

NEW SPECIES OF *CORYDALIS* FROM BURMA, BHUTAN AND INDIA

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The following species of *Corydalis* (*Fumariaceae*) are described: *C. enantiophylla*, *C. birmanica*, *C. leptophylla* and *C. farreri* from Burma (Myanmar), *C. leptantha* from Bhutan, and *C. uranoscopa* from India (Kumaon).

Keywords. Flora of Bhutan, flora of Burma, flora of India, *Fumariaceae*.

INTRODUCTION

Geographically restricted accounts of the Himalayan species of *Corydalis* have been presented by Prain (1896), Jafri (1974), Long (1984), Zhuang Xuan & Su Zhi-yun (1985) and Lidén (1989), and a revision of the mainly Himalayan section *Fumarioides* Lidén was made by Lidén (1995). There still remain, however, a small number of miscellaneous undescribed species, which are hereby validated. Apart from *C. uranoscopa* they are taxonomically isolated, and their sectional affinities are obscure due to the lack of basal parts in the collections.

THE SPECIES

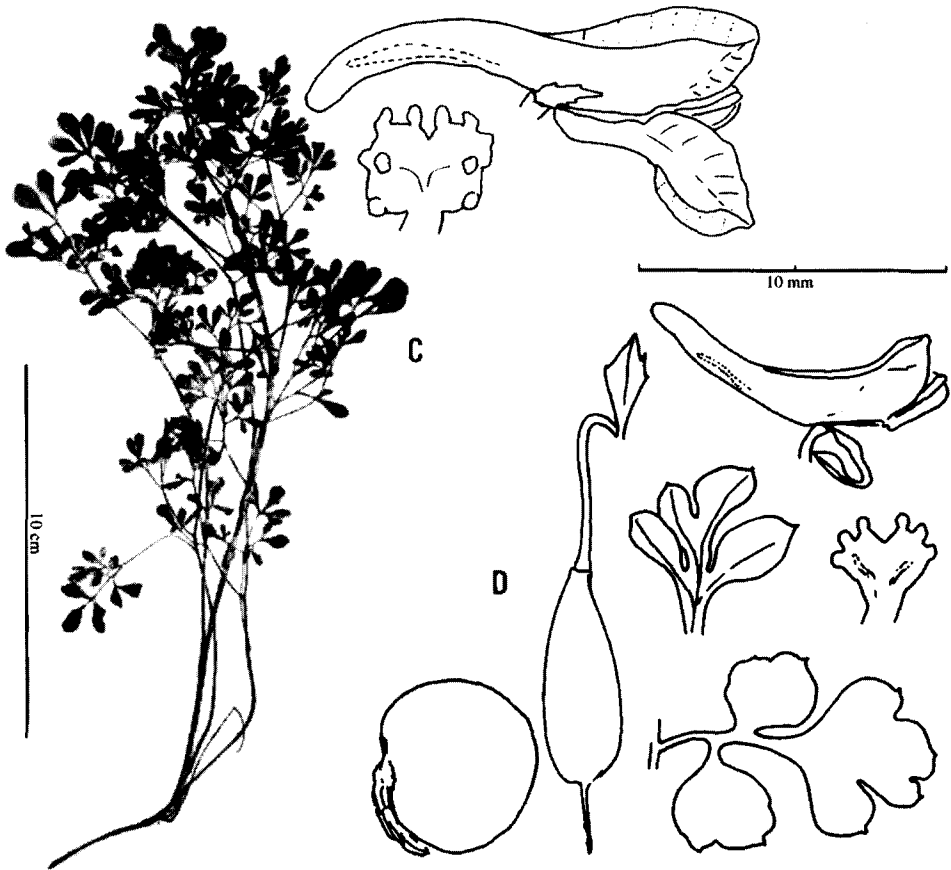
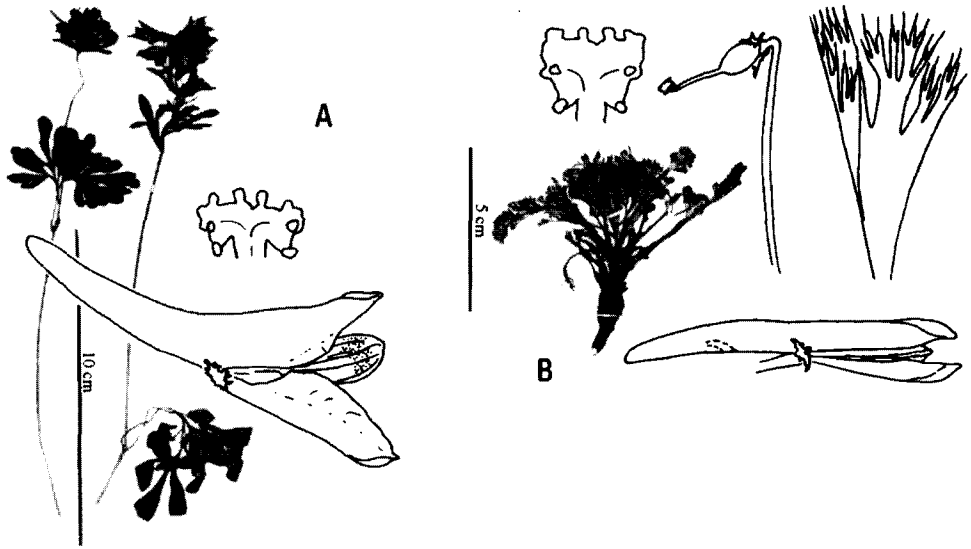
***Corydalis enantiophylla* Lidén, sp. nov. Fig. 1A.**

