
Research Article

The identity and taxonomic status of *Pedicularis rohtangensis* (Orobanchaceae) described from Himachal Pradesh, India

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Abstract: Based on a comprehensive study of type specimens, additional herbarium material, field observations and relevant literature, *Pedicularis rohtangensis* Aswal, Goel & Mehrotra is herein treated as a new synonym of *P. hookeriana* Wall. ex Benth. A detailed taxonomic description, coloured images and an identification key to the Indian species of *Pedicularis* sect. *Siphonanthae* Prain are provided to facilitate accurate identification.

Keywords: Conspecific, Himachal Pradesh, *Pedicularis himalayea*, *Pedicularis hookeriana*, *Pedicularis punctata*, *Pedicularis rohtangensis*, *Siphonanthae*

Introduction

The hemi-parasitic genus *Pedicularis* L. includes about 680 species, distributed mainly in temperate to tropical mountains and subarctic area of the world. It is the largest genus of the family Orobanchaceae (Borah et al., 2020a; Garg et al., 2024; Garg, 2025; POWO, 2025). In India, *Pedicularis* is presently represented by 85 species, 12 subspecies and 9 varieties, of which 21 species, 5 subspecies and 5 varieties are endemic to this country (Husain et al., 2010; Garg and Singh, 2015, 2020; Singh et al., 2016; Borah et al., 2020b, 2020c; Garg and Shukla 2023; Bhatt et al., 2025; Garg, 2025). The Himalayan region hosts 83 species, 12 subspecies and 9 varieties, while two species: *P. perrottetii* Benth. and *P. zeylanica* Benth. are confined to the southern Western Ghats.

Species of the genus *Pedicularis*, commonly known as louseworts, are characterized by a zygomorphic floral geometry with a basal tube splitting at apex into typically bilipped corolla, forming a

three-lobed lower, spreading, labium and a two-lobed upper, laterally compressed and distally rostrate or erostrate galea which encloses the anthers and style. *Pedicularis* species generally have short flowering periods and possess intricate floral morphologies that are often hidden or lost in herbarium processing during drying, poisoning and pressing. This poses a significant challenge to field studies and complicates species delimitation, particularly within complex groups exhibiting subtle and deceptive morphological characters (Hooker, 1884; Prain, 1890; Pennell, 1943; Yamazaki, 1988; Husain and Garg, 2003; Garg, 2009, 2025; Husain et al., 2010; Garg and Singh, 2015; Borah et al., 2020b).

Pedicularis rohtangensis Aswal, Goel & Mehrotra (1991), described from Marhi on the route to Rohtang Pass (Kullu district, Himachal Pradesh), inhabits open marshy slopes and was initially distinguished from *P. punctata* Decne. having smaller habit, being 7 to 12 cm tall, radical leaves equaling or longer than the flowering stems, cauline leaves 1–2, deeply pinnatifid, margins of pinnae non-crustaceous at serrations and flowers white in loose racemes. Based on this, *P. rohtangensis* constituted the sixth entity in *Pedicularis* sect. *Siphonanthae* Prain with ambiguity of key differences from *P. punctata* and similar to *P. hookeriana* Wall. ex Benth. Thus we decided to study the taxonomic delimitation of *P. rohtangensis* from *P. hookeriana* through critical study of protologues, field observations and herbarium collections, detailed in Table 1. Notably, the original description of *P. hookeriana* included mention of floral color variation '*Corolla rubro-purpurea vel alba*' (corolla reddish-purple or white).

More specifically, although *Pedicularis rohtangensis* could be clearly distinguished from the closer species *P. punctata* as well as from *P. siphonantha* D.Don of the sect. *Siphonanthae* in most of the characters by having radical leaves longer than stems (vs. shorter), cauline leaves petiolate (vs. sessile), pinnae margins crenulate (vs. dentate or serrate), inflorescence of terminal racemes (vs. axillary and terminal or clusters), corolla tube 2–3 times longer than calyx (vs. 4–5), galea twisted (vs. coiled) and capsules lanceolate to oblanceolate (vs. ovoid), but there were no comprehensible characters differences from *P. hookeriana* which could affirm its morphologically distinct species status. In addition, *P. rohtangensis* has an overlapping distribution with *P. hookeriana*, and all the characters reported in the protologue and illustration of *P. rohtangensis* fall well within the variability observed in field (Figure 1) and herbarium specimens of *P. hookeriana* housed at BSD, DD and LWG. This strongly supports the interpretation of *P. rohtangensis* as conspecific with *P. hookeriana*, rather than a distinct taxon.

