1 cm long, corymbose); peduncles 1–2.4 cm long (vs. 0.5–1 cm long); bracts ensiform to falcate (vs. oblanceolate to lanceolate); corolla light pink to purplish (vs. white); stigma micropunctate (vs. glabrous). *Ophiorrhiza pemae* also shares similarities with *O. medogensis* in its ovate leaf shape with pale green abaxial surface and entire margins, and corolla tube of comparable length with pinkish coloration, but differs by its shorter habit, 25–40 cm (vs. 40–60 cm tall); fewer secondary veins, 4–9 pairs (vs. 7–16 pairs); glabrous, incised-bifid stipules 5–6 × 3–4 mm (vs. pubescent, filiform-lobed stipules 3–6 mm long); simple cymes (vs. terminal corymb); longer peduncles, 1–2.4 cm long (vs. 3–5 mm long); ensiform to falcate bracts (vs. lanceolate); and micropunctate stigma (vs. glabrous to glabrous-papillose) (Table 2)

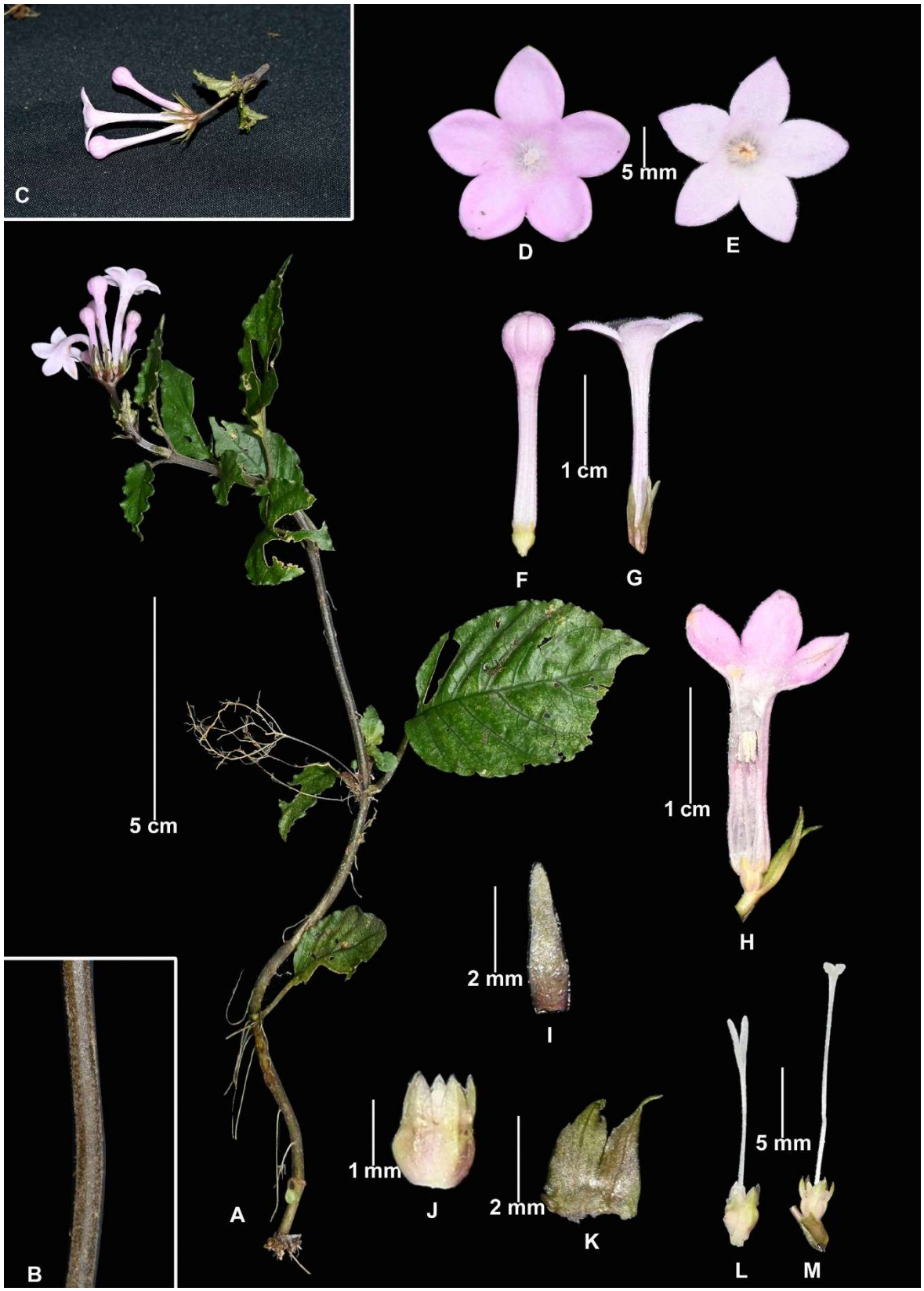

Fig. 4. ***Ophiorrhiza pemae*** **A.** Habit, B. Stem, **C.** Inflorescence, **D-E.** Top views of short- and long-styled flowers, F. Lateral view of floral bud, **G.** Lateral view of flower, **H.** Dissected view of flower, **I.** Bract, **J.** Calyx, **K.** Stipules, **L-M.** Short- and long-style pistils respectively. Dissections by Vinay Kumar Sahani & photographs by Krishna Chowlu.

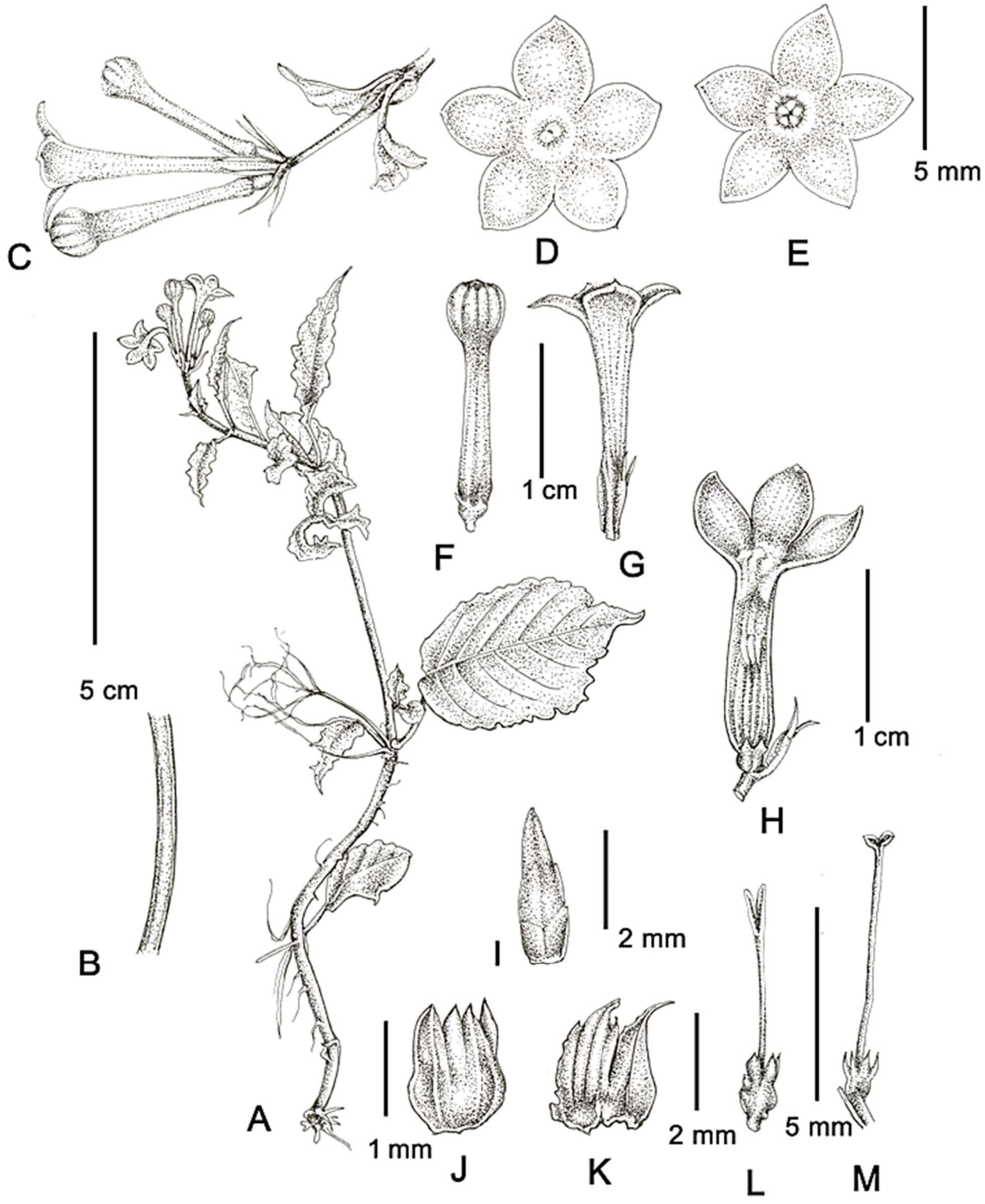

Fig. 5. ***Ophiorrhiza pemae*** **A.** Habit, **B.** Stem, **C.** Inflorescence, **D-E.** Top views of short- and long-styled flowers, **F.** Lateral view of floral bud, **G.** Lateral view of flower, **H.** Dissected view of flower, **I.** Bract, **J.** Calyx, **K.** Stipules, **L-M.** Short- and long-style pistils respectively. Drawed by O Suresh.

