

Corydalis pinnatibracteata (Fumariaceae), a new species from Qinghai, China

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Corydalis pinnatibracteata Y.W. Wang *et al.* *sp. nova* (Fumariaceae) is described from Qinghai, China. It is compared with the related *C. sibirica* (L. f.) Pers. and *C. pseudoimpatiens* Fedde and an identification key to the three species is presented.

Key words: *Corydalis*, new species, taxonomy

Corydalis, the largest genus of the Fumariaceae, is a north temperate taxon with about 440 species, about 300 of which are distributed in China (Wu 1999). Section *Fumarioides* contains about 25 species (Lidén 1995). This section is characterized by leafy, branched stems with thin, ternately or pinnately divided leaves with long-sheathing petioles. The corolla is mostly yellow and the flowers are small, 6–12 mm long; the stigma is flattened, usually more or less rounded-squarish in outline, with 4–6 usually clearly stalked apical papillae. The seeds have small elaiosomes (Lidén 1991).

When examining specimens in PE we found some unusual ones that shared the common characters of ser. *Fumarioides* of sect. *Fumarioides* and resembled *Corydalis sibirica* and particularly *C. pseudoimpatiens*. After a closer comparison, we concluded that the mentioned specimens represented a hitherto undescribed species in sect. *Fumarioides*.

***Corydalis pinnatibracteata* Y.W. Wang *et al.*, *sp. nova* (Fig. 1)**

Species nova ad sect. Fumarioidem pertinens, C. sibiricae (L. f.) Pers. *et C. pseudoimpatiens* Fedde *affinis, ab illa differt bracteis inferis bipinnatisectis supremis palmatisectis, pedicellis bracteis brevioribus, nectario longitudine 2/3 calcaris partes aequante; ab haec recedit bracteis foliaceis petiolulatis, seminibus biseriatis, petalis anticis late saccatis facile differt.*

TYPE: China. Qinghai Province, Maqin Xian, near Jungung Xiang, alpine meadow beside road, 34°35'N, 100°33'E, 3450–3550 m, 26.VII.1993 *Ho Ting-nung, Bruce Bartholomew & Mike Gilbert* 351 (holotype PE; isotypes BM, E, A)

Perennial (?) herb. Taproot strong, branched from base, with many fibrous lateral roots. Rhizome short, covered by old petiole remnants. Stems 20–40 cm high, hollow, 5-ridged, almost