Pedicularis sect. *Siphonanthae* (Prain, 1890) includes five species: *P. hoffmeisteri* Klotzsch, *P. hookeriana*, *P. megalantha* D.Don, *P. punctata* and *P. siphonantha*, which exhibit characters quite overlapping and causing confusion in precise species diagnosis and hence require critical specimen studies for authentic diagnosis. Here provided a taxonomic key for diagnosis of species belonging to the sect. *Siphonanthae*.

Key to the Indian species of *Pedicularis* sect. *Siphonanthae* Prain (1890)

- 1a. Flowers bright or pale yellow *P. hoffmeisteri*
- 1b. Flowers deep-pink to purple with white throat 2
- 2a. Calyx 2-lobed, deeply cleft 3
- 2b. Calyx 3 or 5-lobed, slightly cleft 4

- 3a. Galea dentate; stamens inserted at galea base *P. hookeriana*
 3b. Galea edentate; stamens inserted in upper half of the corolla tube *P. punctata*
 4a. Calyx 5-lobed; galea not auricled *P. megalantha*
 4b. Calyx 3-lobed; galea auricled *P. siphonantha*

Pedicularis hookeriana Wall. ex Benth., Scroph. Ind. 53. 1835.

Lectotype (designated by Garg and Singh, 2020): India, Uttarakhand, Kumaon, *s.d.*, *Wallich cat. n. 421* (K001110000!); isolectotype CALI.

Pedicularis himalayea Klotzsch, Bot. Ergebn. Reise Waldemar 107. 1862.

Lectotype (designated by Garg and Singh, 2020): "Illustration" Klotzsch in Bot. Ergebn. Reise Waldemar [Klotzsch & Garcke]: pl. 58. 1862.

Pedicularis rohtangensis Aswal, Goel & Mehrotra, Feddes Repert. 101(3-4): 109. 1990, **syn. nov.**

Holotype: India, Himachal Pradesh, Kullu district, Marhi, on way to Rohtang, 2800 m, 9 September 1987, *B.S. Aswal 17228A* (CDRI!).

Annual herb, erect or sub-erect, 7–25(–35) cm high, annual; stems 1–3(–6) from the base, glabrous or sparsely pubescent. Leaves both radical and cauline, ovate-lanceolate; radical leaves few, variable in length, equal or longer than the stem, deeply pinnatifid, or bipinnatisect, glabrous; pinnae distant, oblong, 4–7(–10) pairs; cauline leaves 1–2(–3) pairs, alternate, ovate-lanceolate, smaller, deeply pinnatifid, glabrous or sparsely pilose on both surfaces, petiolate; pinnae similar to radical leaves, oblong, margins crenulate, apex acute; petioles slender, 2–5 cm long. Inflorescence few-flowered terminal racemes. Flowers pedicellate, bracteolate. Bracts trifoliate, 7–8 × 2–3 mm, deeply pinnatifid, with two lateral branches at the base, glabrous; pedicels c. 1–5 mm long, glabrous. Calyx 2-lobed, deeply cleft almost to base, tubular, 10–12 × 3–3.5 mm, hirsute; lobes crested, stipitate, 5-dentate, ovate, c. 2.5 mm long. Corolla purple with white galea, base and throat, or white; tube straight, 16–25 mm long, 2–3 times longer than the calyx, ciliolate; galea base continuous with tube, sharply incurved and twisted, ridged, dentate at base, gland dotted, beak 8–9 mm long, tapering initially then slender towards the apex, surface papillose, apex unequally bi-lobed; labium lobes spreading, c. 10–21 mm, lateral lobes reniform, c. 6 × 10 mm, broader than the mid-lobe, apices slightly emarginated, mid-lobe obcordate, apex emarginate c. 6 × 7 mm, margins ciliate. Stamens inserted at galea base; anthers c. 1.5 mm long; filaments 10–12 mm long (from base), anterior pair hairy in upper half, posterior pair glabrous; anthers 1.5–2 mm long, cells narrowly elliptical, acute at base. Style protruding out of beak apex; stigma subcapitate-capitate. Capsules obliquely oblanceolate, acuminate.

Flowering and Fruiting: June–October.

Distribution: Nepal and India (Himachal Pradesh and Uttarakhand). In meadows, open hillside and glacial moraines at 2700–4833 m altitude.

