

43. CARDAMINE Linnaeus, Sp. Pl. 2: 654. 1753.

碎米荠属 sui mi qi shu

Dentaria Linnaeus; *Loxostemon* J. D. Hooker & Thomson; *Sphaerotorrhiza* (O. E. Schulz) Khokhrjakov.

Herbs annual, biennial, or rhizomatous or tuberous perennial. Trichomes absent or simple. Stems erect or prostrate, leafy or rarely leafless and plant scapose. Basal leaves petiolate, rosulate or not, simple and entire, toothed, or 1–3-pinnatisect, or palmately lobed, sometimes trifoliolate, pinnately, palmately, or bipinnately compound. Cauline leaves alternate, (rarely opposite or whorled), simple or compound as basal leaves, petiolate or sessile and base cuneate, attenuate, auriculate, or sagittate, margin entire, dentate, or variously lobed. Racemes ebracteate or rarely bracteate throughout or only basally, corymbose or in panicles, elongated in fruit. Fruiting pedicels slender or thickened, erect, divaricate, or reflexed. Sepals ovate or oblong, base of lateral pair saccate or not, margin often membranous. Petals white, pink, purple, or violet, never yellow, rarely absent; blade obovate, spatulate, oblong, or oblanceolate, apex obtuse or emarginate; claw absent or strongly differentiated from blade, longer or shorter than sepals. Stamens 6 and tetradynamous, rarely 4 and equal in length; anthers ovate, oblong, or linear, obtuse at apex. Nectar glands confluent and subtending bases of all stamens; median glands 2 or rarely 4 or absent; lateral glands annular or semiannular. Ovules 4–50 per ovary. Fruit dehiscent siliques, linear or rarely narrowly oblong or narrowly lanceolate, latiseptate, sessile; valves papery, not veined, glabrous (or very rarely hairy), smooth or torulose, dehiscing elastically acropetally, spirally or circinate coiled; replum strongly flattened; septum complete, membranous, translucent; style distinct or rarely obsolete; stigma capitate, entire. Seeds uniseriate, wingless, rarely margined or winged, oblong or ovate, flattened; seed coat smooth, minutely reticulate, colliculate, or rugose; mucilaginous or not when wetted; cotyledons accumbent or very rarely incumbent.

About 200 species: worldwide; 48 species (24 endemic, one introduced) in China.

- 1a. Racemes bracteate throughout, very lax 38. *C. lihengiana*
1b. Racemes ebracteate, corymbose.
 2a. Flowering stems leafless; all leaves basal.
 3a. Rhizomal leaves trifoliolate, leaflets ovate, 7–18 × 4–5 cm; petals 1.5–1.7 cm 4. *C. cheotaiyenii*
 3b. Rhizomal leaves simple, suborbicular or broadly reniform; rarely to 2 × 3 cm; petals less than 1.5 cm.
 4a. Petals (8–)9–13 mm; fruiting pedicels 1–4 cm; leaf blade reniform or suborbicular 13. *C. scaposa*
 4b. Petals 3–3.5 mm; fruiting pedicels 0.2–0.7 cm; leaf blade ovate, subcordate, or oblong 42. *C. changbaihana*
2b. Flowering stems leafy; at least some leaves cauline.
 5a. Cauline leaves auriculate, sagittate, or amplexicaul at base, sometimes petiole absent and proximal pair of leaflets attached directly to or a little above node.
 6a. Blade of cauline leaves sessile, rachis and petiole absent; petals 10–17 mm 8. *C. violacea*
 6b. Blade of cauline leaves on a distinct petiole or rachis; petals 3–9(–10) mm.
 7a. Petiole ± absent; proximal pair of lateral leaflets auriclelike, attached to rachis at or a little above node, often giving appearance of amplexicaul leaf base.
 8a. Cauline leaves pinnatisect; rhizomes, stolons, stem base, and petiole of basal leaves densely crisped pilose; basal leaves orbicular 12. *C. fargesiana*
 8b. Cauline leaves trifoliolate or pinnately compound; rhizomes, stolons, stem base, and petioles of basal leaves glabrous or some of them sparsely pilose; basal leaves variously-shaped.
 9a. Cauline leaves trifoliolate; lateral leaflets 1 pair 31. *C. engleriana*
 9b. Cauline leaves pinnately compound or pinnatisect; lateral leaflets or leaf lobes 2 or more pairs.
 10a. Plants with long stolons bearing simple leaves; seeds broadly winged; petals white . 29. *C. lyrata*
 10b. Plants without stolons and simple leaves; seeds wingless; flowers purple or lavender, if white then plants pilose at least basally.
 11a. Lateral leaflets 2–4(or 5) pairs; plants erect, pilose basally or along leaf margin.
 12a. Cauline leaves 2–5(–7); plants (7–)10–25(–35) cm tall; petals white; stigma entire 30. *C. hygrophila*
 12b. Cauline leaves (9–)12–28(–37); plants (20–)30–100(–115) cm tall; petals purple or lavender; stigma 2-lobed 28. *C. griffithii*
 11b. Lateral leaflets (6–)7–15 pairs; plants often creeping, glabrous.

