

46. PTERNOPETALUM Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 8: 246. 1885.

囊瓣芹属 nang ban qin shu

Pu Fading (溥发鼎 Pu Fa-ting); Loy R. Phillippe

Cryptotaeniopsis Dunn.

Herbs, annual or perennial. Taproots fusiform. Stem erect. Basal leaves petiolate, sheaths ovate. Cauline leaves similar or heteromorphic to the basal, smaller or absent. Inflorescence branching or unbranched, branches bearing terminal umbels; bracts usually absent; rays 4–40, unequal, erect to ascending in flower, spreading widely and lengthening in fruit; bracteoles 1–4, linear-lanceolate, unequal; umbellules very few flowered, 2–3(–5)-flowered; pedicels extremely unequal. Calyx teeth evident triangular or subulate, subequal, sometimes obscure. Petals white or purplish, ovate or long-obovate, base attenuate and thickening near attachment, apex narrow, inflexed, rarely plane. Stylopodium either conic and long-tapering into elongate erect styles (styles usually twice as long as the stylopodium) or low-conic abruptly tapering into short, deflexed styles (shorter than or equal to the stylopodium). Fruit oblong-ovoid or ovoid, slightly laterally compressed, glabrous; ribs 5, denticulate, finely scabrid or filiform; vittae 1–3 in each furrow, 2–4 on the commissure. Seed face plane. Carpophore 2-parted or bifid.

About 25 species: E Asia, Himalayan region; 23 species (19 endemic) in China.

- 1a. Basal and cauline leaves homomorphic (or cauline leaves absent); fruit ribs denticulate or finely scabrid.
- 2a. Leaves only basal, cauline leaves absent (occasionally 1); inflorescence unbranched.
 - 3a. Leaves 3-foliolate; fruit oblong-ovoid 11. *P. nudicaule*
 - 3b. Leaves 1-pinnate; fruit ovoid 12. *P. delicatulum*
- 2b. Basal and cauline leaves present; inflorescence branched.
 - 4a. Styles short, stylopodium low-conic.
 - 5a. Leaves 3-foliolate; bracts and bracteoles absent 9. *P. trifoliatum*
 - 5b. Leaves 2–3-ternate; bracts 2–3; bracteoles 2–3 10. *P. sinense*
 - 4b. Styles elongate, stylopodium conic.
 - 6a. Cauline leaves 1–2; umbellules usually 2-flowered.
 - 7a. Leaf blades abaxially pale green; umbellules usually with only one flower fertile 8. *P. yiliangense*
 - 7b. Leaf blades abaxially slightly glaucous; umbellules 2-flowered and all fertile.
 - 8a. Leaf blades subleathery, veins and margins cartilaginous, sparsely setose; fruit ovoid 6. *P. cartilagineum*
 - 8b. Leaf blades membranous, veins and margins not cartilaginous, glabrous; fruit ovoid or oblong-ovoid 7. *P. molle*
 - 6b. Cauline leaves 3–5; umbellules 2–3(–5)-flowered.
 - 9a. Leaves 1–2-ternate or ternate-1-pinnate; fruit ribs finely scabrid.
 - 10a. Leaves 1–2-ternate, margins double serrate 4. *P. rosthornii*
 - 10b. Leaves ternate-1-pinnate, margins crenate 5. *P. botrychioides*
 - 9b. Leaves 1–2-ternate; fruit ribs denticulate.
 - 11a. Leaves 2-ternate; petals white; vittae 1 in each furrow 3. *P. davidii*
 - 11b. Leaves ternate; petals purplish; vittae 1–3 in each furrow.
 - 12a. Lateral leaflets undivided; fruit ovoid 1. *P. wolffianum*
 - 12b. Lateral leaflets 2–3-lobed; fruit oblong-ovoid or ovoid 2. *P. vulgare*
 - 1b. Basal and cauline leaves heteromorphic, rarely homomorphic (see. *P. gracillimum*, *P. leptophyllum*, *P. subalpinum*, and *P. trichomanifolium*); fruit ribs filiform.
 - 13a. Basal and cauline leaves homogeneous.
 - 14a. Leaves 1–2-pinnate, ultimate segments ovate or ovate-lanceolate; styles short.
 - 15a. Leaves 1-pinnate, pinnae broadly ovate; rays 5–9; petals purplish 20. *P. subalpinum*
 - 15b. Leaves 2-pinnate, pinnae ovate-lanceolate; rays 6–25; petals white 21. *P. leptophyllum*
 - 14b. Leaves ternate-2–4-pinnate, highly dissected, ultimate segments linear; styles short or elongate.
 - 16a. Calyx teeth minute; styles short; both mericarps developing in fruit 22. *P. gracillimum*
 - 16b. Calyx teeth conspicuous; styles elongate; only one mericarp developing in fruit 23. *P. trichomanifolium*
 - 13b. Basal and cauline leaves heteromorphic.
 - 17a. Stems profusely branched and caespitose; umbels numerous, terminal on the branches 19. *P. caespitosum*
 - 17b. Stems sparsely branched or unbranched; umbels terminal, a few lateral.
 - 18a. Stems 3–5-branched; umbellules 3–4-flowered; vittae 1–3 in each furrow.
 - 19a. Stems 1–2; basal leaves absent; styles shorter than stylopodium; fruit ovoid 15. *P. longicaule*
 - 19b. Stem solitary; basal leaves present; styles nearly as long as or longer than the stylopodium; fruit oblong-ovoid or ovoid.

- 20a. Petals white; styles elongate; fruit oblong-ovoid 13. *P. delavayi*
 20b. Petals purplish; styles as long as the stylopodium; fruit ovoid 14. *P. cardiocarpum*
 18b. Stems 1–2-branched; umbellules 2(–3)-flowered; vittae 1–2 in each furrow.
 21a. Calyx teeth conspicuous, triangular or subulate; styles elongate, longer than
 stylopodium; fruit ovoid 16. *P. heterophyllum*
 21b. Calyx teeth obscure or minute; styles shorter than stylopodium; fruit oblong-ovoid.
 22a. Rhizomes nodes not tuberculate; fruit ca. 3 × 1 mm 17. *P. filicinum*
 22b. Rhizomes nodes tuberculate; fruit 2–2.5 × 1–2 mm 18. *P. tanakae*

1. *Pternopetalum wolffianum* (Fedde ex H. Wolff) Handel-Mazzetti, Symb. Sin. 7: 719. 1933.