Specimen examined: India, Himachal Pradesh, Kullu district, Marhi, on way to Rohtang, 2800 m, 9 September 1987, *B.S. Aswal 17228A* (CDRI); Kullu district, Marhi, on way to Rohtang, 2800 m, 4 August 2019, *A. Garg 79514* (BSA); Lahaul valley, Koksar, 3200 m, 9 August 1980, *B.S. Aswal 10575* (CDRI); Rohtang Pass, 4000 m, 24 August 1982, *B.S. Aswal 11073* (CDRI); Simla hill States, Baspa valley, Sangla Rukti Gad, 4000 m, 27 June 1939, *G. Sherriff 7358* (BM); Simla hill States, Dhaola Dhar Range,

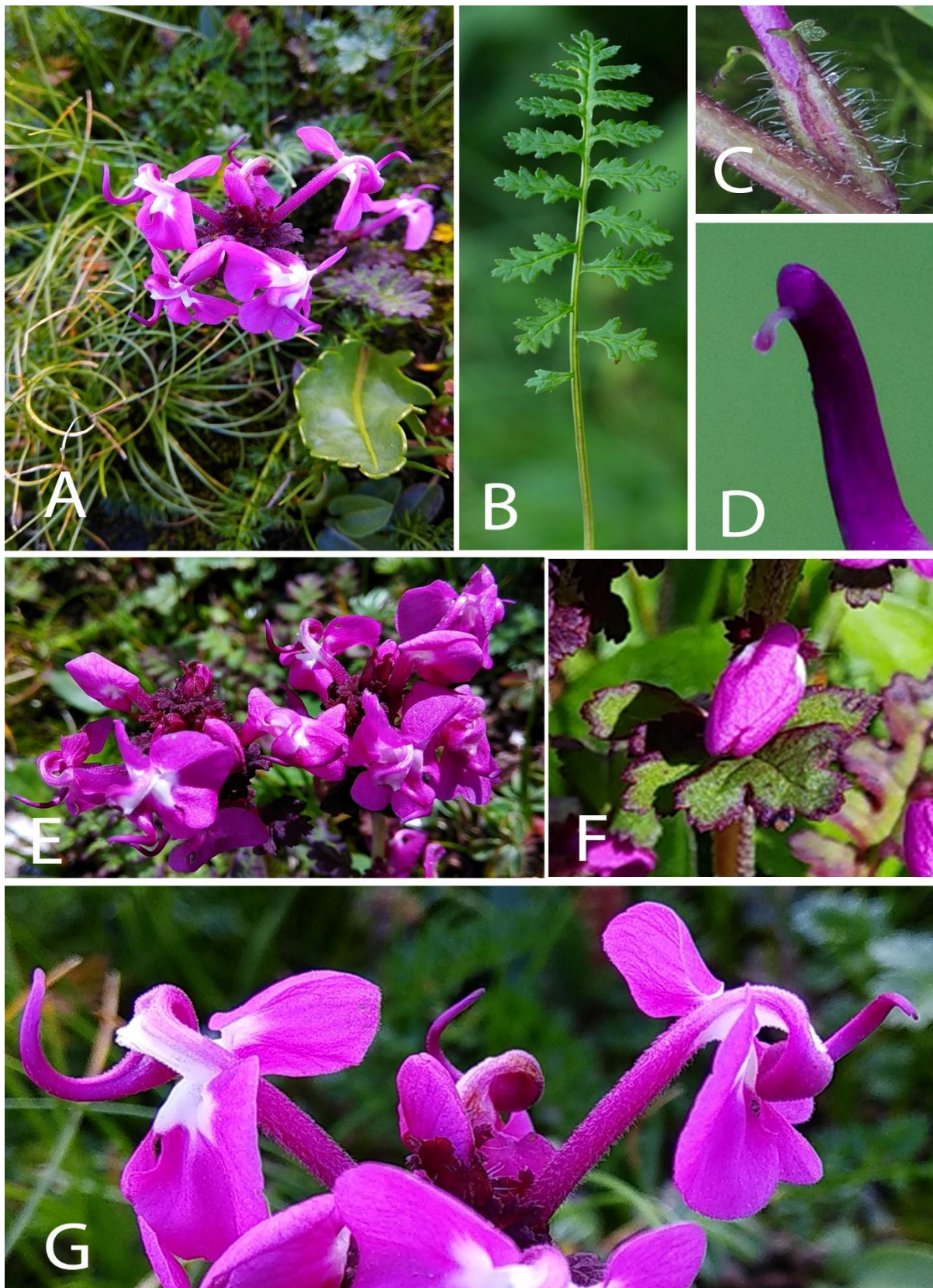


Figure 1: Field photographs of *Pedicularis hookeriana* Wall. ex Benth. from type locality of *P. rohtangensis* Aswal, Goel & Mehrotra. A. Habit; B. Close-up of cauline leaf; C. Close-up of calyx; D. Close-up of beak apex showing protruded style and stigma; E. Close-up of inflorescence; F. Close-up of bract; G. Close-up of corolla