- 13a. Lateral leaflets ovate to ovate-oblong, entire or repand, base obtuse; seeds wingless; style 2–4 mm; sepals 2.5–3 mm 27. *C. multijuga*
- 13b. Lateral leaflets linear or narrowly oblong, proximal margin 1- or 2(or 3)-toothed, base oblique; seeds winged; style 4–6 mm; sepals 3–4 mm 26. *C. gracilis*
- 7b. Petiole distinct; proximal pair of leaflets not auriclelike, attached well above node.
- 14a. Petiole broadly winged at least along proximal half.
- 15a. Blade of cauline leaves not lobed; petals 3–4 mm; Heilongjiang, Jilin, Liaoning [Korea] 32. *C. komarovii*
- 15b. Blade of cauline leaves 3-lobed or pinnatisect; petals 5–8 mm; Guizhou, Sichuan, Yunnan.
- 16a. Blade of cauline leaves trilobed, terminal lobe ovate to ovate-lanceolate; petals purple; racemes simple 6. *C. bodinieri*
- 16b. Blade of cauline leaves pinnatisect, terminal lobe obovate to obovate-oblong; petals white; racemes in panicles 7. *C. multiflora*
- 14b. Petiole wingless.
- 17a. Leaves simple, rarely a few trifoliolate.
- 18a. Blade of basal leaves not fleshy, ovate, cordate, or rarely suborbicular, longer than wide; petals white, (4–)5–7(–8) mm 33. *C. circaeoides*
- 18b. Blade of basal leaves fleshy, reniform, much wider than long; petals violet, deep magenta, or rarely lavender or white, 7–10 mm 34. *C. calthifolia*
- 17b. All leaves pinnatisect, trifid, trifoliolate, or pinnately compound.
- 19a. Cauline leaves trifid or pinnatisect, with all lobes decurrent; rhizomes fleshy, often with bulbils 17. *C. repens*
- 19b. Cauline leaves compound, with 3–11 pairs of nondecurent leaflets; rhizomes not fleshy, without bulbils.
- 20a. Cauline leaves (9–)13–23-foliolate 41. *C. impatiens*
- 20b. Cauline leaves 3–7-foliolate.
- 21a. Plants 3–10 cm tall; cauline leaves with petiole 0.4–1.1 cm, terminal leaflet narrowly oblanceolate or linear, 0.5–1 mm wide; ovaries and fruit valves glabrous 43. *C. nipponica*
- 21b. Plants (10–)15–45(–60) cm tall; cauline leaves with petiole (1–)2–7(–8.5) cm, terminal leaflet lanceolate, elliptic, oblong, ovate, or suborbicular, (4–)6–20(–30) mm wide; ovaries and fruit valves sparsely pilose 39. *C. yunnanensis*
- 5b. Cauline leaves not auriculate, sagittate, nor amplexicaul, proximal leaflets or leaf lobes attached to a distinct petiole well above the node.
- 22a. Cauline leaves simple, rarely obscurely 2- or 3-lobed.
- 23a. Cauline leaves reniform, 15–40 mm wide; petals 7–10 mm; sepals 2.5–4 mm 34. *C. calthifolia*
- 23b. Cauline leaves broadly ovate, subcordate, or oblong, 1.5–8 mm wide; petals 3–3.5 mm; sepals 1.3–1.7 mm 42. *C. changbaiana*
- 22b. Cauline leaves pinnatisect, deeply trifid, trifoliolate, or pinnately compound.
- 24a. Plants annual or biennial; petals 1.5–5(–6) mm.
- 25a. Lateral lobes of middle cauline leaves filiform, linear, or narrowly oblong, 0.3–3 mm wide; petals (1.5–)1.8–2.5 mm; fruit 0.6–0.9 mm wide 45. *C. parviflora*
- 25b. Lateral lobes of middle cauline leaves variously-shaped, wider; petals 2.5–4.5(–6) mm; fruit (0.8–)1–1.5 mm wide.
- 26a. Fruit and usually fruiting pedicels erect, often appressed to rachis; stamens 4(–6); petioles of basal leaves ciliate 46. *C. hirsuta*
- 26b. At least pedicels divaricate or ascending, together with fruit not appressed to rachis; stamens (4 or 6); petioles of basal leaves often not ciliate.
- 27a. Terminal lobe of middle and upper cauline leaves nearly as large as lateral ones; raceme rachis and/or stem often flexuous 47. *C. flexuosa*
- 27b. Terminal lobe of middle and upper cauline leaves considerably larger than lateral ones; raceme rachis and stem straight 48. *C. scutata*

