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A New *Corydalis* (Fumariaceae) from Western Himalaya, India

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ABSTRACT: A new species of *Corydalis* (Fumariaceae), *C. kedarensis* Pusalkar & D. K. Singh is described and illustrated from the Western Himalaya, India. Novelty is allied to *C. govaniana* Wall., but differs in many important morphological characters of habit, cauline leaves, bracteole, pedicel, petal, spur and capsule. A table to distinguish the novelty from allied species along with the comments on other allied species is provided.

KEY WORDS: *Corydalis*, Western Himalaya, India, Uttarakhand, Gangotri National Park.

INTRODUCTION

A new species of *Corydalis* (Fumariaceae) is described based on the study of the recent collections from the Western Himalaya (Garhwal) along with the old material of the genus housed in the herbarium of the Botanical survey of India, Northern Circle, Dehradun (BSD), Forest Research Institute, Dehradun (DD) and Central National Herbarium, Howrah (CAL) as a part of the ongoing "Flora of Uttarakhand" followed by the scrutiny of literature (Wallich, 1825; Hooker and Thomson, 1855; Hooker, 1872; Prain, 1896; Movat and Chater, 1964; Royle, 1970; Wendelbo, 1974; Jafri, 1974; Polunin and Stainton, 1984; Long, 1984; Popov, 1985; Stainton, 1988; Lidén, 1989; Ellis and Balakrishnan, 1993; Press et al., 2000; Zhang et al., 2008).

TAXONOMIC TREATMENTS

Corydalis kedarensis Pusalkar & D. K. Singh, *sp. nov*. Fig. 1

Corydalis govanianae Wall. affinis, sed plantis sparse pappillatis; caulino-foliis 1–3 (–5), alternatis, marginibus et venis manifeste pappillatis; racemis ramosis; bracteolis angustis, dense pappillatis, pinnatisectis vel in segmenta ramosis, segmentis linearibus, saepe curvatis; pedicellis bracteolis longioribus; supero-petali labio apice acuto ad breviter acuminato plus minusve punctatis; supero-petali dorsalio-ala plus minusve triangulari, undulata, versus apicem contracta; calcari gracili, contracto; interioro-petalis non atro-apiculatis; infero-petali labio angusto, dorsalio-ala undulata; ovariis et fructibus pappillatis differt.

Type (here designated): India, Western Himalaya, Uttarakhand, Uttarkashi district, Gangotri National Park, on way to Kedarkharak, Bhoj kharak slopes, 3500–4000 m, 06/Aug./2003, *Pusalkar* 103885 (holotype: BSD; isotype: BSD)

Perennial herb, 12–60 cm high; rootstock rhizomatous, thick taproot-like, crowned with remnants of broad, scarious petiole bases. Basal leaves many, spreading or erect, long petioled; petiole up to 20 cm long, glabrous or glaucous, sparsely to moderately pappillate, conspicuously so along margins, base broadened, sheathing; lamina 2–3-pinnate or -pinnatisect, 3–15 x 2–8 cm, oblong or ovate-oblong in outline; foliage glaucous; primary pinnae 3–4 pairs with terminal pinna, obovate or suborbicular in outline, cuneate, 2.5–4.5 x 2–4 cm; lower pinnae petioluled, subsessile to sessile above; ultimate segments oblanceolate or linear-oblanceolate, rarely linear-oblong, 4–15 x 1.5–5 mm, acute or rounded, cuspidate, subacuminate in uppermost leaves. Cauline leaves 1–3(–5), alternate, lower petioled with sheathing petiole base, upper subsessile; lamina 2-pinnatisect or pinnate with pinnatisect pinnae, reduced upwards, similar to basal leaves. Flowers yellow, 15–20 mm long, 12–28, arranged in branched raceme on flowering scapes arising from the axis of basal leaves; racemes somewhat capitate when young, elongated later; bracts leafy, pinnatisect with linear-elliptic segments; bracteoles pinnatisect with narrowed, linear-filiform, often curved segments; uppermost bracteoles linear; pedicels longer than bracteoles, glabrous or glaucous. Sepals 2, opposite, ovate to cordate, 0.5–1 x 0.5–1 mm, white, membranous with lobed or fimbriate-dentate margins, glabrous. Petals 4: upper petal 15–20 mm long, lamina 8–10 mm long, apex acute or shortly acuminate, pointed, winged (crestate) on back, with somewhat triangular wing, tapering to the apex on one side and spur base on the other side with undulate margins, sometimes slightly extended on spur, spur 7–10 mm long (half as long as flower or nearly as long as lamina of upper petal), slender, tapering; nectary fused with the