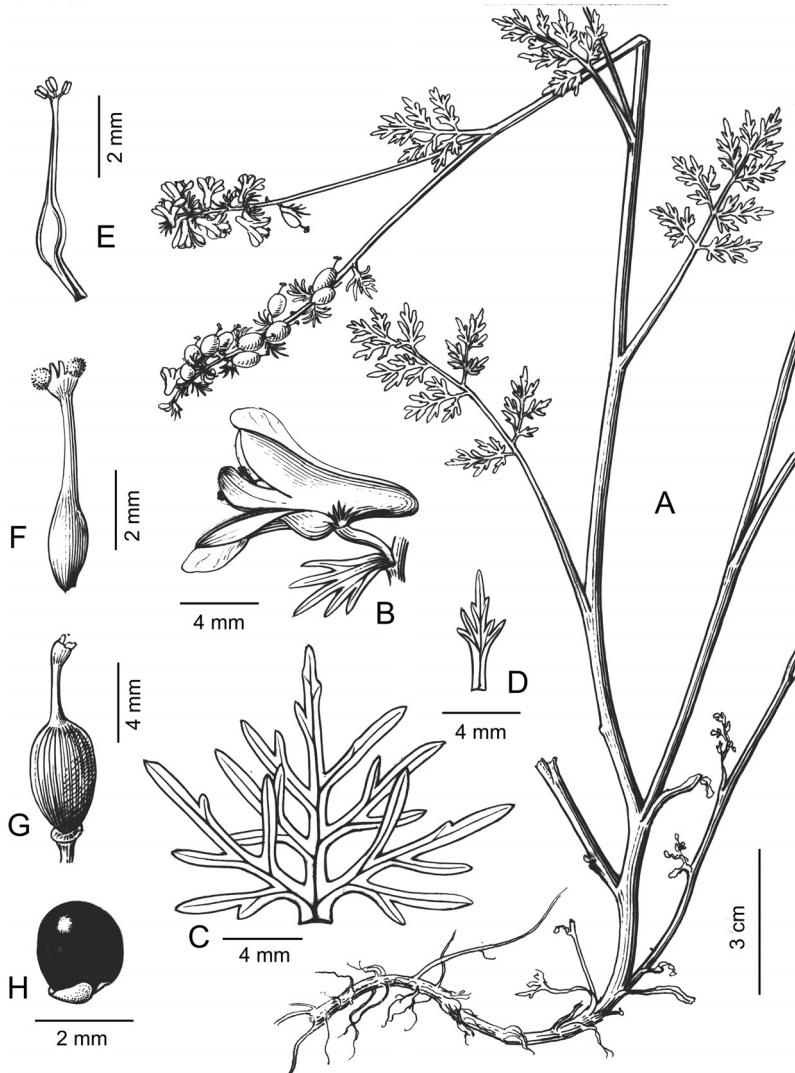


Fig. 1. *Corydalis pinnatibracteata* (from holotype, drawn by Chao-zhen Ji). — **A:** Habit. — **B:** Flower. — **C:** Lowermost bract. — **D:** Uppermost bract. — **E:** Stamen bundle. — **F:** Ovary. — **G:** Fruit. — **H:** Seed.

winged, erect, leafy and branched throughout, especially above. Petioles long-sheathing; lower leaves long-stalked, 1–2.5 cm long, upper ones progressively shorter-stalked, ovate, 2–3.5 cm long, bipinnately divided, primary segments stalked, secondary short-stalked, final sessile and divided into 2–3 lanceolate to obovate, mucronate segments. Racemes 3–5 cm long, 12–20-flowered, 7–9 cm in fruit. Lowermost bracts triangular-ovate, bipinnately divided, like cauline leaves but much smaller; upper ones palmatilobate, with 5–7 segments; longer than pedicels. Sepals minute, fimbriate. Corolla broadly triangular, pale yellow with purple marks, upper petal 7–9 mm long, with a broad crest, ca. 2 mm high.

Spur of upper petal cone-shaped, 3–4 mm long, shorter than lamina, with nectary 2/3 as long. Inner petal 5–6 mm long. Lower petal 6–8 mm long, constricted in middle, base distinctly saccate. Ovary elliptic, ca. 2 mm long. Stigma bi-ovate, with four apical papillae. Capsule short and broad, 6–8 mm long, with a sharply set-off style 3 mm long including stigma. Fruit 5–8 seeded, biseriate. Seeds black, shiny, 1.5–1.8 mm in diameter. Flowering July to August.

Corydalis pinnatibracteata is distributed in Qinghai province (Maqin Xian, Gande Xian, and Dari Xian), collected from river flood plane with a mosaic of pebble deposits, silt deposits and older consolidated terraces with deeper soil,

alpine meadow and river terraces with pebbles and turf, at an altitude of 3200–4200 m.

Corydalis pinnatibracteata is similar to *C. sibirica* (especially ssp. *elata*) and *C. pseudoimpatiens*, with which it shares the sharply ridged stem, long sheathing petioles, the small flowers with an upwardly curved, short spur and a stigma with four apical papillae. It differs from *C. sibirica* ssp. *elata* in the bipinnately divided leaves with opposite pinnae, much divided bracts and a longer nectary, and from *C. pseudoimpatiens* in the broad biseriate capsule and a distinct pouch to the lower petal. *Corydalis pinnatibracteata* differs from both of the other species in the larger bracts (clearly longer than pedicels), much larger and more strongly divided sepals, larger flowers with broader outer petal crests, and very broad fruits (Table 1). The three species can be distinguished by the following key:

- 1 Leaves biternate; bracts entire; fruit obovate ... *C. sibirica*
- 1 Leaves bipinnate with opposite pinnae; bracts divided ... 2
- 2 Capsule broadly obovate; lower petal with a basal pouch *C. pinnatibracteata*
- 2 Capsule linear-oblong; lower petal without a basal pouch *C. pseudoimpatiens*

SPECIMENS EXAMINED. — *Corydalis pinnatibracteata* (paratypes). **China.** Qinghai. Maqin Xian, Xueshan Xiang, 3720 m, 1993 *Ho Ting-nung, Bruce Bartholomew & Mike Gilbert 442* (PE); Gande Xian, Shanggongma Xiang, 4150 m,