滇西囊瓣芹 dian xi nang ban qin

Cryptotaeniopsis wolffiana Fedde ex H. Wolff, Repert. Spec. Nov. 27: 327. 1930.

Plants 15–45 cm. Stems 1–2-branched. Basal leaves petio- late, petioles 6–14 cm, densely strigose; blade ovate or oblong- ovate in outline, 5–15 × 3–8 cm, ternate; leaflets 3(–5), remote, broad-ovate, 2–3 × 1–2 cm, lateral leaflets undivided, strigose on the veins and margins. Cauline leaves 1–2. Umbels 2–3.5 cm across; bracts absent; rays 15–32, 1–3.5 cm; bracteoles 2–3, 0.5–1.5 mm; umbellules 2–3(–5)-flowered, pedicels 0.5–2.5 mm. Calyx teeth subulate, 0.3–0.6 mm. Petals purple-white, ca. 2 × 1 mm. Stylopodium conic; styles elongate; stylopodium plus styles 1.2–1.8 mm. Fruit ovoid, ca. 3 × 2.5 mm, ribs denticulate; vittae 1–3 in each furrow, 4 on commissure. Fl. Apr–Jun, fr. Jul–Aug.

- Forests; 2000–3300 m. Guizhou, NE and W Yunnan.

2. *Pternopetalum vulgare* (Dunn) Handel-Mazzetti, Symb. Sin. 7: 719. 1933.

五匹青 wu pi qing

Plants 20–50 cm. Stems solitary or 2–3. Basal leaves peti- olate, petioles 10–20 cm, glabrous or strigose; blade triangular- ovate in outline, 5–12 × 5–11 cm, ternate; leaflets 3, lateral leaf- lets usually 2–3-lobed; ultimate segments ovate or rhomboidal, 1.6–6 × 0.6–3.8 cm, glabrous or strigose along veins, margins serrate, apex acute. Umbels 1.5–3 cm across (to 7 cm in fruit); bracts absent; rays 15–30, 2–4(–6) cm; bracteoles 1–4, ca. 0.5 mm, subequal; umbellules 2–5-flowered; pedicels 0.3–1.5 mm in flower. Calyx teeth triangular, 0.5–0.7 mm. Petals white or purple-white, ca. 1.8 × 0.7 mm. Stylopodium conic; styles elon- gate; stylopodium plus styles ca. 1.3 mm. Fruit globose-ovoid or oblong-ovoid, 3.5–5 × 2–3 mm; ribs denticulate; vittae 1–3 in each furrow, 2–4 on commissure. Fl. Apr–Jun, fr. Jul–Sep.

Forests, grassy slopes, shady or grassy streamsides; 1300–3500 m. S Gansu, Guizhou, Hubei, Hunan, Shaanxi, Sichuan, Yunnan [NE India, N Myanmar, Nepal].

All three varieties have reputed medicinal value (in Sichuan).

- 1a. Ultimate leaf segments ovate or rhomboidal;
 fruit oblong-ovoid 2a. var. *vulgare*
 1b. Ultimate leaf segments broad-ovate or ovate-
 lanceolate; fruit globose-ovoid.
 2a. Ultimate leaf segments broad-ovate,
 densely strigose on veins and petioles
 2b. var. *strigosum*

- 2b. Ultimate leaf segments ovate-lanceolate,
 sparsely strigose on veins, petioles
 glabrous 2c. var. *acuminatum*

2a. *Pternopetalum vulgare* var. *vulgare*

五匹青(原变种) wu pi qing (yuan bian zhong)

Cryptotaeniopsis vulgaris Dunn, Hooker’s Icon. Pl. 28: t. 2737. 1902; *Deringa vulgaris* (Dunn) Koso-Poljansky; *Pim- pinella clarkeana* Watt ex Banerji; *Pternopetalum vulgare* (Dunn) Handel-Mazzetti var. *foliosum* R. H. Shan & F. T. Pu.

Ultimate leaf segments ovate or rhomboidal, apex acute to acuminate. Fruit oblong-ovoid.

Forests, shady streamsides; 1400–3500 m. S Gansu, Guizhou, Hubei, Hunan, Shaanxi, Sichuan, Yunnan [NE India, N Myanmar, Nepal].

2b. *Pternopetalum vulgare* var. *strigosum* R. H. Shan & F. T. Pu, Acta Phytotax. Sin. 16(3): 68. 1978.

毛叶五匹青 mao ye wu pi qing

Ultimate leaf segments broad-ovate, apex acute, veins and petioles densely strigose. Fruit globose-ovoid.

- Forests, grassy slopes; 1900–2500 m. W Sichuan.

2c. *Pternopetalum vulgare* var. *acuminatum* C. Y. Wu ex R. H. Shan & F. T. Pu, Acta Phytotax. Sin. 16(3): 68. 1978.

尖叶五匹青 jian ye wu pi qing

Ultimate leaf segments ovate-lanceolate, apex acuminate, veins sparsely strigose, petioles glabrous. Fruit globose-ovoid.

- Forests, grassy streamsides; 1300–1600 m. Shaanxi, Sichuan, NW Yunnan.

3. *Pternopetalum davidii* Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 8: 246. 1885 [“*davidii*”].

囊瓣芹 nang ban qin

Cryptotaeniopsis davidii (Franchet) H. Wolff.

Plants 20–45 cm. Stems 1–3, branching. Basal leaves peti- olate, petioles 8–15 cm, sparsely strigose or glabrous; blade ovate in outline, 6–10 × 5–9 cm, 2-ternate; ultimate segments ovate or rhomboidal, 2–7 × 1–3.5 cm, strigose on the veins, margins serrate, apex acute or acuminate. Umbels 2–4 cm across in flower, to 7 cm in fruit; bracts absent; rays (6–)15–20(–25), 1.5–3.5 cm, strigose only in inner surface; bracteoles 2–3, 1–1.8 mm; umbellules 2–4-flowered; pedicels 0.3–4 mm. Calyx teeth subulate, 0.7–1 mm. Petals white, ca. 1.8 × 0.9 mm. Stylopodium conic; styles elongate; stylopodium plus styles 1–1.4 mm. Fruit ovoid, 2–3 × 2–3 mm; ribs denticulate; vittae 1 in

each furrow, 2 on commissure. Fl. Apr–Jun, fr. Jul–Sep.