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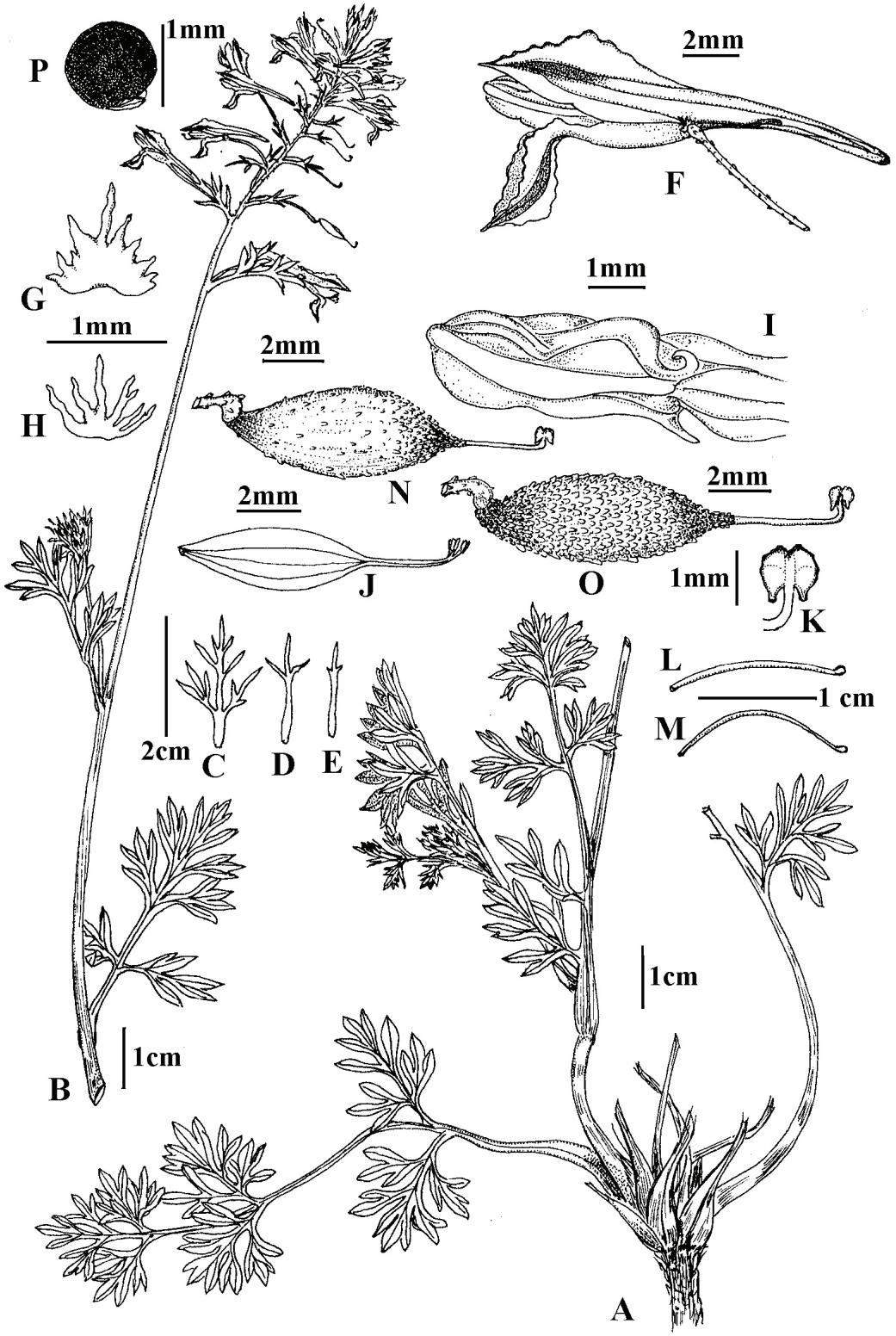


Fig. 1. ***Corydalis kedarensis sp. nov*****. A: Plant base. B: Flowering twig. C-E: Bracteoles. F: Flower. G, H: Sepals. I: Inner petal. J: Phalange with anthers. K: Stigma. L, M: Fruiting pedicels. N, O: Fruit. P: Seed. (drawn by Prashant Keashav Pusalkar from the** ***holotype*****).**

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Table 1. Comparison of diagnostic characters of *C. govaniana* Wall. and *C. kedarensis, sp. nov*.

Characters	*C. govaniana*	*C. kedarensis*
Habit	Up to 20 cm high	12–60 cm high
Cauline leaves	2, opposite or subopposite; Glabrous	1−3 (–5), alternate; Glaucous, sparsely to moderately pappill along margins and on veins.
Ultimate leaf segments	Oblong-oblanceolate	Linear to oblanceolate
Raceme	Simple (not branched)	Branched
Bracteoles	Glaucous; All entire except lower bracteoles	Glaucous, pappillose along margins and on veins; All pinnatisect except upper bracteoles
Pedicels	Glabrous Shorter than bracteoles	Sparsely pappillate Longer than bracteoles
Upper/lower petal lip apex	Rounded or obtuse	Acute or shortly acuminate, pointed
Dorsal wing of upper/lower petal	Rounded or subrounded, entire, slightly exceeding limb apex	Somewhat triangular undulate, somewhat wavy, not exceeding limb apex
Inner petal tips	Black-tipped	Not black-tipped
Spur	Moderately robust, not tapering	Slender, tapering
Ovary	Glabrous	Pappillate
Capsules (Pods)	Oblong-obovoid, glabrous	Oblong-oblanceoid, pappillate