- 24b. Plants perennial, with distinct rhizomes, tubers, bulbils, or stolons; petals (5–)6–18 mm.
- 28a. Rhizomes with bulbils or tubers; stem narrowed basally into a fragile, slender attachment to rhizome.
- 29a. Rhizomes with stalked tubers; bulbils absent; rhizomal leaves ternate, biternate, or palmately 5-foliolate; petals 8–11(–14) mm 11. *C. trifida*
- 29b. Rhizomes with sessile bulbils; tubers absent; rhizomal leaves simple, trifoliolate, or pinnately compound; petals smaller.
- 30a. Cauline leaves pinnatisect; terminal lobe filiform, linear, or lanceolate, without petiolule.
- 31a. Terminal lobe of cauline leaves lanceolate to linear-lanceolate, decurrent with distal pair of lateral lobes, 4–9 mm wide; petiole winged 17. *C. repens*
- 31b. Terminal lobe of cauline leaves filiform to narrowly linear, not decurrent with distal pair of lateral lobes, 0.5–1.5(–2) mm wide; petiole slender, wingless 18. *C. granulifera*
- 30b. Cauline leaves compound; terminal lobe oblong, elliptic, or obovate, petiolulate.
- 32a. Cauline leaves with 1(or 2) pairs of lateral leaflets; axils of cauline leaves with bulbils; filaments of median stamens 0.7–1.1 mm wide, extended into an apical tooth . 15. *C. pulchella*
- 32b. Cauline leaves with (2 or)3–6 pairs of lateral leaflets; axils of cauline leaves without bulbils; filaments of median stamens narrower, toothless.
- 33a. Terminal leaflet oblong or oblong-elliptic, entire; petals white or rarely lavender, 7–9 mm 14. *C. franchetiana*
- 33b. Terminal leaflet orbicular, obovate, or oblanceolate, often lobed, trifid, or subapically toothed; petals purple with darker veins, 8–12(–14) mm 19. *C. loxostemonoides*
- 28b. Rhizomes without bulbils or tubers; stem stout at attachment to rhizome, if slender then at least some leaflets more than 1 cm wide.
- 34a. Terminal leaflet or ultimate segments of upper cauline leaves filiform, linear, linear-lanceolate, or narrowly oblanceolate, to 2 mm wide.
- 35a. At least some leaf segments bifid or trifid into linear segments 44. *C. caroides*
- 35b. Leaf segments entire or dentate, never deeply cleft.
- 36a. Cauline leaves with 4–7(–13) lateral lobes or leaflets on each side of rachis; petals purple or lavender; stems and rachis not flexuous.
- 37a. Rhizomes stoloniferous; median staminal filaments 4–5 mm; ovules 10–16; fruit to 2.5 cm 24. *C. purpurascens*
- 37b. Rhizomes not stoloniferous; median staminal filaments 5–10 mm; ovules 20–30; fruit often longer 10. *C. pratensis*
- 36b. Cauline leaves with 1–3 lateral lobes or leaflets on each side of rachis; petals white; stems and rachis flexuous.
- 38a. Petals 5–6 mm; fruiting pedicels 8–14 mm, divaricate, recurved 20. *C. stenoloba*
- 38b. Petals 6.5–9 mm; fruiting pedicels (8–)10–25(–30) mm, erect or ascending, straight 21. *C. simplex*
- 34b. Terminal leaflet of upper cauline leaves variously-shaped but never filiform, linear, linear-lanceolate, or narrowly lanceolate, more than 2 mm wide.
- 39a. Cauline leaves with 4–13 lateral leaflets or lobes on each side of rachis.
- 40a. Terminal leaflet of cauline leaves more than 1 cm; seeds (1.5–)2–3(–4) mm 1. *C. macrophylla*
- 40b. Terminal leaflet of cauline leaves 0.2–0.8(–1) cm; seeds 1.2–2.1 mm.
- 41a. Rhizomes thickened, not elongated; lateral leaflets of cauline leaves symmetric, base cuneate; median staminal filaments 5–10 mm 10. *C. pratensis*
- 41b. Rhizomes slender, elongated; lateral leaflets of cauline leaves strongly asymmetric, base oblique; median staminal filament 3.5–5.
- 42a. Flowers white; at least some lateral leaflets of lower and middle cauline leaves deeply 3–5-toothed or -lobed along abaxial margin 23. *C. rockii*

- 42b. Flowers purple or lavender, or white; lateral leaflets entire, repand, or 1(or 2)-toothed along abaxial margin 25. *C. microzyga*
- 39b. Cauline leaves with 1–3 lateral leaflets or lobes on each side of rachis.
- 43a. Leaf blade or terminal leaf lobe of rhizomal, basal, and lowermost cauline leaves reniform, suborbicular, orbicular, or rarely broadly cordate, palmately veined.
- 44a. Stems strongly flexuous; terminal leaflet of upper cauline leaves linear or narrowly oblong; fruit valves torulose 16. *C. delavayi*
- 44b. Stems not flexuous; terminal leaflet of upper cauline leaves obovate, suborbicular, subreniform, or ovate-suborbicular; fruit valves smooth.
- 45a. Rhizomes not stoloniferous; ovules or seeds 24–30 per fruit; margin of upper leaves or leaflets crenate or repand-crenate 36. *C. anhuiensis*
- 45b. Rhizomes stoloniferous; ovules or seeds 10–14 per fruit; margin of upper leaves or leaflets entire, repand, dentate, or rarely slightly lobed.
- 46a. Stems pilose; petals 6–9 mm; sepals 3–4 mm; terminal leaflet of cauline leaves obovate 35. *C. calcicola*
- 46b. Stems glabrous or puberulent; petals 5–6 mm; sepals 2–2.5 mm; terminal leaflet of cauline leaves suborbicular, reniform, or ovate-suborbicular 37. *C. hydrocotyloides*
- 43b. Leaf blade or terminal leaf lobe of rhizomal, basal, and lowermost cauline leaves oblong, elliptic, obovate, or lanceolate, pinnately veined.
- 47a. Terminal leaf lobe rarely to 1.2 cm, broadly obovate 22. *C. trifoliolata*
- 47b. Terminal leaf lobe considerably larger, variously-shaped by never broadly obovate.
- 48a. Cauline leaves trifoliolate, uppermost sometimes simple.
- 49a. Plants (35–)50–100(–130) cm tall; cauline leaves (5–)7–10(–15); petals purple, lavender, pink, or rarely white 5. *C. fragariifolia*
- 49b. Plants 15–40 cm tall; cauline leaves 1–4; petals white 40. *C. paucifolia*
- 48b. Cauline leaves 5–23-foliolate, rarely uppermost trifoliolate.
- 50a. Rhizomes stoloniferous; petals white; leaflet apex of cauline leaves obtuse 9. *C. prorepens*
- 50b. Rhizomes not stoloniferous; petals purple or lavender, if white then 6–8 mm; leaflet apex acuminate or acute.
- 51a. Flowers white; stems flexuous; terminal leaflet of cauline leaves petiolulate, apex caudate-acuminate, acuminate, or rarely acute 3. *C. leucantha*
- 51b. Flowers deep purple or lavender; stems straight or rarely subflexuous; terminal leaflet of cauline leaves sessile or rarely petiolulate, apex acute or acuminate.
- 52a. Cauline leaves 1–3(–5); plants (8–)15–30(–40) cm tall; rhizomes sparsely scaly; lateral leaflets of cauline leaves not decurrent 2. *C. tangutorum*
- 52b. Cauline leaves 3–12(–18); plants (20–)30–95(–115) cm tall; rhizomes usually not scaly; at least the distal pair of lateral leaflets of cauline leaves decurrent at base, rarely all cuneate 1. *C. macrophylla*