• Forests, scrub, grasslands, streamsides; 1500–3000 m. S Gansu, Guizhou, W Hubei, S Shaanxi, W Sichuan, S and W Yunnan.

4. *Pternopetalum rosthornii* (Diels) Handel-Mazzetti, Symb. Sin. 7: 719. 1933.

川鄂囊瓣芹 chuan e nang ban qin

Pimpinella rosthornii Diels, Bot. Jahrb. Syst. 29: 495. 1900; *Cryptotaeniopsis rosthornii* (Diels) H. Wolff.

Plants rather stout, 30–80 cm tall. Stems 1–2. Basal leaves petiolate, petioles 10–20 cm, glabrous; blade ovate in outline, 3.5–15 × 3–10 cm, 1–2-ternate; ultimate segments oblong-ovate or ovate-lanceolate, 1–11 × 0.5–2.5 cm, margins double serrate, apex caudate. Umbels 1.5–3 cm across in flower, to 7 cm in fruit; bracts absent; rays (7–)15–30(–40), 2–4 cm; bracteoles 2–3, ca. 0.8 mm; umbellules 2–3-flowered; pedicels 0.2–3 mm. Calyx teeth subulate, ca. 0.4 mm. Petals white, ca. 1.5 × 0.6 mm. Stylopodium conic; styles elongate; stylopodium plus style ca. 1.1 mm. Fruit ovoid, ca. 2–3 × 1.5–2 mm; ribs finely scabrid; vittae 1–3 in each furrow, 2–4 on commissure. Fl. Apr–Jun, fr. Jul–Aug.

• Forests, valley sides, moist rock crevices; 1300–2100 m. W Hubei, E Sichuan.

5. *Pternopetalum botrychioides* (Dunn) Handel-Mazzetti, Symb. Sin. 7: 718. 1933.

散血芹 san xue qin

Plants 15–60 cm. Stems 1–2(–3), branching. Basal leaves petiolate, petioles 10–15 cm, glabrous; blade ovate in outline, 3.5–8 × 3–8 cm, ternate-1-pinnate; ultimate segments ovate or rhomboidal, 1–6 × 0.5–1.5 cm, glabrous or sparsely strigose along veins, margin crenate, apex caudate. Umbels 1.5–3 cm across in flower, to 7 cm in fruit; bracts absent; rays (6–)15–30(–40), 2–3(–5) cm; bracteoles 2–3, 0.3–1 mm; umbellules (2–)3-flowered; pedicels 0.2–3 mm. Calyx teeth subulate, ca. 0.4 mm. Petals white, ca. 1.5 × 0.6 mm. Stylopodium conic; styles elongate; stylopodium plus styles ca. 1.1 mm. Fruit ovoid or broadly so, 2–3 × 1.5–2 mm; ribs finely scabrid; vittae 1–3 in each furrow, 2–4 on commissure. Fl. Apr–Jun, fr. Jul–Aug.

• Shady forests, valley slopes in forests, among shrubs, stream banks; 700–3000 m. Guizhou, Sichuan, W Yunnan.

- 1a. Ultimate leaf segments 0.5–1.5 cm broad; fruit broadly ovoid 5a. var. *botrychioides*
- 1b. Ultimate leaf segments 2–3 cm broad; fruit ovoid 5b. var. *latipinnulatum*

5a. *Pternopetalum botrychioides* var. *botrychioides*

散血芹(原变种) san xue qin (yuan bian zhong)

Cryptotaeniopsis botrychioides Dunn, J. Linn. Soc., Bot. 35: 494. 1903.

Ultimate leaf segments 1–6 × 0.5–1.5 cm. Fruit broadly ovoid.

• Valley slopes in forests, among shrubs; 700–3000 m. Guizhou, Sichuan, W Yunnan.

This variety has reputed medicinal value (in Sichuan).

5b. *Pternopetalum botrychioides* var. *latipinnulatum* R. H. Shan, Sinensia 11: 158. 1940.

宽叶散血芹 kuan ye san xue qin

Ultimate leaf segments 1–6 × 2–3 cm. Fruit ovoid.

• Shady forests, stream banks; 800–1400 m. Sichuan.

6. *Pternopetalum cartilagineum* C. Y. Wu ex R. H. Shan & F. T. Pu, Acta Phytotax. Sin. 16(3): 70. 1978.

骨缘囊瓣芹 gu yuan nang ban qin

Plants ca. 25 cm. Stems 1–3, slender. Basal leaves petiolate, petioles 3.5–25 cm; blade ovate in outline, 3–8 × 3–7 cm, ternate; ultimate segments broad-ovate, 2–3 × 1–3 cm, somewhat coriaceous, abaxially slightly glaucous, margins serrate, veins and margins cartilaginous and sparsely setose. Cauline leaves usually 1. Inflorescence branching, umbels 1–2 cm across in flower, larger in fruit; bracts absent; rays 10–20; bracteoles 2, ca. 0.4 mm; umbellules 2-flowered; pedicels 0.2–2 mm. Calyx teeth subulate, ca. 1 mm. Petals white. Stylopodium conic; styles elongate; stylopodium plus styles ca. 1 mm. Fruit ovoid, 2.5–3 × ca. 2.5 mm; ribs denticulate; vittae not recorded. Fl. and fr. Mar–Jul.

• Forests, riparian grasslands; 2400–2500 m. W Yunnan.

This poorly known taxon is recorded only from a few collections.

7. *Pternopetalum molle* (Franchet), Handel-Mazzetti, Symb. Sin. 7: 718. 1933.