Description: Erect or decumbent perennial herb, 25–40 cm tall. Stem terete, dark brownish-green, pilose or arachnoid; internodes 4–5 cm long. Stipules interpetiolar, 5–6 × 3–4 mm long, ovate, apex incised-bifid, glabrous, light brownish-green. Leaves opposite and decussate; petiole terete, 1–2.4 cm long, pilose-villous, light brownish-green, adaxially minutely corrugated; lamina 2–8.5 × 1.5–4.5 cm, ovate–broadly lanceolate, apex acute-attenuate, margin undulate-entire, base cuneate-rounded, adaxially green, sub-conspicuous, glabrous, abaxially pale green, veins primary and secondary raised, veins covered with soft hairs; secondary veins 4–9 pairs on either side of the midvein. Inflorescence terminal, simple cyme, 4–4.5 cm long. Peduncle 1–2.4 cm long, terete, light greenish-brown, glabrous. Bracts and bracteoles subsimilar, 5–6 × 1–1.5 mm, ensiform-falcate, glabrous, light brown to pale green. Flowers 6–9 per inflorescence, distylous; pedicels 1–2 mm long, terete, pale green, glabrous. Calyx light purplish to pale green, 1–3 mm long; lobes, ovate-dentate, 1 mm long. Hypanthium (immature) 2 mm long, infundibuliform, glabrous, pale-green to light purplish. Corolla sympetalous, tubular, 2.3–2.5 cm long, outside glabrous and sulcate-corrugated, infundibuliform-salver towards opening, white at base, light pink to purplish towards middle and mouth. Interior densely pubescent with soft hairs from neck of corolla tube to base of corolla lobes both in short- and long-styled flowers, glabrous from base to neck of corolla tube. Corolla lobes 5, occasionally 4, 4–5 × 3–4 mm, spreading, ovate, acute-obtuse at apex, glabrous outside, inside sparsely puberulous. Long-styled flowers with stamens 5, filaments ca. 1 mm long, attached to middle portion of corolla tube, anthers linear, cream yellow, 2.5–3 mm long. Style filiform, white, up to 15 mm long; stigma micropunctate, deeply bilobed, obovate-oblong, 1–1.5 mm long. Short-styled flowers with stamens 5, filaments ca. 1 mm long, attached to neck portion of corolla tube, anthers linear, cream yellow, 2 mm long. Style filiform, white, 10–11 mm long, stigma micropunctate, bifid-bilobed, lanceolate, 3 mm long.

Fruit: Not observed during the present study; specimens were collected during the flowering stage (April 2026), prior to fruit maturation. Although mature fruit was unavailable, the placement of the new species within *Ophiorrhiza* is well supported by a combination of both vegetative and floral characters diagnostic of the genus, including the distylous flowering system, infundibuliform hypanthium, sympetalous corolla, and bilobed stigma (Deb and Mondal, 1997; Hareesh *et al*., 2017). Although fruit morphology provides additional taxonomic information, species delimitation in *Ophiorrhiza* has traditionally relied primarily on vegetative and floral characters, as reflected in recent taxonomic treatments (Hareesh and Sabu, 2018, 2022; Bhuyan *et al*., 2021).

Etymology: The specific epithet is derived from Mr. Pema Khandu, Hon. Chief Minister of Arunachal Pradesh, India for his contribution to the state developmental activities especially to the scientific activities.

Preliminary conservation assessment: *Ophiorrhiza pemae* is currently known from a single location (*sensu* IUCN, 2022) within the Vijoynagar valley, Arunachal Pradesh, India, with an area of occupancy (AOO) of 4.00 km^2. Restriction to a single location and a highly restricted AOO render the species prone to the effects of human activities or stochastic events within a very short time period in an uncertain future, and thus capable of becoming Critically Endangered or even Extinct in a very short time period. The population at this site is estimated at fewer than 2,000 mature individuals based on field observations rather than an actual population count; however, this estimate was not used as the basis for the criterion applied below, as Criterion D2 is defined by area of occupancy and number of locations rather than population size. Given the restriction of the species to a single location, and its very small area of occupancy, *Ophiorrhiza pemae* is provisionally assessed as Vulnerable (VU) under Criterion D2 (IUCN, 2022).