Rupin Pass, 4833 m, 8 July 1939, G. Sherriff 7414 (BM). Uttarakhand, Almora, Phungal glacier, 4560 m, 14 June 1881, *Pharmanand* 20529 (DD); Duda, Slacur, Moraine, below Srikanta, 10 August 1883, J.F. Duthie 565 (DD); Garhwal, Kidar Kanta, 3330 m, 13 June 1904, J.R. Drummond 14841 (BM); Kumaon: Ralam valley, 4330–5000 m, 24 August 1884, J.F. Duthie 3227 (DD); Kumaon, without locality, s.d., *Wallich cat. n.* 421 (CAL); Gori valley, Parbhu, 12 August 1900, *Inayat* 24787 (DD); Ralam valley, 18 August 1900, *Inayat* 24792 (DD); Tehri-Garhwal, 4000–4430 m, 7 August 1883, J.F. Duthie 562 (BM, DD).

Table 1: Character comparison of *Pedicularis hookeriana*, *P. punctata*, *P. rohtangensis* and *P. siphonantha*.

Character	<i>P. rohtangensis</i>	<i>P. hookeriana</i>	<i>P. punctata</i>	<i>P. siphonantha</i>
Habit	Erect or suberect	Erect or suberect	Erect or ascending	Tufted
Height	7–12 cm	7–35 cm	6–35 cm	5–15 cm
Stems	1–4 from the base	Many from the root	Several	Stem-less or many from the root
Hairs	Glabrate-hirsute	Glabrous or sparsely pubescent or hirsute	Sparsely pubescent	Glabrous
Radical leaves	Equal or longer than stems; deeply pinnatifid or bipinnatisect; pinnae 4–5(–6) pairs, distant	Equal or longer than stems; deeply pinnatifid or bipinnatisect; pinnae generally 4–7 pairs, sometimes up to 10 or more pairs, distant	Shorter than stems; pinnatifid; pinnae 3–6 pairs, close	Shorter than stems; pinnatisect; pinnae 8–9 pairs, close
Cauline leaves	1–2(–3) pairs, alternate, petiolate; pinnae margins crenulate	1–3 pairs, alternate, petiolate; pinnae margins crenulate	1–4 pairs, alternate, sessile; pinnae margins serrate	8–9 pairs, alternate, petiolate; pinnae margins dentate
Inflorescence	Terminal racemes	Terminal racemes	Axillary and terminal racemes	Dense terminal cluster

Calyx	Tubular up to 10 mm long, crested, 2-lobed, foliose	Tubular up to 10 mm long, crested, 2-lobed, foliose	Tubular, up to 11 mm long, crested, 2-lobed, foliose	Tubular-campanulate, up to 12 mm long, 3-lobed, foliose
Corolla	White, pedicellate	Red-purple or white, pedicellate	Purple with white throat, pedicellate	Purple-crimson with white throat, pedicellate
Corolla tube	16–25 mm long, ciliolate, 2–3 times longer than calyx, ciliolate	15–25 mm long, hairy, 2–3 times longer than the calyx, ciliolate	2–4 times longer than the calyx, hairy	3–5 times longer than the calyx, glabrous
Galea	Sharply curved, twisted, gradually narrowed to apex, gland dotted. apex unequally bi-lobed	Sharply incurved, twisted, gradually tapering to apex, gland dotted, apex unequally bi-lobed	Circinately incurved, twisted, continuing into a long sharp beak, glabrous, apex deeply notched	Sharply coiled, twisted, tapering to a slender beak, glabrous, apex unequally bifid
Labium	Lobes emarginated, midlobe narrower	Lobes emarginated, midlobe narrower	Lobes emarginated, midlobe narrower	Lobes emarginated or rounded, midlobe narrower or equal
Filaments	Anterior pairs pilose	Anterior pair pilose	Anterior pair with few sparse hairs	Anterior pair hairy
Anthers	2–4 mm long	1.5–4 mm long	c. 2 mm long	c. 1.5 mm long
Capsules	Obliquely lanceolate, acuminate	Obliquely oblanceolate, acuminate	Ovoid	Ovoid

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