Caulis tenuis erectus simplex inferne nudus superne bifolius foliis oppositis biter-natis lobis anguste obovatis integris obtusis. Inflorescentia racemosa subumbellata. Pedicelli filiformes. Bracteae inferiores divisae, superiores integrae. Corolla coerulea breviter et anguste cristata calcari attenuato leviter sursum curvato.

Type: Burma, Laktang (26°13'N, 98°25'E), 'amongst tall herbs in meadow, steep south-facing slope, flowers intensely brilliant blue', 2800m, 22 vii 1919, *F. Kingdon Ward* 3356 (holo. E).

(sect. *Fasciculatae*?) Roots, perennating parts, and radical leaves unknown. Stems very slender, with thin tapering bases, 20–30cm below the leaves, 7–14cm above. Leaves two, truly opposite, with the petiole-margins joined across the node, stalked, irregularly biternate; leaflets with obovate, narrowly cuneate, obtuse lobes. Leaves and bracts densely and minutely papillose, glaucous beneath. Racemes dense, subumbellate, c.10-flowered, simple or basally branched, elongating in fruit. Lower and middle bracts deeply cut into oblanceolate obtuse lobes, upper ones entire; lower bracts longer, upper bracts shorter than the thin, 5–12mm long pedicels. Sepals

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deeply and sharply dentate, up to 1mm broad and slightly shorter. *Corolla* brilliant blue. *Outer petals* very shortly and narrowly cristate, acute. *Spur* tapering, slightly upwardly arcuate, 10mm long. *Lower petal* with a short claw and a more or less rhombic limb. *Inner petals* 8mm long, with a subapical dark blotch and with dorsal crests not surpassing the apex. *Stigma* broader than long with pronounced basal horns with geminate papillae, a pair of lateral geminate papillae, and 4–6 apical simple papillae, of which the outer ones are broad and diffuse. *Fruit* unknown.

Known only from the type specimen.

The slender tapering stem-base and the brilliant blue flowers (somewhat similar to those of *C. yargongensis* C.Y. Wu) indicate that it may belong in sect. *Fasciculatae*, but it differs from all species in that section in its opposite leaves.