Phenology: Flowering: April-May; fruiting period not confirmed

Distribution: *Ophiorrhiza pemae* is presently known only from Vijoynagar, Changlang district of Arunachal Pradesh, India. (Fig. 6)

Habitat: *Ophiorrhiza pemae* is a steno-endemic species restricted to the temperate montane forests of Vijoynagar, Changlang district, Arunachal Pradesh, India, occurring within a narrow altitudinal range of 2,100–2,600 m asl. The species is highly microhabitat-specific, colonizing hygrophilous, steep, damp slopes on weathered parent rock rich in minerals, humus, and leaf litter. It thrives as a sciophytic understory element in close phytosociological association with *Begonia flaviflora* H. Hara, *Impatiens* spp., *Dryopteris* spp., Bryophyte mats, and Urticaceae taxa. This specialized community is sheltered beneath a dense, multi-tiered closed canopy dominated by mature temperate arboreal elements, specifically *Quercus lamellosa* Sm., *Lithocarpus xylocarpus* (Kurz) Markgr., *Rhododendron neriiflorum* Franch., *Acer* spp., and *Elaeocarpus* spp.

Other specimens examined (Paratypes): INDIA, Arunachal Pradesh, Changlang district, Vijoynagar, 27°16'12.6"N, 97°00'34.5"E, 2,390 m, 20 April 2026, *Vinay Kumar Sahani 57333* (ARUN!); 27°14'36.6"N 97°2'26.9"E, 2,584 m, 17 April 2026, *Vinay Kumar Sahani 57337* (ARUN!).

DISCUSSION

Ophiorrhiza shidiensis and *O. pemae* were discovered in Changlang District, Arunachal Pradesh, a botanically underexplored region situated within the Patkai Bum range of the Eastern Himalaya along the international border with Kachin State, Myanmar. This region forms

part of the Indo-Burma biodiversity hotspot and represents an important transition zone between the eastern Himalayan and Southeast Asian floristic regions. The discovery of two previously undescribed *Ophiorrhiza* species from a relatively limited survey highlights the incompletely documented plant diversity of eastern Arunachal Pradesh and suggests that additional botanical exploration is likely to reveal further taxonomic novelties. These findings reinforce the importance of northeastern India as a centre of diversity for *Ophiorrhiza* and support previous observations that many species of the genus exhibit narrow distributions associated with humid forest habitats and mountain systems (Deb and Mondal, 1997; Hareesh and Sabu, 2022; Bawri *et al*., 2024).

The two new species also occupy distinct elevation zones. *Ophiorrhiza shidiensis* occurs in moist, shaded forests between 1,100 and 2,000 m asl, spanning subtropical to temperate vegetation, whereas *O. pemae* is restricted to higher elevations (2,100–2,600 m asl) in temperate forests. This largely segregated elevational pattern is echoed in the morphological differences between *O. pemae* and its close ally, *O. himadrica*, currently known from 1,900–2,200 m in Shi-Yomi District, Arunachal Pradesh (Khanal *et al*., 2026). In addition to occupying higher elevations, *O. pemae* is taller and distinctly pubescent, whereas *O. himadrica* is comparatively shorter and glabrous. Although the ecological significance of these differences remains uncertain, we treat both taxa as species rather than as infraspecific or environmentally induced variants. Each differs from its closest allies in a combination of discrete, qualitative characters (stigma form and surface, stipule shape and apex, petiole indumentum, inflorescence; Tables 1 and 2) rather than in size alone, and these combinations were consistent across the type and paratype collections from separate localities, with no intermediates to *O. wallichii* or O. *himadrica* observed.

The present discoveries further emphasize the need for continued floristic inventories in eastern Arunachal Pradesh. Given the rugged terrain, limited history of botanical exploration, and geographic proximity to northern Myanmar, additional field surveys are expected to improve our understanding of species diversity, distribution patterns, and endemism within *Ophiorrhiza* and other understudied plant groups in this part of the Eastern Himalaya.