洱源囊瓣芹 er yuan nang ban qin

Plants 10–35 cm. Stems 1–3, glabrescent, slender. Basal leaves petiolate, petioles 5–18 cm, glabrous; blade triangular-ovate in outline, 2–10 × 2–8 cm, 1–2-ternate; ultimate segments broad-ovate or rhomboidal, 2–5 × 1–3 cm, membranous, glabrous abaxially slightly glaucous, margins serrate or crenate. Cauline leaves 1–2. Inflorescence 1–2-branches; umbels 2–3 cm across in flower, to 6 cm in fruit; bracts absent; rays (5–)10–20, 1–3.5 cm; bracteoles 2, 0.4–0.8 mm; umbellules (1–)2(–3)-flowered; pedicels 0.3–2.5 mm. Calyx teeth subulate, ca. 0.4 mm. Petals white, ca. 2 × 0.9 mm. Stylopodium conic; styles elongate; stylopodium plus styles ca. 1.3 mm. Fruit ovoid or oblong-ovoid, 2–3 × ca. 1 mm; ribs finely scabrid or minutely denticulate; vittae 1–3 in each furrow, 4 on commissure. Fl. Apr–Jun, fr. Jul–Sep.

• Forests, alpine meadows, streamsides; 1400–3500 m. N and W Sichuan, N and W Yunnan.

- 1a. Ultimate leaf segments 2–5 × 1–3 cm, 2–3-lobed or undivided 7a. var. *molle*
- 1b. Ultimate leaf segments 4–7 × 3–5 cm, margins irregularly lobed to pinnatifid 7b. var. *dissectum*

7a. *Pternopetalum molle* var. *molle*

洱源囊瓣芹(原变种) er yuan nang ban qin (yuan bian zhong)

Carum molle Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 120. 1894; *Cryptotaeniopsis cuneifolia* H. Wolff; *C. mollis* (Franchet) Dunn; *Pternopetalum cuneifolium* (H. Wolff) Han-

del-Mazzetti; *P. molle* var. *crenulatum* R. H. Shan & F. T. Pu.

Ultimate leaf segments 2–5 × 1–3 cm, 2–3-lobed or undivided. Rays 1–2.5 cm. Fruit ovoid or oblong-ovoid.

• Coniferous forests, alpine meadows; 2600–3500 m. W Sichuan, NE and W Yunnan.

7b. *Pternopetalum molle* var. *dissectum* R. H. Shan & F. T. Pu, Acta Phytotax. Sin. 16(3): 72. 1978.

裂叶囊瓣芹 lie ye nang ban qin

Ultimate leaf segments 4–7 × 3–5 cm, margins irregularly lobed to pinnatifid. Rays 1.5–3.5 cm. Fruit oblong-ovoid.

• Forests, streamsides; 1400–3200 m. N Sichuan, NW Yunnan.

8. *Pternopetalum yiliangense* R. H. Shan & F. T. Pu, Acta Phytotax. Sin. 16(3): 72. 1978.

宜良囊瓣芹 yi liang nang ban qin

Plant rather stout, 30–60 cm. Stem single, 1–2-branched. Basal leaves petiolate, petioles 4–10 cm, densely strigose; blade broadly triangular-ovate in outline, 4–8 × 4–8 cm, 3–5-foliolate; ultimate segments ovate or oblong-ovate, 3–5 × 2–4 cm, abaxially pale green, strigose on veins, margins crenate. Umbels ca. 2 cm across in flower, to 4 cm in fruit; bracts absent; rays 15–32, 1–3.5 cm; bracteoles 2, ca. 0.5 mm; umbellules 2-flowered, usually only terminal umbellule fertile; pedicels 0.2–1.5 mm. Calyx teeth subulate, ca. 0.4 mm. Petals white, ca. 1.8 × 0.8 mm. Stylopodium conic; styles elongate; stylopodium plus style ca. 1 mm. Fruit ovoid, 2.5–3 × ca. 2.5 mm; ribs denticulate; vittae 1–2 in each furrow, 2–4 on commissure. Fl. Apr–Jun, fr. Jul–Sep.

• Riparian grasslands; 1900–2000 m. C Yunnan.

This poorly known taxon is recorded only from a few collections.

9. *Pternopetalum trifoliatum* R. H. Shan & F. T. Pu, Acta Phytotax. Sin. 27: 64. 1989.

鸚鵡山囊瓣芹 zhe gu shan nang ban qin

Plants 10–30 cm. Stem glabrescent, slender. Basal leaves petiolate, petioles 4–6 cm, glabrous; blade triangular-ovate in outline, 2–5 × 2–4 cm, ternate; leaflets 3, ovate, 1–3 × 0.7–1.5 cm, lateral leaflets 2–3-lobed or undivided, glabrous, margins serrate. Cauline leaves usually 2. Umbels 1.5–2.5 cm across in flower, to 4 cm in fruit; bracts and bracteoles absent; rays (3–) 10–20, 1.5–3 cm; umbellules 2–4-flowered; pedicels 0.5–1 mm. Calyx teeth triangular, ca. equaling stylopodium. Petals white. Stylopodium low conic; styles short, less than 0.5 mm. Fruit ovoid, ca. 2.5 × 2 mm; ribs denticulate; vittae 1–3 in each furrow, 2–4 on commissure. Fl. Jun–Jul, fr. Aug–Sep.

• Among mosses in *Abies* forests; 3400–3900 m. W Sichuan.

This poorly known taxon is recorded only from a few collections.

10. *Pternopetalum sinense* (Franchet) Handel-Mazzetti, Symb. Sin. 7: 719. 1933.

华囊瓣芹 hua nang ban qin

Carum sinense Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 119. 1894; *Cryptotaeniopsis sinensis* (Franchet) H. Wolff.

Plants 30–60 cm. Stems glabrescent, slender. Basal leaves petiolate, petiole 4–6 cm; blade triangular-ovate in outline, 5–7 × 3.5–5.5 cm, 2–3-ternate; ultimate segments ovate, 1–2 × 1–1.5 cm, sparsely strigose on the veins, margins crenate. Umbels 3–5 cm across in flower, to 5–7 cm in fruit; bracts 2–3, linear-lanceolate, 1–1.5 mm; rays 7–15, 1–4 cm; bracteoles 2–3, ca. 0.5 mm; umbellules 2–3-flowered; pedicels to 4 mm. Calyx teeth lanceolate, ca. 0.4 mm. Petals white. Stylopodium low conic; styles short, ca. 0.4 mm. Fruit ovate, ca. 3 × 2 mm; ribs finely scabrid; vittae absent in each furrow and on commissure. Fl. and fr. May–Aug.