1993 *Ho Ting-nung, Bruce Bartholomew & Mike Gilbert 973* (PE, E, BM, A); Dari Xian, Manzhang Xiang, 4000 m, 1993 *Ho Ting-nung, Bruce Bartholomew & Mike Gilbert 1164* (PE, E, BM, A); near Kokonor, “in alves rivuli”, 3100 m, 1880 *Przewalski s.n.* (LE). — *Corydalis sibirica* ssp. *elata*. **China.** Sichuan. Kangding, 3900 m, *West Academ. Sin., C. S. Liu et al. 1320* (PE); Kangding, 3500m, *C. S. Liu et al. 1302* (PE); Daofu, *NSBD. Exp., S. Jiang et al. 9634* (PE); Karlong, *H. Smith 4109* (PE, W, GB, S, UPS); Kangding, 3500 m, *West Sichuan Exp., W. C. Wang et al. 662* (PE); Daofu: *Si. Pl. Res. Exp. 15650* (KUN); Dawo, Haitzeshan, *H. Smith 11349* (UPS); *11586* (UPS); Hsiochshan, *H. Smith 3681* (GB, S, UPS); Ganzi (Garze), Jiang Su 9634 (KUN); Niutoushan, Liljestrand 160 (UPS); Kangding, Cheto La, *H. Smith 10962* (UPS); Chungo Valley, Hsientientzu, *H. Smith 11394* (UPS). — *Corydalis pseudoimpatiens*. **China.** Gansu. Kantiankuo, ca. 2850 m, 1930 *D. Hummel 4147* (E, S); Lanzhou, Yuzhong, Xinlong shan, 2500 m, *Y. Q. He 5659* (PE, WUK); *Qing Gan Exp. 1452* (PE); Lianhua, *Y. Q. He 4964* (PE, WUK); Minxian, 2600 m, *Z. B. Wang 4618* (KUN, PE); Qiongsha, *Z. B. Wang 5561* (PE, WUK); Xiahe (Labrang), *Z. B. Wang 6907* (PE, WUK); Sunan, 3200 m, *Hexi Exp. 237* (PE); Maqu, *WUK 18* (WUK); *Przewalski s.n.* (BM); Zaluk, *Hummel 4305* (S). Qinghai. Xining, 2650–3100 m, *R.C. Ching 589* (E, S, P, W, GH); Huangyuan, *P. Q. Zhong 8946* (PE, WUK, HNWP); Menyuan, 2860 m, *P. Q. Zhong 10041* (PE, WUK, HNWP); Qilian, *P.Q. Zhong 8628* (PE, KUN, WUK); Huzhu, *B.Z. Guo 9375* (PE, KUN, HNWP); Ledu, 2700 m, 1959, *Qing Gan Exp. 1452* (HNWP); Xunhua, 1760 m, *Z.D. Wei 353* (WUK); Tongde, 3900 m, *S. Chen 2205* (WUK). Sichuan. Zoige, 1970 *P130* (SM); Aba, 3650 m, 1971 *Xizang Drug Exp. 838* (HNWP); Heishui, 3010 m, *X. Li 73226* (PE); Sichuan, *Wilson 3189* (P, K); Ka-lung-pan, *H. Smith 3019* (UPS); Huang-chen-kuan, *H. Smith 3997* (UPS). Xizang. Jomda to Joyong, *Y. W. Cui 5331* (PE); Gonjo, 3700 m, *Q. Z. Exp. Veg. Gr. 9672* (PE).

Table 1. Morphological comparison of *Corydalis sibirica* ssp. *elata*, *C. pinnatibracteata* and *C. pseudoimpatiens*.

Characters	<i>C. sibirica</i> ssp. <i>elata</i>	<i>C. pinnatibracteata</i>	<i>C. pseudoimpatiens</i>
Root	annual	possibly perennial	annual
Stem	40–80 cm	20–40 cm high	40–75 cm
Leaf	biternate	bipinnate	bipinnate
Bract	entire	pinnate to palmatilobate	dentate to lobate
	as long as pedicel	longer than pedicel	as long as pedicel
	linear-lanceolate	triangular-ovate	ovate
Flower	racemes 9–14-flowered	racemes 12–20-flowered	racemes 10–20-flowered
	sepals small with a few lobes	sepals larger, fimbriate	sepals small with a few lobes
	corolla yellow	corolla yellow	corolla pale yellow
	7–8 mm long	7–9 mm long	7 mm long
	outer petal crested	outer petal broadly crested	outer petal narrowly crested
	lower petal with sac	lower petal with sac	lower petal without sac
	nectary half of spur	nectary two-thirds of spur	nectary two-thirds of spur
Fruit	obovate 7–10 mm long	broadly obovate 5–8 mm long	linear 10 mm long
	seeds 3–8, biseriate	seeds 5–8, biseriate	seeds 6–7, uniseriate
	style 2 mm	style 3 mm	style 2 mm
Distribution	Heilongjiang; Jilin; Inner Mongolia; W of Sichuan; Mongolia; Russia	from E to S of Qinghai	Gansu, Qinghai, Sichuan, Tibet

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