

RESEARCH ARTICLE

Corydalis adhikarii (Fumariaceae), a new alpine species from Dibang Valley district, East Arunachal Pradesh, India

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Article No: MLJBR08; Received: 13.08.2022; Reviewed: 16.10.2022; Revised and Accepted: 27.11.2022; Published: 31.12.2022

Doi: <https://doi.org/10.5281/zenodo.8275369>

Abstract

Corydalis adhikarii is described as new to science. It is an alpine species, similar to the presumably related vicariant species *C. pseudoadoxa* from NW Yunnan, SE Tibet and N Burma, but clearly differs from this in taller stature, glaucous adaxial leaf surface, lax racemes, more divided bracts, longer stiffer pedicels, and much larger flowers with up-turned spur and broadly auriculate outer petals. Photos and line drawings of the new species are provided, and the differences to *C. pseudoadoxa* are outlined. Notes on the ecology and phenology of the new species are given.

Keywords: *Corydalis*; New Species; Fumariaceae; Alpine Flora; Dibang Valley; Arunachal Pradesh

1. Introduction

The extremely rich flora of Dibang Valley District (East Arunachal Pradesh), includes several still undescribed species, especially (but not exclusively) at alpine levels. A floristic report from a small area East of Anini was published by Lidén and Adhikari (2019), in which it was hinted at undescribed species of the genera *Corydalis*, *Stellaria*, *Gentiana* and *Koenigia*. I here take the opportunity to describe one quite unique species of *Corydalis*, recorded photographically by Alister Adhikari already in 2013 (Figure 1), but not collected until 2017.

2. Description

Corydalis adhikarii Lidén, *sp. nov.*

Type: India, Arunachal Pradesh, Dibang Valley district: East of Anini (28°49'03"N; 96°02'59"E), 3900 m, in herb-rich alpine meadow. 10 September 2017. A. Adhikari & M. Lidén 1 (ASSAM, holotype) (Figure 3). Related to *Corydalis pseudoadoxa* (C.Y. Wu & H. Chuang) C.Y. Wu & H. Chuang (sect. *Fasciculatae* ser. *Fusiformes*) (Zhang Ming-Li et al., 2007) from SE Tibet, NW Yunnan and N Burma, to which it is similar in prominent overwintering bulb (ca 5 mm wide), narrowly oblong sessile storage roots, ternately divided radical leaves with deeply cut obovate-oblong leaflets that are strongly glaucous abaxially, stem without or with a single cauline leaf, long pedicels which are straight and erecto-patent in fruit, blue flowers, sepals minute, outer petals acute at apex and prominently crested, and similar fruit, stigma and seed. *Corydalis adhikarii* is, however, easily distinguished by taller stature, glaucous adaxial leaf surface, lax raceme, more divided bracts, longer stiffer pedicels, and larger flowers with up-turned spur and broadly auriculate outer petals.

Etymology: The species is named in honour of Alister Adhikari, a naturalist from Kalimpong (Sikkim), who was the first to record this species (by photograph in 2013), and took me to the locality and collected the type specimen in 2017.

Description: Herbs, perennial, 9–30 cm tall, glabrous; stems, as well as petioles of radical leaves, basally (towards the point of attachment to the rhizome) attenuate into a weak almost filiform underground part. Rhizome small, vertical, 0.5–1 cm, with several narrowly oblong storage roots 15–50 × 1.5–2 mm. Apical bulb prominent, white, rounded, 5–10 × ca 5 mm, of pale fleshy ovate scales (Figure 2B).



Figure 1. *Corydalis adhikarii*, close to the type locality at 3850 m (Photo: Alistair Adhikari, 2013).

Radical leaves 4 to 7; petiole 8–25 cm; blade glaucous on both sides, 3–4 cm, slightly fleshy, ternate; leaflets sessile to shortly petiolulate, cuneate at base, the two lateral ones deeply cut (can appear as 5 separate leaflets); lobes again shallowly to deeply 2- or 3-divided; ultimate lobes oblong to oblanceolate or obovate, obtuse

or often mucronulate, usually with a reddish margin. Stems 1–4, erect to suberect, green or purplish, without leaves or with 1 deeply 3- to 5-digitate leaf up to 3 cm long.

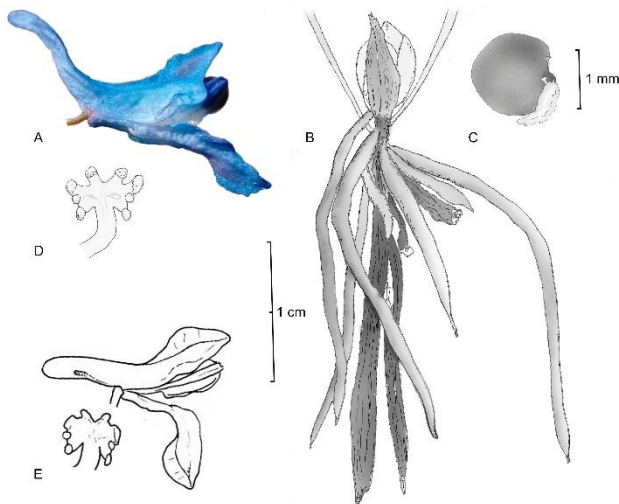


Figure 2. *Corydalis adhiikarii*, details. A. Flower; B. Underground parts, showing terminal over-wintering bulb and two generations of fleshy storage roots (those from the previous year darker and longitudinally wrinkled); C. seed; D. Stigma; E. Flower and stigma of *C. pseudoadoxa* (from Lidén, 2009). The 1 mm bar refers to seed and stigmas; the 1 cm bar refers to flowers and underground parts.