• Forests; 1400–3100 m. Yunnan.

11. *Pternopetalum nudicaule* (H. de Boissieu) Handel-Mazzetti, Symb. Sin. 7: 718. 1933.

裸茎囊瓣芹 luo jing nang ban qin

Cryptotaeniopsis nudicaulis H. de Boissieu, Bull. Acad. Int. Géogr. Bot. 16: 184. 1906; *Pternopetalum nudicaule* var. *esetosum* Handel-Mazzetti.

Plants 10–25 cm. Stems slender, glabrous. Basal leaves 4–6, petiolate, petioles 6–15 cm, glabrous; blade triangular in outline, 3–8(–12) × 2.5–6(–10) cm, ternate; leaflets 3, lateral leaflets ovate, terminal leaflets rhomboidal (1.5–)3–6(–8.5) × (1–)2–3(–5) cm, 2–3-lobed or entire, glabrous except sparsely setulose along main veins and margins, margin serrate. Cauline leaves absent. Umbels terminal, 2.5–3 cm across in flower, to 9 cm in fruit; bracts absent; rays 10–30, 1.5–5 cm, pubescent; bracteoles 2–3, 0.5–1.5 mm; umbellules 2–3-flowered; pedicels 0.3–1.5 mm. Calyx teeth subulate, 0.6–0.9 mm. Petals white, ca. 1.3 × 0.6 mm. Stylopodium conic; styles elongate; stylopodium and styles ca. 1 mm. Fruit oblong-ovoid, 2.5–4 × 1–1.5 mm; ribs finely scabrid; vittae 1–3 in each furrow, 2–4 on commissure. Fl. and fr. Apr–Aug.

Forests, stream banks, moist shady rocks; 600–1800 m. Guangdong, Guangxi, Guizhou, Hunan, C Yunnan [NE India, N Vietnam].

This species has reputed medicinal value.

12. *Pternopetalum delicatulum* (H. Wolff) Handel-Mazzetti, Symb. Sin. 7: 718. 1933.

嫩弱囊瓣芹 nen ruo nang ban qin

Carum delicatulum H. Wolff in H. Limpricht, Bot. Reis. Chin. 449. 1922; *Cryptotaeniopsis affinis* H. Wolff; *C. delicatula* (H. Wolff) H. Wolff; *Pternopetalum affine* (H. Wolff) M. Hiroe.

Plants 30–45 cm. Stem single, unbranched and glabrous. Basal leaves petiolate, petioles up to 25 cm; blade triangular-ovate in outline, 6–8 × 3–8 cm, 1-pinnate; pinnae 3–4-paired, ovate, broadly ovate or lanceolate, 2–3.5 × 1.2–1.8 cm, veins and margins sparsely strigose, abaxially pale green, margin incised-serrate. Cauline leaves absent or occasionally 1. Umbels usually terminal, 2.5–3 cm across in flower, 3–5 cm in fruit; bracts absent; rays ca. 30, 1–3 cm; bracteoles 2–3, ca. 0.4 mm; umbellules 2–3-flowered; pedicels to 2 mm. Calyx teeth subulate, ca. 0.4 mm. Petals white. Stylopodium conic; styles elongate; stylopodium plus styles 0.3–0.5 mm. Fruit ovoid, 2–3 ×

1–1.5 mm; ribs finely scabrid; vittae 1 in each furrow, 2 on commissure. Fl. and fr. Apr–Sep.

- Forests; 800–3000 m. Guizhou, Sichuan, NE Yunnan.

13. *Pternopetalum delavayi* (Franchet) Handel-Mazzetti, Symb. Sin. 7: 718. 1933.

澜沧囊瓣芹 lan cang nang ban qin

Carum delavayi Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 120. 1894; *Cryptotaeniopsis delavayi* (Franchet) Dunn.

Plants (15–)30–60(–150) cm. Stems erect, sparsely pubescent, 3–5(–7)-branched. Basal and lower leaves petiolate, petioles 4–15 cm, glabrous; blade triangular-ovate, 3–7 × 2.5–6 cm, 2-ternate; ultimate segments rhomboidal or flabelliform, 1–5 × 2–3 cm, veins and margins pubescent. Upper leaves 1–2-ternate; ultimate segments elongate-linear, 4–10 × 0.3–0.8 cm. Inflorescence branching, umbels 2–4 cm across in flower, to 8 cm in fruit, terminal on stem and branches; bracts absent; rays (4–)13–18(–25), 0.5–5 cm; bracteoles 2–4, 0.5–1.2 mm; umbellules (2–)3–4-flowered; pedicels 0.2–2.5 mm. Calyx teeth subulate, ca. 0.3 mm. Petals white, sometimes tinged pink, ca. 1.1 × 0.8 mm. Stylopodium conic; styles elongate; stylopodium and style ca. 0.9 mm. Fruit oblong-ovoid, 2–4 × 1.2–2 mm, sometimes 1 mericarp aborted in fruit; ribs filiform; vittae 1–3 in each furrow, 4 on commissure. Fl. Jun–Jul, fr. Aug–Sep.

- Forests, forest margins, alpine scrub and meadows; 2300–4500 m. W Sichuan, E Xizang, NW Yunnan.

This species has reputed medicinal value.

14. *Pternopetalum cardiocarpum* (Franchet) Handel-Mazzetti, Symb. Sin. 7: 718. 1933.

心果囊瓣芹 xin guo nang ban qin

Carum cardiocarpum Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 120. 1894; *Cryptotaeniopsis cardiocarpa* (Franchet) Dunn

Plants (8–)20–40(–90) cm. Stem single, 3–5-branched. Basal and lower leaves petiolate, petioles 4–12 cm; blade triangular-ovate, 3–6 × 2.5–6 cm, 1–2-ternate; ultimate segments flabelliform or rhomboidal, ca. 1 × 1 cm, veins and margins pubescent. Upper leaves several, 1–2-ternate; ultimate segments elongate-linear, 10–25 × ca. 2 mm. Inflorescence branching, umbels 1.5–2.5 cm across in flower, to 5 cm in fruit, terminal on stem and branches; bracts absent; rays 5–25, 1.5–3 cm; bracteoles 1–3, ca. 0.5 mm; umbellules 2–4-flowered; pedicels 0.1–2 mm. Calyx teeth subulate, size ca. 0.4 mm. Petals purple-white. Stylopodium low-conic; styles ca. 0.5 mm, as long as stylopodium, reflexed. Fruit ovoid, 2–3 × 1.5–2 mm; ribs filiform; vittae 1–3 in each furrow, 4 on commissure. Fl. Jun–Jul, fr. Aug–Sep.