***Corydalis birmanica* Lidén, sp. nov. Fig. 1C.**

Caulis 5–6-foliatus foliis pinnatis pinnis ternato-divisis foliolis profunde lobatis lobis obovatis mucronatis. Bracteae inferiores divisae, superiores integrae. Pedicelli validi, fructiferi recurvati. Corolla lutea late cristata calcari attenuato deorsum curvato.

Type: Burma, valley of the Seinghku (28°10'N, 97°20'E), 'steep rocky gravel slopes in a slate gully, in clumps, flowers dull yellow, foliage glaucous', 3700–4000m, 12 x 1926, *F. Kingdon Ward 7575* (holo. K).

Roots and perennating parts unknown. Growing 'in clumps'. *Stems* 11–23cm with 5–6 leaves, not or sparsely branched. *Lower leaves* stalked, pinnate with 3–4 sparsely set long-stalked primary leaflets that are ternately divided into short-stalked secondary leaflets, which are again cleft almost to the base into 3–4 obovate mucronate lobes. Upper leaves sessile. *Racemes* c.8-flowered, elongating in fruit. *Lowermost bracts* leaf-like with 2 pairs of pinnae, upper ones entire, clavate. *Pedicels* recurved in fruit, stout, 5–9mm in flower, elongating to 9–13mm in fruit. *Sepals* 1–2.5mm long, up to 1mm broad, dentate. *Corolla* dull yellow. *Outer petals* rather broad, broadly crested. *Spur* 10–12mm, downwardly directed, slightly tapering towards the obtuse apex, with a prominent nectary more than $\frac{3}{4}$ of its length. *Lower petal* with basal pouch. *Inner petals* 7–8mm. *Stigma* squarish. *Ovary* ovoid, 5 × 2mm with 7 ovules. Fruit and seeds unknown.

Known only from the type specimen.

A taxonomically isolated species whose sectional affinity remains obscure, partly because of the lack of basal parts.

FIG. 1. Whole plants, flowers, and stigmas of: A. *Corydalis enantiophylla* (left plant in bud), B. *C. uranoscopa* (also fruiting pedicel and bract; *Koelz 21101, RAW*), C. *C. birmanica*, D. *C. leptantha* (also seed, fruiting pedicel with upper bract, lower bract, and leaflet). Right-hand 10mm scale bar refers to line-drawings (excluding stigmas, which are 4 × more magnified).

Corydalis farreri Lidén, *sp. nov.* Fig. 2B.

Caulis subflexuosus ramosus foliatus foliis biternatis lobis oblanceolatis subtus papillois. Bracteae inferiores ternato-divisae, superiores integrae. Corolla lutea late cristata. Capsula obovoidea papillosa.

Type: North Burma, Moku-ji pass, 'cliff chinks in the shadier moister aspects of the highest alpine granites, foliage rather dark and glaucous, flowers yellow', 3700m, 4 viii 1920, *R. Farrer* 1811 (holo. E).

Roots and perennating parts unknown. *Radical leaf* (one only seen) triternate, triangular in outline; leaflets stalked, deeply biternatisect with small oblanceolate mucronate segments, dark and glaucous, papillose beneath, grossly so on the veins, more finely papillose between them. *Stems* 20–40cm (?), leafy, branched. *Cauline leaves* biternate, like the radical. *Upper leaves* sessile. *Racemes* up to 10-flowered (or lateral ones more few-flowered), rather dense, terminal and axillary from the upper leaves. *Lower bracts* ternate to ternatisect: upper bracts entire. *Pedicels* 4–10mm in flower, 8–12mm, and often recurved in fruit. *Sepals* c.1mm, deeply dentate. *Corolla* yellow with darker keels and apex. *Outer petals* broadly cristate, with a straight 7–9mm long spur. *Inner petals* 8–9mm long. *Young fruit* obovoid with densely papillose ridges, 9 × 2mm with 2.5mm long style.

Known only from the type specimen; named after its collector, Reginald Farrer.

Due to the lack of basal parts, the sectional affinity of this species cannot be settled with certainty. It bears a vague resemblance to some species in the sect. *Fasciculatae*.

Corydalis leptantha Lidén, *sp. nov.* Fig. 1D.