Key to similar species

1a. Stipules deciduous, subulate, minute (2–3 mm long); stigma lanceolate, glabrous ..... ***O. wallichii***
1b. Stipules persistent **2**
2a. Petioles pilose-villous; stipules ovate with an apex incised-bifid; corolla light pink to purplish; stigma micropunctate ..... ***O. pemae***
2b. Petioles glabrous or pubescent; stipules not ovate with an incised-bifid apex (or if stipules ovate, leaves 11–22 cm long and corolla tube 1.6–1.8 cm long) **3**
3a. Stipules ovate, deeply bifid; leaves 11–22 × 5–9 cm, glabrous; corolla tube 1.6–1.8 cm long ..... ***O. mizoramensis***
3b. Stipules not ovate and deeply bifid; leaves smaller or stipules lanceolate, triangular, subulate, or linear **4**
4a. Stipules lanceolate, entire; leaves 5–17.5 × 2.5–7.5 cm, pale green beneath; corolla tube 3.0–3.5 cm long; stigma vesicular ..... ***O. shidiensis***
4b. Stipules triangular, subulate, or linear; leaves/corolla traits not as above **5**
5a. Petioles glabrous; stipules triangular with an acute apex (0.9–1.0 mm long); filaments 2.5–3.0 mm long ..... ***O. himadrica***
5b. Petioles pubescent; stipules subulate to linear with 1–3 filiform apical lobes (3–6 mm long); filaments 0.5–0.75 mm long …..... ***O. medogensis***

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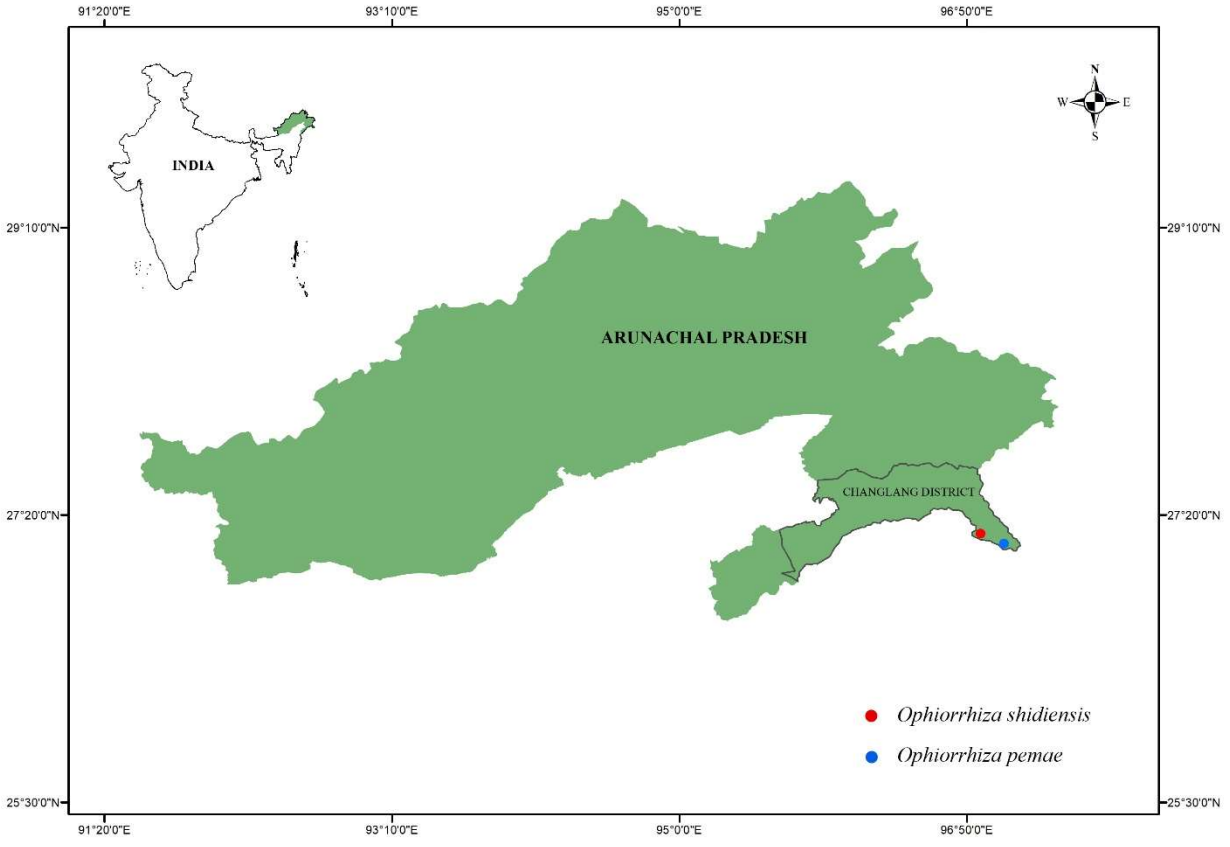

Fig. 6. Map showing the collection site of ***Ophiorrhiza shidiensis*** & ***Ophiorrhiza pemae*** By R. Lalnunfeli