- Coniferous forests, forest margins, scrub, alpine meadows; 2700–4300 m. W Sichuan, E Xizang, NW Yunnan.

This plant may be conspecific with the E Himalayan *Pternopetalum radiatum* (W. W. Smith) P. K. Mukherjee & Constance (*Acronema radiatum* (W. W. Smith) H. Wolff; *Pimpinella radiata* W. W. Smith), but further work and collections from NE India and N Myanmar are needed to confirm this.

15. *Pternopetalum longicaule* R. H. Shan, Sinensia 11: 161. 1940.

长茎囊瓣芹 chang jing nang ban qin

Plants 20–65 cm. Stems usually single, or occasionally 2, 1–5-branched or unbranched. Basal leaves absent. Cauline leaves long-petiolate, petioles 1.5–9 cm; blade triangular-ovate, 5–7 × 3–5 cm, ternate-2-pinnate; ultimate segments ovate or ovate-lanceolate, 5–15 × 2–10 mm, setulose on the veins. Upper leaves smaller, 2-ternate; ultimate segments ovate-lanceolate. Umbels 3–4 cm across in flower, 5(–7) cm in fruit; bracts absent; rays (4–)10–20, (1–)3–4 cm; bracteoles 2–3, 0.5–1.5 mm; umbellules (2–)3-flowered; pedicels 2–3(–5) mm. Calyx teeth subulate, ca. 0.5 mm. Petals white. Stylopodium low-conic; styles ca. 0.5 mm, shorter than stylopodium, suberect to slightly reflexed. Fruit ovoid, 2–3 × 1.5–2 mm; ribs filiform; vittae 1–3 in each furrow, 4 on commissure. Fl. Apr–Jun, fr. Jul–Sep.

- Forests, alpine meadows, moist mossy rocks; 1900–3700 m. S Gansu, Guizhou, C and S Shaanxi, W Sichuan, SE Xizang.

1a. Plants 20–65 cm; rays (4–)10–20 15a. var. *longicaule*

1b. Plants 4–20(–30)cm; rays 4–6 15b. var. *humile*

15a. *Pternopetalum longicaule* var. *longicaule*

长茎囊瓣芹(原变种) chang jing nang ban qin (yuan bian zhong)

Plants 20–65 cm. Leaf blade ternate-2-pinnate. Upper leaves 2-ternate. Rays (4–)10–20. Fruit vittae 1–3 in each furrow, 4 on commissure.

- Forests, alpine meadows, moist mossy rocks; 2000–3200 m. Guizhou, W Sichuan, SE Xizang.

15b. *Pternopetalum longicaule* var. *humile* R. H. Shan & F. T. Pu, Acta Phytotax. Sin. 16(3): 76. 1978.

短茎囊瓣芹 duan jing nang ban qin

Pternopetalum brevium (R. H. Shan & F. T. Pu) K. T. Fu; *P. longicaule* var. *brevium* R. H. Shan & F. T. Pu.

Plants low, 4–20(–30) cm. Leaves occasionally only 1, basal. Rays 4–6. Fruit vittae 1–2 in each furrow, 2 on commissure.

- Forests, alpine meadows; 1900–3700 m. S Gansu, C and S Shaanxi, NW Sichuan.

16. *Pternopetalum heterophyllum* Handel-Mazzetti, Oesterr. Bot. Z. 90: 122. 1941.

异叶囊瓣芹 yi ye nang ban qin

Plants 15–30 cm. Stem single, slender, 1–2-branched or unbranched. Basal leaves petiolate, petioles 3–10 cm; blade ovate-triangular, ca. 1.5–4 × 1.5–3.5 cm, ternate; leaflets 3(–5); ultimate segments flabelliform or rhomboidal, ca. 1 × 1 cm, margins serrate. Cauline leaves 1–3, 1–2-ternate; ultimate segments linear, 20–50 × 1–2 mm. Umbels 1.5–2.5 cm across in flower, to 4 cm in fruit; bracts absent; rays 10–20, 1–2 cm; bracteoles 1–3, 0.5–1.8 mm; umbellules 2(–3)-flowered; pedicels 0.1–1.8 mm. Calyx teeth triangular-subulate, ca. 0.3 mm. Petals white, ca. 1.1 × 0.7 mm. Stylopodium conic; styles elongate; stylopodium plus styles ca. 0.6 mm. Fruit ovoid, 1.5–1 ×

0.7–1 mm; ribs filiform; vittae 2 in each furrow, 4 on commissure. Fl. Mar–May, fr. Jun–Aug.

• Forests, among shrubs, grasslands, streamsides; 1200–3400 m. S Gansu, W Hubei, Hunan, E Qinghai, S Shaanxi, W Sichuan.

17. *Pternopetalum filicinum* (Franchet) Handel-Mazzetti, Symb. Sin. 7: 718. 1933.

羊齿囊瓣芹 yang chi nang ban qin

Carum filicinum Franchet, Bull. Soc. Philom. Paris, sér. 8, 6: 121. 1894; *Cryptotaeniopsis filicina* (Franchet) H. de Boissieu; *Pimpinella filicina* (Franchet) Diels.

Plants 25–40 cm. Stems 1–2, 1–2-branched or unbranched. Basal leaves petiolate, petioles 3–7 cm; blade triangular-ovate, 2–8 × 2–4 cm, ternate or ternate-2-pinnate; ultimate segments flabelliform or lanceolate, 7–16 × 3–9 mm. Upper leaves 2-ternate; ultimate segments elongate-linear, 20–40 × 1–2 mm. Umbels 2–3.5 cm across in flower, to 9 in fruit; bracts absent; rays 7–24, 2–4 cm; bracteoles 2–3, 0.3–1 mm; umbellules 2(–3)-flowered; pedicels 0.2–1.5 mm. Calyx teeth minute, almost obsolete, triangular, ca. 0.05 mm. Petals white, 0.9–0.5 mm. Stylopodium low-conic; styles shorter than stylopodium, ca. 0.15 mm, reflexed. Fruit oblong-ovoid, 2.5–3 × 0.7–1 mm; ribs filiform; vittae 1–2 in each furrow, 2 on commissure. Fl. Apr–Jun, fr. Jul–Sep.