1. *Cardamine macrophylla* Willdenow, Sp. Pl. 3: 484. 1800.
大叶碎米荠 da ye sui mi qi

Cardamine macrophylla var. *crenata* Trautvetter; *C. macrophylla* var. *dentariifolia* J. D. Hooker & T. Anderson; *C. macrophylla* var. *diplodonta* T. Y. Cheo; *C. macrophylla* var. *foliosa* J. D. Hooker & T. Anderson; *C. macrophylla* var. *lobata* J. D. Hooker & T. Anderson; *C. macrophylla* var. *moupinensis* Franchet; *C. macrophylla* subsp. *polyphylla* (D. Don) O. E. Schulz; *C. macrophylla* var. *polyphylla* (D. Don) T. Y. Cheo & R. C. Fang; *C. macrophylla* var.

sikkimensis J. D. Hooker & T. Anderson; *C. polyphylla* D. Don (1825), not O. E. Schulz (1903); *C. sachalinensis* Miyabe & Miyake; *C. sinomanshurica* (Kitagawa) Kitagawa; *C. urbaniana* O. E. Schulz; *Dentaria gmelinii* Tausch; *D. macrophylla* (Willdenow) Bunge ex Maximowicz; *D. sinomanshurica* Kitagawa; *D. wallichii* G. Don; *D. willdenowii* Tausch. Herbs perennial, (20–)30–95(–115) cm tall. Rhizomes creeping, not scaly, slender or stout and with tuberous knots, 2–10(–30) mm in diam., not stoloniferous. Stems

stout or slender, erect, simple or rarely branched above, glabrous, hirsute, or pilose. Rhizomal leaves (4–)10–40(–50) cm; petiole (1–)3–20(–25) cm; terminal leaflet lanceolate, elliptic, oblong, ovate, or obovate, (1–)2–15(–25) × (0.5–)1–3.5(–5) cm, sessile or petiolulate, base cuneate, margin serrate, crenate, dentate, or rarely 3–5-lobed, apex acuminate, acute, or subobtusely; lateral leaflets (1 or)2–6 pairs, similar to terminal but smaller. Cauline leaves 3–12(–18); petiole (1–)2–5(–6.5) cm, not auriculate at base; terminal leaflet narrowly ovate, lanceolate, elliptic, or oblong, rarely obovate or lanceolate-linear, (2–)4–12(–20) × 1–4(–5) cm, glabrous or pubescent, sessile or on a petiolule to 1 cm, base cuneate, margin ciliolate and crenate, serrate, or serrulate, rarely subentire or doubly serrate, apex acute, rarely acuminate; lateral leaflets 2–7(–11) pairs, sessile or petiolulate, base cuneate or obliquely decurrent, similar to but slightly smaller than terminal leaflet. Racemes 10–30-flowered. Fruiting pedicels ascending or rarely divaricate, (0.3–)0.8–2.5(–3.1) cm, straight, stout. Sepals oblong, 3.5–6.5(–8) × 1.5–3 mm. Petals purple or lilac, obovate or spatulate, (0.8–)1–1.7 cm × 3.5–8 mm, apex rounded or rarely subemarginate. Median filament pairs 7–9(–11) mm, lateral pair 6–7 mm; anthers oblong, 1–2(–2.5) mm. Ovules 8–12(–16) per ovary. Fruit linear, (2.2–)2.5–6(–7) cm × 1.5–2.5 (–3) mm; gynophore 0.5–3 mm; valves smooth, sparsely pubescent or glabrous; style (1–)2–6.5(–9) mm. Seeds brown, ovoid or oblong, (1.5–)2–3(–4) × 1–1.7(–2) mm. Fl. (Mar–) Apr–Oct, fr. May–Oct. $2n = 64, 80, 96$.