Radix ignota. Caules decumbentes(?) debiles valde ramosi foliati. Folia bipinnata subtus glauca, superne viridia, foliolis ultimis parvis leviter divisis. Racemi spicati, 5–10-flori, bracteis parvis ultimis integris basalibus divisis. Corolla parva, lutea, parce cristata; calcar tenue 6mm longum nectario 4mm longo praedito. Capsulae obovoideae, truncatae, 5–10-spermae. Semina parva, nitida, nigra. Stigma cum sex papillis brevibus simplicibus.

Type: Bhutan, Thimphu district, on the ridge running south from Dochu La, 'disturbed path-side in very moist broad-leaved forest', 3300m, 17 ix 1989, *J.R.I. Wood* 7176 (holo. E).

(sect. *Ramoso-sibiricae* Fedde ex Wendelbo) Presumably a tap-rooted annual, but basal parts unknown. *Stems* angular, weak, much branched; main stem several dm long; lateral branches 10–15cm. *Leaves* bipinnate, green above, glaucous beneath, ovate-triangular in outline. *Lamina* 4–5cm long, 5–7cm broad at base. *Petioles* c.4cm long, sheathing at base, narrow and slender. Primary leaflets stalked, in 2 or 3 pairs; petiolules slender. Secondary leaflets shortly stalked, almost orbicular, entire to shallowly divided into broad, obtuse, shortly mucronate lobes, sometimes again divided into 3 tertiary leaflets. *Racemes* 5–10-flowered, dense at anthesis, rather lax in fruit. *Lower bracts* divided into 3–4 obovate lobes; middle and upper ones entire or with a few lateral teeth, equalling or usually slightly longer than the pedicels, which are

2–3mm in flower, up to 6mm, and basally strongly recurved in fruit. *Flowers* yellow, 9mm long. *Upper petal* with a very narrow crest and a long straight slightly tapering *spur* 6mm long, equipped with a 4mm long nectary. *Inner petals* 4mm long, pale at apex. *Stigma* with six short simple papillae. *Capsule* 7 × 2.5mm, obovoid, 5–10-seeded. *Style* 1.5–2mm. *Seeds* 1.2mm, shining black, smooth, with a strap-shaped elaiosome.

Known only from the type specimen.

Corydalis leptantha seems taxonomically isolated, although a relation with *C. cornuta* Royle could be suggested. *C. cornuta* is similar in form and texture of leaves and racemes, but has a stigma rather like that of *C. leptophylla* (Fig. 2A), a common stigma type in the genus. The type specimen of *C. leptantha* is a half-withered stem from which axillary branches arise. Presumably, the plant has had a more upright position, but fell over, and produced lateral stems late in the season.

***Corydalis leptophylla* Lidén, sp. nov. Fig. 2A.**

Caulis foliatus ramosus foliis bipinnatis foliolis lobatis lobis late obovatis. Folia superiora minuta biternata. Bractee parvae ternato-divisae ad simplices, lobis obovatis parce dentatis. Pedicelli filiformes. Corolla purpurea cristata calcari attenuato. Type: North Burma, Nam Tamai valley (28°00'N; 97°45'E), 'on the rubble flanks of a steep gully, flowers dusky purple', 2800m, 6 ix 1937, *F. Kingdon Ward* 13149 (holo. BM, iso. TI).

Roots and basal parts unknown. *Stems* (two stems without basal parts have been seen) at least 40cm long, leafy and branched with 10–11 leaves. *Smaller branches* straight, tapering towards the apex, with 2–6 very small leaves. *Lower leaves* stalked, upper ones sessile, basally with conspicuous auricles, bipinnate with 2 pinnae and 1–2 pinnulae; pinnulae simple to ternate with leaflets deeply or shallowly divided into small broadly obovate lobes. Upper leaves very small, biternate, grading into the bracts. *Racemes* 5–9-flowered. *Bracts* very small, ternate (or the upper ones simple), ±lobed to dentate. *Pedicels* filiform, c.5mm long, probably erecto-patent or patent in fruit. *Sepals* rounded, finely dentate, c.1mm. *Corolla* purple. *Outer petals* narrowly cristate, acute. *Upper petal* with a slightly tapering, subsigmoidally curved, about 10mm long spur, into which a nectary about two thirds as long intrudes. *Lower petal* sometimes with a prominent sub-basal pouch. *Inner petals* c.9mm long. *Stigma* about as broad as long with prominent basal horns. *Fruit* (immature) 8–10 × 1mm, with style 2–2.5mm long.