• Coniferous forests, grassy slopes; 1500–3900 m. Gansu, W Hubei, Qinghai, Shaanxi, NE and W Sichuan, NW Yunnan.

Specific boundaries with the following species, *Pternopetalum tanakae*, are indistinct and need further work.

18. *Pternopetalum tanakae* (Franchet & Savatier) Handel-Mazzetti, Symb. Sin. 7: 719. 1933.

东亚囊瓣芹 dong ya nang ban qin

Plants 1–25 cm. Roots fusiform; rhizomes creeping, frequently with a few tubercles at nodes. Stems 1–2, glabrous, 1–2-branched or unbranched. Basal leaves petiolate, petioles 2–10 cm; blade ovate-triangular, 2–4 × 1.5–3.5 cm, ternate-2-pinnate; ultimate segments flabelliform or lanceolate, 5–15 × 3–8 mm. Cauline leaves 1–2, ternate-1–2-pinnate or ternate; ultimate segments lanceolate or elongate-linear, 10–25 × 2–3 mm. Umbels 2–3 cm across in flower, to 7 cm in fruit; bracts absent (occasionally 1, minute); rays 5–25(–30), 1.5–3 cm; bracteoles 1–3, 0.3–2 mm; umbellules 1–2(–3)-flowered; pedicels 0.2–2.5 mm. Calyx teeth minute, ca. 0.1 mm, or obsolete. Petals white, oblong, apex acute. Stylopodium low-conic; styles ca. 0.2 mm, shorter than stylopodium. Fruit oblong ovoid, 2–2.5 × 1–2 mm; ribs filiform; vittae 1–2 in each furrow, 2 on commissure. Fl. and fr. Apr–Aug.

Forests; 700–1600 m. Anhui, Fujian, Jiangxi, Zhejiang [Japan, Korea].

Literature references to *Pternopetalum tanakae* occurring in the Himalayas are based on misidentification of material that should correctly be ascribed to *P. subalpinum*.

- 1a. Bract-like leaves absent under base of umbel 18a. var. *tanakae*
- 1b. Bract-like leaves 1–2 under base of umbel 18b. var. *fulcratum*

18a. *Pternopetalum tanakae* var. *tanakae*

东亚囊瓣芹(原变种) dong ya nang ban qin (yuan bian zhong)

Carum tanakae Franchet & Savatier, Enum. Pl. Jap. 2: 371. 1878; *Cryptotaeniopsis tanakae* (Franchet & Savatier) H. de Boissieu; *Pimpinella tanakae* (Franchet & Savatier) Diels.

Bract-like leaves absent from base of umbel. Bracts absent. Fruit vittae 1–2 in each furrow, 2 on commissure.

Forests; 700–1600 m. Anhui, Fujian [Japan, Korea].

18b. *Pternopetalum tanakae* var. *fulcratum* Y. H. Zhang, Bull. Bot. Res., Harbin 9(3): 59. 1989 [“*fulcrantum*”].

假苞囊瓣芹 jia bao nang ban qin

Leaves 1–2 under the base of umbel, bract-like, 1–2-ternate; ultimate segments elongate-linear, 10–25 × 1–2 mm. Bracts usually absent or occasionally 1, minute, linear-lanceolate. Fruit vittae 1 in each furrow.

• Among mosses in forests; ca. 1500 m. Anhui, Fujian, Jiangxi, Zhejiang.

19. *Pternopetalum caespitosum* R. H. Shan, Sinensia 14: 113. 1943.

丛枝囊瓣芹 cong zhi nang ban qin

Plants 20–30(–60) cm. Stems slender, profusely branched, caespitose. Basal leaves petiolate, petioles 1.5–7 cm; blade ovate-triangular in outline, 2.5–6 × 2–5 cm, 1–2-ternate; ultimate segments ovate, ca. 1 × 1 cm, or linear-lanceolate, 2–4 × 0.3–0.5 cm. Cauline leaves ternate; ultimate segments elongate-linear, 30–70 × 3–5 mm. Umbels numerous, 2–3 cm across in flower, to 4 cm in fruit, terminal on stem and branches; bracts absent; rays 5–20, 2–4 cm, pubescent; bracteoles 2–3; umbellules 2–3-flowered. Calyx teeth minute, subulate, ca. 0.3 mm. Petals white. Stylopodium low-conic; styles ca. equaling calyx teeth, suberect to slightly reflexed. Fruit ovoid, 2–3 × 1.5–2 mm; ribs filiform; vittae 1–3 in each furrow, 2–4 on commissure. Fl. May–Jul, fr. Aug–Oct.

• Forests, forest margins, grasslands; 2300–3600 m. Gansu, Shaanxi, W Sichuan, E Xizang.

20. *Pternopetalum subalpinum* Handel-Mazzetti, Symb. Sin. 7: 718. 1933.

高山囊瓣芹 gao shan nang ban qin

Plants 5–10 cm. Stems 1–2, unbranched, glabrous. Basal leaves petiolate, petioles 2–6 cm; blade ovate-triangular, 8–20 × 9–18 mm, 1-pinnate; pinnae 2–4 pairs, broadly ovate, 2–6 × 2–6 mm, margins serrulate. Cauline leaves similar to basal. Umbels 0.5–1.1 cm across in flower, to 3.5 cm in fruit, terminal; bracts absent; rays 5–9, 3–25 mm, extremely unequal; bracteoles 1–2, 0.3–1.5 mm; umbellules (1–)2(–3)-flowered; pedicels to 1.3 mm. Calyx teeth minute, triangular, ca. 0.1 mm. Petals white or purplish-white, ca. 1 × 0.4 mm, apex acute. Stylopodium low-conic; styles ca. 0.15 mm, shorter than stylopodium, reflexed. Fruit ovoid, 1.5–2 × 0.75–0.9 mm; vittae not observed. Fl. and fr. Jun–Aug.