Damp forests, river banks, tundra, rock crevices, meadows, damp woodlands, thickets, streambanks, valleys, ravines, mountain slopes, among boulders; 500–4200 m. Anhui, Gansu, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangxi, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan, Zhejiang [Bhutan, India, Japan, Kashmir, Kazakstan, Mongolia, Nepal, Pakistan, Russia, Sikkim].

The above first records from Anhui, Henan, Hunan, and Jiangxi are based on Yao 8927 (A), Boufford et al. 26199 (A, MO), Handel-Mazzetti (E, W, WU), and Tan Ceming 9604090 (MO), respectively. *Cardamine macrophylla* is highly variable, especially in leaflet number, shape, size, base, and margin. An examination of several hundred specimens from the entire range of the species reveals that only a small number of the variants has been recognized formally in China, that the variation does not show any correlation among characters and/or geography, that some of the variants (on which varieties are based) occur within the same population, and that a thorough study at the population level is needed before the species is divided into infraspecific taxa. For example, leaflet number, in which var. *polyphylla* is said to have four or more pairs, is quite variable, though a maximum of seven pairs (e.g., Yü 22173, at A) was found in China, whereas serrate, serrulate, and doubly serrate leaflets were observed in one population (Al-Shehbaz et al. 9312, B, BM, E, G, K, MO). Serrate and doubly serrate leaflets also occur sporadically in *C. leucantha* and *C. tangutorum*.

Syntypes of *Cardamine urbaniana* represent robust plants with thick rhizomes and very large leaves. Schulz (Bot. Jahrb. Syst. 32: 280–623. 1903) separated the species from *C. macrophylla* primarily on the basis of its having thick rhizomes and sessile terminal leaflets.

However, these two characters, as well as the cuneate vs. decurrent base of the lateral leaflets, do not correlate, and one finds various combinations of them in populations from Bhutan, China, Nepal, and Sikkim. *Cardamine urbaniana* is here lectotypified on Henry 5635 (lectotype, GH; isolectotypes, G, K, US). The isolectotype at K has leaflets ca. 20 × 5 cm, which is the largest examined in the Brassicaceae.

Cardamine macrophylla is used medicinally, and the young parts are eaten as a vegetable.

2. *Cardamine tangutorum* O. E. Schulz, Bot. Jahrb. Syst. 32: 360. 1903.

唐古碎米荠 tang gu sui mi qi

Herbs perennial, (8–)15–30(–40) cm tall. Rhizomes creeping, sparsely scaly, not stoloniferous. Stems simple, erect, strongly curved at base, glabrous throughout or sparsely pilose distally. Rhizomal leaves 7–16(–22) cm; petiole 3.5–8(–12) cm; terminal leaflet oblong, oblong-lanceolate, or elliptic, (2–)3–5 (–6) × 0.7–1.2(–2) cm, sessile, base cuneate, margin serrate and ciliolate, apex acute to subobtusely; lateral leaflets 3–5(or 6) pairs, not decurrent at base. Cauline leaves 1–3(–5), (3–)5–10 (–13) cm, subleathery; petiole (0.5–)1–2.5(–4) cm, not auriculate at base; terminal leaflet oblong, 2–4 cm × 3–10(–15) mm, subsessile, glabrous or rarely sparsely pilose, base cuneate, margin ciliolate and serrate, rarely subentire or doubly serrate, apex acute or acuminate; lateral leaflets 2–4 pairs, similar to terminal but slightly smaller, not decurrent at base. Racemes 10–15-flowered. Fruiting pedicels ascending or divaricate, (0.7–)1–1.5 cm, straight, slender. Sepals oblong, 4–5 × (1–)1.5–2 mm, base of lateral pair saccate. Petals purple, spatulate, 0.8–1.4 cm × (2–) 3–5 mm, base not clawed, apex rounded. Median filament pairs 6–8 mm, lateral pair 5–6 mm; anthers oblong, 1.2–2 mm. Ovules 10–14 per ovary. Fruit linear, 3.5–4.5 cm × 2–3 mm; gynophore to 2.5 mm; valves smooth, glabrous; style 2–4 mm. Seeds brown, ovate or suborbicular, 2–2.8 × 1.5–1.8 mm. Fl. May–Jul, fr. Jun–Aug. $2n = 42^*$.

• Montane ditches, swampy meadows, river basins, woodlands; 1300–4400 m. Gansu, Hebei, Qinghai, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan.

Although Schulz placed *Cardamine tangutorum* in a section different from that of *C. macrophylla*, the two species, if indeed distinct, are very closely related and are often difficult to separate. The separation in the key above is tenuous, and a critical study of the complex might prove that the two are conspecific.

This species is used medicinally and eaten as a vegetable.

3. *Cardamine leucantha* (Tausch) O. E. Schulz, Bot. Jahrb. Syst. 32: 403. 1903.

白花碎米荠 bai hua sui mi qi

Dentaria leucantha Tausch, Flora 19: 404. 1836; *Cardamine cathayensis* Migo; *C. dasyloba* (Turczaninow) Miquel; *C. leucantha* var. *crenata* D. C. Zhang; *C. macrophylla* Willdenow var. *parviflora* Trautvetter; *D. dasyloba* Turczaninow; *D. macrophylla* (Willdenow) Bunge ex Maximowicz var. *dasyloba* (Turczaninow) Makino.