Figure 3. *Corydalis adhiikarii*, parts of the type specimen (ASSAM, unmounted).

Raceme lax, 4–9 cm, 6–15-flowered, slightly elongating in fruit. Lowermost bract often rather leaf-like, subsessile to shortly stalked, obtriangular, ± deeply divided into 3 to 5 ovate to oblanceolate lobes, 15–30 mm long; bracts successively smaller and less divided towards the apex of the raceme; the upper ones invariably narrowly oblong, entire, 5–10 mm. Pedicel erecto-patent, stiff, 10–17 mm in flower, 20–30 (–40) mm in fruit. Sepals triangular to rounded in outline, pale pinkish, ca 0.5 mm, deeply cut into several acute lobes. Corolla a deep celestial blue; outer petals often with a purplish tint along the keels towards the apex; inner petals pale in basal half and with dark blue apex (Figure 2). Outer petals acute at apex, but with broad rounded subapical lateral auricles; dorsal crests 1.5–2 mm wide, tapering to both ends, not or only slightly decurrent on spur; spur of upper petal 9–12 mm long, usually up-turned and often (sub)sigmoid (Figure 2A). Nectary ca 3/5 as long as spur, obtuse at apex. Lower petal 11–13 mm long, apical half usually bent downwards. Inner petals 9–10 mm, pale at base, dark blue apically; apical dorsal crests low, rounded, slightly overtopping petal apex. Stigma flat with 4 broad simple papillae in apical half; geminate (double) papillae laterally as well as on triangular basal lobes (Figure 2D). Capsules sharply

reflexed from erecto-patent to almost patent pedicels, narrowly elliptic, somewhat flattened, 15–25 × 2.5–3 mm (including 3–4 mm long apically upturned style) 3- to 9-seeded, green or brown with green veins. Seeds ca 1.2 mm, rounded, almost smooth, with rather small elaiosome (Figure 2C).

Flowering and fruiting: Flowering (estimate) from late July to early October; fruiting from August to October. The flowering time of an individual plant may be quite long, due to production of late flowering shoots (Figure 1).

Habitat ecology: Occurring from 3850 to 4050 m (and probably beyond), in herb-rich alpine meadows, but also among pebbles or in cliff crevices, and then usually rather dwarf. When growing in taller vegetation, it may reach 30 cm, and an axillary raceme is sometimes produced from the cauline leaf.

Distribution: Yet only known from the type locality and its immediate surroundings, and here fairly widely scattered, though not frequent. I counted a couple of hundred flowering plants in early September 2017, and it is a fair guess that the population numbers at least several thousand individuals. It was first photographed in the same place by Alister Adhikari and Pascal Brüggeman in September 2013 (Figure 1).

Accompanying plants include, for example *Hymenidium davidii* (Franch.) Pimenov & Kljuykov, *Cremanthodium phyllocladum* S.W.Liu, *Swertia tibetica* Batalin, *Patrinia speciosa* Hand.-Mazz., *Meconopsis prainiana* Kingdon-Ward, *Bistorta griffithii* (Hook.f.) Grierson, *Bistorta macrophylla* (D.Don) Soják, *Aruncus gombalanus* (Hand.-Mazz.) Hand.-Mazz., *Platanthera bakeriana* (King & Pantling) Kraenzlin and many others (see also Lidén and Adhikari, 2019).

3. Discussion

This very distinct new species is most probably related to *C. pseudoadoxa*, based on the comparatively large overwintering bulb situated apically on a small vertical rhizome, the glaucous ternately divided cauline leaves, the blue crested flowers and the similar fruit, seed and stigma (Figure 2E; Lidén, 2009). It is, however, readily distinguished by its higher and more erect stature, long-stalked radical leaves with lamina glaucous on both sides, lax raceme with long stiff fruiting pedicels, and larger flowers with upturned sigmoid spur and broadly auriculate outer petals. Phytogeographically, there are very strong links between the alpine parts of NE Arunachal Pradesh and SE Tibet/N Burma/NW Yunnan (Lidén and Adhikari, 2019; Lidén and Bharali, 2020), and it would not be unexpected if this species turns up close to the border on the Tibetan side, or in parallel mountain ridges of East Arunachal Pradesh.

Acknowledgments

I extend my sincere thanks and appreciation to my comrades of the 2017 Anini expedition, to all herbaria that have put material at my disposal (ARUN, ASSAM, BM, BSI-DD, CAL, DD, E, HNWP [through CVH-web], K, KUN, PE), and to editors and reviewers for swift processing and insightful comments.

Author's contributions

Author have conceptualized the work and carried out in the field, and finalized the manuscript.

Conflict of interests

Author has no conflict of interest

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