Known only from the type specimen.

Possibly related to *C. auriculata* Lidén & Z.Y. Su and *C. pubicaulis* C.Y. Wu & X. Zhuang from SE Tibet, but the peculiar very small and numerous leaves indicate an isolated position.

***Corydalis uranoscopa* Lidén, sp. nov. Fig. 1B.**

C. hendersonii Hemsl. affinis, sed foliis majoribus profunde pinnato-divisis floribus fructibusque multo minoribus differt.



FIG. 2. Whole plants, flowers, stigmas and bracts of: A. *C. leptophylla*, B. *C. farreri*. Bottom right 10mm scale bar refers to line-drawings (excluding stigmas, which are 4× more magnified).

Type: India, Kumaon, above Dudhpani, 4000m, 27 vii 1886, *Reid s.n.* (holo. E).

Very small and condensed cushion-plant. *Radical leaves* crowded, vaginate at base with broad flattened petiole and rhachis. Lamina ovate-triangular in outline, bi(-tri)-pinnate. Leaflets divided into 3–7 small lanceolate mucronate lobules. *Stems* axillary from the radical leaves, 4–5cm, leafless at base, with a few bract-like leaves above subtending axillary racemes. *Racemes* very dense. *Bracts* with long cuneate pale bases, ± triternately divided into small narrow acute lobes with long scabrid aristae. *Pedicels* 10–15mm, equalling or usually shorter than the bracts, thin, erect in fruit. *Flowers* vertically held with the spur hidden in the cushion. *Sepals* deeply divided into a few long and narrow widely diverging teeth. *Corolla* ‘pale orange yellow’. *Outer petals* with short dorsal crests that conspicuously surpass the apex. *Spur* 7–8mm long, rather narrow, tapering towards the apex, with a tiny nectary reaching about halfway through the spur. *Inner petals* 6mm long. *Capsule* sharply pendent, 3–11 × 1.5mm (length depending on the number of developed seeds) with style 2–2.5mm, 1–6-seeded.

Additional specimens. INDIA, Uttar Pradesh: Kumaon: Kuti side of Bedang pass, ‘bare ground, pale orange yellow’, 4900m, 1948, *Koelz* 21101 (RAW, photo in E and K); near Shibu in Darma, 3900m, 1 ix 1984, *Duthie* 2705 (K, WU); Shinla, 9 ix 1900, *Duthie* 24228 (K)

Corydalis uranoscopa is similar to *C. hendersonii* Hemsl. in the dense cushion-like habit, the much divided bracts with cuneate bases, and the vertically held, partly concealed flowers. Although undoubtedly closely related, *C. uranoscopa* is easily distinguished by the comparatively large bi(-tri)-pinnate leaves (in *C. hendersonii* small and bi-ternately divided), the aristate bract-lobes, the prominent basal stigma-lobes, the small flowers and fruits, and the short style.

Corydalis uranoscopa has previously been mistaken for *C. boweri* Hemsl. They agree in their cushion-like habit and small size, but are widely different in leaves and flowers, *C. boweri* being very similar to *C. mucronifera* Maxim.

The epithet ‘uranoscopa’ (facing heaven) refers to the orientation of the flowers.

ACKNOWLEDGEMENTS

The Royal Botanic Garden Edinburgh provided me with space and facilities, for which I am heartily grateful. The herbaria of BM, K, RAW and TI kindly made their material available.

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Received 27 May 1997; accepted in revised form 14 July 1997