Herbs perennial, 25–75 cm tall, sparsely to densely villous. Rhizomes creeping, slender, not scaly or stoloniferous. Stems simple, flexuous. Cauline leaves 4–7, including petiole (8–)10–20(–25) cm; petiole (1–)2–8(–10) cm, not auriculate at base; terminal leaflet lanceolate, elliptic, to ovate-elliptic, (3–) 4–9(–13) × (0.6–)1–3.5(–4) cm, adaxially shortly strigose or puberulent, abaxially pilose or long strigose, with a petiolule 5–13(–20) mm, base cuneate, margin antrorsely ciliate and irregularly serrate, doubly serrate, or subdentate, apex acuminate or rarely acute; lateral leaflets 2 or 3 pairs, rarely uppermost leaf trifoliolate, similar to terminal one, smaller, sessile, base cuneate or sometimes oblique. Racemes 12–24-flowered. Fruiting pedicels divaricate or ascending, (0.5–)1–1.8(–2.3) cm, pilose or puberulent, slender. Sepals oblong, (2–)2.5–3.5 × 0.9–1.5 mm, margin membranous, pilose abaxially. Petals white, spatulate to oblong-oblancoate, 6–8 × 2–3.5(–4) mm, cuneate and not clawed at base, apex rounded. Median filament pairs 5–6 mm, lateral pair 4–5 mm; anther oblong, 0.8–1.3 mm. Ovules 6–12 per ovary. Fruit linear, (1–)1.5–3 cm × 1–1.5 mm; gynophore 0.3–0.8(–1) mm; valves smooth, sparsely hairy or glabrous; style slender, (2–)3–5 mm. Seeds brown, oblong, 1.5–2.2 × 0.8–1.2 mm, narrowly winged or wingless. Fl. Apr–Jul, fr. May–Aug. $2n = 16$.

Roadsides, shady areas, forests, wet places along streams, roadsides; 100–2000 m. Anhui, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shanxi, Sichuan, Zhejiang [Japan, Korea, Mongolia, Russia].

The above first record from Sichuan is based on *Henry 5572* (GH, K, P, US).

Dried plants are used as a tea substitute, the rhizomes are medicinal, and seedlings are edible.

4. *Cardamine cheotaiyenii* Al-Shehbaz & G. Yang, Harvard Pap. Bot. 3(1): 73. 1998.

周氏碎米荠 *zhou shi sui mi qi*

Hilliella alatipes (Handel-Mazzetti) Y. H. Zhang & H. W. Li var. *macrantha* Y. H. Zhang.

Herbs perennial, scapose. Rhizomes ca. 5 mm in diam., with prominent petiolar scars. Rhizomal leaves 2, trifoliolate; petiole 5–30 cm, glabrous; leaflets ovate, 7–18 × 4–5 cm, adaxially glabrous, abaxially sparsely hirsute with thick trichomes 0.5–0.8 mm, base of terminal leaflet cuneate, that of lateral ones oblique, margin repand to repand-crenate, sparsely ciliate with trichomes 0.1–0.2 mm, apex obtuse or acute; lateral veins ending with mucros 0.3–0.5 mm; petiolule of terminal leaflet 0.6–1.5 cm, that of lateral leaflets 2–6 mm; cauline leaves absent. Scapes 15–30 cm, glabrous, leafless. Racemes few flowered, ebracteate, corymbose. Flowering pedicels slender, 2–3.5 cm, glabrous. Sepals ascending, oblong, 5–6 × 2.5–3.5 mm, erect, slightly saccate at base, glabrous. Petals white, oblong, 1.5–1.7 cm × 5–8 mm, erect, apex rounded; claw 1–2 mm.

Filaments white, erect, median pairs 6–7 mm, lateral pair 5–5.5 mm; anthers oblong, ca. 2 mm. Ovary narrowly linear, glabrous. Fruit and seeds unknown. Fl. Feb.

• About 1000 m. SE Yunnan (Malipo Xian).

A very distinct species at present known only from the type collection, *C. W. Wang 86836* (holotype, KUN; isotype, IBSC).

5. *Cardamine fragariifolia* O. E. Schulz, Bot. Jahrb. Syst. 32: 446. 1903.

莓叶碎米荠 *mei ye sui mi qi*

Cardamine scoriarum W. W. Smith; *C. smithiana* Biswas; *Cochlearia alatipes* Handel-Mazzetti; *Cochlearia scoriarum* (W. W. Smith) Handel-Mazzetti; *Hilliella alatipes* (Handel-Mazzetti) Y. H. Zhang & H. W. Li; *Yinshania alatipes* (Handel-Mazzetti) Y. Z. Zhao.