Forests, grasslands, streamsides; 3000–4100 m. NW Yunnan [Bhutan, NE India, Sikkim].

21. *Pternopetalum leptophyllum* (Dunn) Handel-Mazzetti, Symb. Sin. 7: 719. 1933.

薄叶囊瓣芹 bao ye nang ban qin

Cryptotaeniopsis leptophylla Dunn, J. Linn. Soc., Bot. 35: 495. 1903; *C. viridis* C. Norman; *Pternopetalum confusum* C. Norman; *P. viride* (C. Norman) Handel-Mazzetti.

Plants 10–30 cm. Stems 1–3, usually unbranched or occasionally of a single branch. Basal leaves petiolate, petioles 4–16 cm; blade ovate-acuminate in outline, 3–8 × 1.5–7 cm, 2-pinnate/pinnatifid; ultimate segments ovate-lanceolate, 5–15 × 3–5 mm. Cauline leaves similar to basal. Umbels 2–3 cm across in flower, to 4 cm in fruit; bracts absent; rays 6–25, 1–2 cm; bracteoles 2–4, 1–1.5 mm; umbellules 2–4-flowered; pedicels 0.5–3 mm. Calyx teeth minute, triangular, ca. 0.1 mm. Petals white, apex not inflexed. Stylopodium low-conic; styles ca. 0.4 mm, shorter than stylopodium, reflexed. Fruit oblong-ovoid, ca. 2 × 1 mm; ribs filiform; vittae 1 in each furrow, 2 on commissure. Fl. and fr. Apr–Aug.

- Shady moist rocks; 1000–1800 m. Sichuan.

This poorly known taxon is recorded only from a few collections. It has reputed medicinal value.

22. *Pternopetalum gracillimum* (H. Wolff) Handel-Mazzetti, Symb. Sin. 7: 719. 1933.

纤细囊瓣芹 xian xi nang ban qin

Cryptotaeniopsis gracillima H. Wolff, Acta Horti Gothob. 2: 306. 1926; *Pternopetalum lamellosociliare* K. T. Fu; *P. wangianum* Handel-Mazzetti.

Plants 10–20 cm tall, glabrous. Stems 1–6, usually unbranched or occasionally of a single branch. Basal leaves petiolate, petioles 5–7 cm; blade ovate-triangular, 1.5–3 × 1–3 cm, ternate-2–3-pinnate; pinnae 4–5-paired, proximal pinnae petiolulate; ultimate segments linear, 1.5–5 × 0.5–1 mm. Cauline leaves absent, or occasionally 1, similar to the basal. Umbels 1–2 cm across in flower, to 5 cm in fruit, usually terminal; bracts absent or 1, linear-lanceolate; rays (5–)10–15(–30), 1–3 cm; bracteoles 2, 1–2 mm; umbellules 2–3-flowered; pedicels 0.2–2 mm. Calyx teeth minute, triangular, ca. 0.1 mm. Petals white. Stylopodium low-conic; styles ca. 2 mm, shorter than stylopodium, reflexed. Fruit oblong-ovoid, ca. 2 × 1.1 mm, both mericarps developed in fruit; ribs filiform; vittae 1 in each furrow, 2 on commissure. Fl. and fr. May–Aug.

- Forests, mossy rocks; 1500–3400 m. Gansu, Hubei, Sichuan, NW Yunnan.

23. *Pternopetalum trichomanifolium* (Franchet) Handel-Mazzetti, Symb. Sin. 7: 719. 1933.

The following species have been described from Chinese material, but are imperfectly known as no specimens have been seen or the specimens are inadequate.

Pternopetalum asplenioides (H. de Boissieu) Handel-Mazzetti (Symb. Sin. 7: 718. 1933; *Cryptotaeniopsis asplenioides* H. de Boissieu,

膜蕨囊瓣芹 mo jue nang ban qin

Carum trichomanifolium Franchet, Bull. Mus. Hist. Nat. (Paris) 1: 64. 1895; *Cryptotaeniopsis decipiens* C. Norman; *C. kiangsiensis* H. Wolff; *C. trichomanifolia* (Franchet) H. de Boissieu; *Pimpinella trichomanifolia* (Franchet) Diels; *Pternopetalum decipiens* (C. Norman) M. Hiroe; *P. kiangsiense* (H. Wolff) Handel-Mazzetti.

Plants 30–40(–60) cm. Stems 1–3, usually unbranched or occasionally of a single branch. Leaves almost all basal, petiolate, petioles 3–18 cm; blade triangular-ovate in outline, 6–9 × 5–10 cm, ternate-3–4-pinnate, very finely dissected; ultimate segments linear, 1.5–4 × 1–2 mm. Umbels 1.5–2.5 cm across in flower, to 10 cm in fruit; bracts absent; rays (6–)15–30(–40), (2–)3–5 cm; bracteoles 2–4, 0.7–2 mm; umbellules 2–4-flowered; pedicels 0.1–2 mm. Calyx teeth subulate, ca. 1 mm. Petals white, ca. 2 × 1 mm. Stylopodium conic; styles elongate; stylopodium plus style ca. 1 mm. Fruit oblong-ovoid, 3–4 × 0.8–1.2 mm, often only one mericarp develops in fruit; ribs filiform; vittae 1–3 in each furrow, 4 on commissure. Fl. Mar–May, fr. Jun–Aug.

- Forests, shady moist rocks, streamsides; 600–2400 m. Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Sichuan, Xizang, Yunnan.

This species has reputed medicinal value (in Guangxi).

Bull. Herb. Boissier, sér. 2, 2: 807. 1902), described from Chongqing (Chengkou, *P. G. Farges s.n.*, holotype, P).

Flora of China 14: 85–92. 2005.

Pternopetalum mire 3652, *holotairei* (Diels ex H. Wolff) Handel-Mazzetti (Symb. Sin. 7: 719. 1933; *Cryptotaeniopsis mairei* Diels ex H. Wolff in Engler, Pflanzenr. 90(IV. 228): 180. 1927; *Carum mairei* (Diels ex H. Wolff) M. Hiroe), described from NE Yunnan (Dongchuan, 2600 m, E. E. Maype, B).