lower wall of spur, extended up to the middle or just behind the middle of the spur (3.4–5 mm long) with distal, 1-2 mm free apical part ending in knob-loke apex; lower petal 8–10 mm long, apex acute or shortly acuminate; lamina 4.2–5 mm long, deflexed at maturity, winged (crestate) on back with somewhat triangular, undulate wing, tapered to the apex; lower petal base subsaccate or not saccate; inner petals 2, cohering at the tip with 4–5 mm long lamina, winged, basally clawed; claw 0.7–1 mm long, hooked or curved. Stamens 6, in two bundles; each bundle with one dithecous and two monothecous anthers; phalange forming membranous covering around the carpel, 3–7 mm long; anthers yellow, oblong, 0.5–1 mm long, reaching the stigma. Carpels 2, united; ovary narrowly elliptic, pappillate, 3–5 mm long; style 2–3.5 mm long, apically upwardly curved at almost right angle; stigmas 2, united, rounded, minutely notched at apex, with basal lobes. Capsules (pods) ellipsoid, sometimes oblong-oblanceoid, 5–12 mm long, green or yellowidh green, densely pappillate or with papillae sparse on body and dense at to below the base of the persistent style; seeds 3-7, sub biseriate, rounded, 1–2 mm across, black, glossy, microscopically puncticulate with attached caruncle.

Flowering and Fruiting: July–October

Ecology: Moist places, often along streams in alpine meadows.

Altitude range: 3500–4300 m.

Abundance: Common.

Distribution: India (Western Himalaya: Uttarakhand).

Additional specimens examined: UTTARAKHAND: Uttarkashi District, Tehri Garhwal (now in Uttarkashi district), Nila valley (now in Gangotri National Park), 4550–4850 m, 16 Aug. 1883, *J.F. Duthie 950* (DD); Tehri Garhwal, Rudughera (Rudragaira valley), 4550–4850 m, 20 Jul. 1883, *J.F. Duthie 950 c* (DD); Tihri Garhwal (now in Uttarkashi district), Dudu Gad under Srikantha, 4250–4550 m, 09 Aug. 1883, *J.F. Duthie 950 a* (DD); Uttarkashi, on way to Barasu Pass, 21 Aug. 1996, *B. Balodi 92237* (BSD); Western Himalaya, Uttarakhand, Uttarkashi district, Gangotri National Park, on way to Kedarkharak, 3700–4000 m, 31/Jul./2003, *Pusalkar 103943* (BSD); 06 Aug. 2003 , *Pusalkar 104216* (BSD); Kedar kharak–Rudragaira route, 3800–4000 m, 05 Aug. 2003, *Pusalkar* 103836 (BSD); Kedar kharak, 07 Aug. 2003, 3800–4000 m, *Pusalkar 105203* (BSD).

Etymology: The species is named after the type locality in the Kedar (Ganga) valley in the Gangotri National Park, Uttarkashi district, Uttarakhand, India. The valley is itself named after the Lord of the Himalaya, the Shiva, also known as the Kedar.

Comments: This remarkable *Corydalis*, was collected recently by P.K. Pusalkar in the Gangotri National Park. The detailed study on the old collection in BSD, DD and CAL revealed additional material collected from the various localities in Uttarkashi district of Uttarakhand state of India, which were erroneously referred to *C. govaniana* Wall., the most common species in the Western Himalaya. A close-look, reveals striking differences between two allied species. The diagnostic characters of the new species includes foliage, petioles, pedicels and inflorescence axis being pappilate; densely to sparsely pappillate pods; acute or shortly acuminate, pointed apices of the upper and lower petals lips; uneven, undulate margin of somewhat triangular wings (crest) of upper/lower petals; slender spur; most of the bracteoles (except upper) pinnatisect with filiform, densely pappillate often curved or recurved segments and pedicels longer than bracteoles. It is also allied to *C. moorcroftiana* Hook.f. & Thomson, in having pappillate foliage but the later species differs in having ultimate leaf segments obovate to sub orbicular; non tapering, curved, robust spur; dorsal wing (crest) of upper/lower petals rounded, entire; petal apex obtuse; most of the bracteoles linear, entire, as long as pedicels and glabrous pods. Table 1 gives comparative account of diagnostic characters to distinguish *C. kedarensis* from *C. govaniana.*

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記一產自印度西喜馬拉雅地區之黃堇 (紫堇科) 新種

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摘要：本文繪圖並描述一產自印度西喜馬拉雅山地區之紫堇科黃堇屬新種：*Corydalis kedarensis* Pusalkar & D. K. Singh。本新種與其相近種：*C. govaniana* Wall. 區別在於許多重要的形態特徵，例如其習性、莖生葉、小苞片、花梗、花瓣、距及蒴果。本文亦提供一表格描述此新種和其他相近種類之區別特徵。

關鍵詞：*Corydalis*、西喜馬拉雅、印度、Uttarakhand、Gangotri 國家公園。

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