Herbs perennial, (35–)50–100(–130) cm tall. Rhizomes 3–8 mm in diam. Stems erect, simple or branched above, glabrous or rarely puberulent. Basal leaves withered by flowering. Cauline leaves (5–)7–10(–15), petiolate, trifoliolate, rarely lowermost with 4 or 5 leaflets, often simple below raceme; petiole 1–6(–10) cm, not auriculate at base, wingless or wing rarely to 1 mm wide; petiolules 1–6(–11) mm; leaflets subequal or terminal larger, ovate or lanceolate, rarely elliptic or subrhomboid, (1.5–)3–8(–12) × (1–)2–3(–5) cm, glabrous or with appressed, antrorse, simple trichomes 0.1–0.7 mm, base cuneate or obtuse, that of lateral leaflets often oblique, margin serrate or crenate, rarely lobed or subentire, ciliate with trichomes more than 0.1 mm, teeth mucronate, apex acute, acuminate, or acuminate-caudate. Fruiting pedicels divaricate, 5–9(–13) mm, slender, straight, glabrous or sparsely puberulent. Sepals oblong, 2.5–3.5(–4) × 1.5–2 mm, erect or ascending, not saccate, glabrous. Petals purple, lavender, pink, or rarely white, obovate or obovate-oblong, (6–)7–9(–10) × (2.5–)3–4 mm, rounded at apex; claw 1.5–2(–3) mm. Median filament pairs 4–5 mm, lateral pair 3–4 mm; anthers (0.6–)0.7–1 mm. Pistil glabrous; style slender, ca. 1 mm; stigma entire. Fruit and not seen. Fl. May–Jul.

Volcanic mountain slopes, shaded streamsides, wet forests, rocky places, moist grasslands; 1000–3000 m. Guangxi, Guizhou, Hubei, Hunan, Sichuan, Xizang, Yunnan [Bhutan, India, Myanmar].

The above first record from Myanmar is based on *Maw Mu Pa 17432* (K).

Records of *Cardamine trifoliolata* J. D. Hooker & Thomson in FRPS, Fl. Sichuan. (14: 89. 1999), Fl. Xizang. (2: 360. 1985), and Fl. Yunnan. (6: 58. 1995) are all based on misidentified plants of *C. fragariifolia*. The former species, which also occurs in China (see below), is readily distinguished by being a slender plant, 5–20(–30) cm tall, with white flowers, few cauline leaves, and a repand or obtusely lobed terminal leaflet 0.5–1(–1.5) cm. By contrast, *C. fragariifolia* is a robust plant, (35–)50–100(–130) cm tall, with purple, lavender, or pink (rarely white) flowers, (5–)7–10(–15) cauline leaves, and a serrate to crenate terminal leaflet (1.5–)3–8(–12) cm.

6. *Cardamine bodinieri* (H. Léveillé) Lauener, Notes Roy. Bot. Gard. Edinburgh 26: 336. 1965.
博氏碎米荠 *bo shi sui mi qi*

Dentaria bodinieri H. Léveillé, Repert. Spec. Nov. Regni Veg. 8: 452. 1910.

Herbs perennial, ca. 60 cm tall, rhizomatous. Stems erect, simple or branched above, glabrous except for leaves. Basal leaves withered by flowering. Cauline leaves 5–8, simple, deeply 3-lobed; petiole 0.5–5 cm, with a broad wing 2–6 mm wide and extending along entire length, base amplexicaul; auricles broadly oblong or ovate, to 6 × 4 mm; terminal leaf lobe ovate to ovate-lanceolate, 4–8 × 2–4 cm, sparsely hirsute with stout trichomes to 0.4 mm, sessile and base decurrent with lateral lobes, margin serrate-crenate, ciliolate with trichomes less than 0.1 mm, teeth mucronate, apex acute or acuminate; lateral lobes similar to terminal but smaller. Fruiting pedicels divaricate-ascending, 5–10 mm, straight, glabrous. Sepals ovate-oblong, 2–3 × ca. 1.5 mm, glabrous, lateral pair subsaccate. Petals purple, obovate, ca. 7 × 3 mm, not clawed. Median filaments pairs 2.5–3 mm, lateral pair 1.5–2 mm; anthers ca. 0.6 mm. Ovules 8–12 per ovary. Fruit linear, 0.8–1.2 cm × 1–1.2 mm; gynophore ca. 0.5 mm; valves glabrous, smooth; style 0.5–2 mm. Seeds dark brown, oblong, 1.3–1.7 × 0.7–0.9 mm, wingless. Fl. May, fr. Jul.

• About 1100 m. Guizhou.

Although the type of *Cardamine bodinieri* was collected from Guizhou (“Kouy-Yang” (Guiyang), May 1910, *Bodinier s.n.* (holotype, E)), the species was not mentioned in FRPS or in Fl. Guizhou. (vol. 7. 1989). The above record from Guizhou is also based on *C. Z. Dang & P. Dang 335* (PE).

Cardamine bodinieri is related to *C. fragariifolia*, from which it differs by having 3-lobed, simple leaves (vs. trifoliolate, compound leaves with distinctly petiolulate leaflets), a broadly winged (vs. slender or narrowly winged) petiole, an amplexicaul (vs. entire) petiolar base, and petals without (vs. with) well-developed claws.

7. *Cardamine multiflora* T. Y. Cheo & R. C. Fang, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1980(6): 21. 1980.

多花碎米荠 *duo hua sui mi qi*

Herbs perennial, 35–75 cm tall. Rhizomes stout. Stems erect, angled, sparsely pilose, lower nodes sometimes producing stolons to 60 cm, branched above middle. Basal leaves withered by anthesis. Middle cauline leaves pinnatisect; petiole (0.5–)1–3 cm, ciliate, gradually winged from apex to a much broader, auriculate or amplexicaul base; auricles oblong or ovate, (1.5–) 2.5–10(–13) × 1–3(–5) mm, ciliate; terminal lobe broadly obovate or obovate-oblong, (0.5–)1–4.5(–6) × (0.6–)1–2.5(–3) cm, pilose, subsessile or with a petiolule 2–12 mm, base cuneate and often decurrent with adjacent lateral lobes, margin crenate, apex obtuse to subacute; lateral lobes 1–4 on each side of rachis, similar to terminal lobe but smaller. Uppermost leaves and stolon leaves trifid, with oblanceolate or narrowly obovate terminal lobe decurrent with narrower and smaller lateral lobes; petiole rarely to 1 cm; auricles

rarely to 2 mm or reduced to a tooth. Racemes many flowered, in panicles. Fruiting pedicels divaricate or ascending, 1–2.5 cm, glabrous, straight. Sepals ovate or oblong, 2–3 × 1–1.5 mm, glabrous, lateral pair subsaccate. Petals purple, spatulate, 6–8 × 2.5–3.5 mm, apex rounded. Median filament pairs 3.5–5 mm, lateral pair 2.5–3.5 mm; anthers oblong, 0.9–1.3 mm. Ovules 12–16 per ovary. Fruit linear, 1–2 cm × 1.2–1.5 mm; valves smooth, glabrous; style 1–3 mm. Seeds brown, oblong, 1.5–1.7 × 0.8–1 mm, wingless. Fl. May–Jul, fr. Jul–Aug.

• Mountain slopes, damp places, forests; 2100–3700 m. Sichuan, Yunnan.

8. *Cardamine violacea* (D. Don) Wallich ex J. D. Hooker & Thomson, J. Proc. Linn. Soc., Bot. 5: 144. 1861.

堇色碎米荠 *jin se sui mi qi*

Erysimum violaceum D. Don, Prodr. Fl. Nepal. 202. 1825; *Cardamine violacea* subsp. *bhutanica* Grierson.

Herbs perennial, 20–100 cm tall, shortly pilose or subglabrous. Rhizomes stout, to 1 cm in diam. Stems erect, simple, stout, glabrous. Basal leaves not seen. Middle cauline leaves sessile, strongly auriculate, sagittate, or amplexicaul at base; blade lanceolate, linear-lanceolate, or ovate-lanceolate, 3.5–20 × 0.7–3.5 cm, abaxially glabrous, adaxially puberulent or subpilose, margin ciliolate and dentate, denticulate, or entire, apex acuminate or caudate; auricles oblong or ovate, 2–10 × 2–7 mm. Racemes 5–25-flowered. Flowering pedicels spreading or reflexed; fruiting pedicels divaricate or ascending, 0.8–3 cm, glabrous, straight. Sepals oblong 5–7 × 1.5–3 mm, glabrous or sparsely pilose, base of lateral pair saccae. Petals purple, spatulate or obovate, 1–1.7 cm × 4.5–7 mm. Median filament pairs 7–9 mm, lateral pair 6–7 mm; anthers oblong, 1.5–2 mm. Ovules 10–16 per ovary. Fruit linear, 2–6 cm × 1.4–2.5 mm; gynophore 0.5–1 mm; valves smooth, glabrous; style 3–8 mm. Seeds brown, oblong, 2–3 × 1.4–1.8 mm, wingless. Fl. May–Aug, fr. Jul–Sep.

Grassy slopes, streamsides, open forests, pastures, thickets, roadside banks, sandy moist forests, forest ravines; 1800–4000 m. Yunnan [Bhutan, Nepal, Sikkim].

9. *Cardamine prorepens* Fischer ex de Candolle, Syst. Nat. 2: 256. 1821.

浮水碎米荠 *fu shui sui mi qi*

Cardamine borealis Andrzejowski ex de Candolle; *C. pilosa* Willdenow; *C. pratensis* Linnaeus var. *prorepens* (Fischer ex de Candolle) Maximowicz; *C. pubescens* Steven.

Herbs perennial, 15–50(–60) cm tall, glabrous or pubescent. Rhizomes prostrate, stoloniferous. Stems stout, erect or decumbent, simple, glabrous or pubescent, 2–5(–8)-leaved. Rhizomal leaves 3–11-foliolate, 2–12 cm; petiole (0.5–)1.5–8 (–10) cm; terminal leaflet ovate, oblong, or narrowly obovate, 0.5–2(–3) cm × 4–13(–20)

mm, with a petiolule 2–10 mm, margin crenate or repand; lateral leaflets 1–5 pairs, often sessile, similar to terminal ones but smaller. Cauline leaves 3–5-foliolate, often glabrous; petiole to 7 cm, not auriculate at base; terminal leaflet elliptic, oblong, or rhomboid, 1–3.5(–5) × 0.5–1.8(–2.5) cm, with a petiolule to 2.5 cm, base cuneate or obtuse, margin remotely crenate, dentate, or repand, apex obtuse; lateral lobes obliquely ovate or oblong, sessile or shortly petiolulate, similar to terminal one. Racemes 5–15-flowered. Fruiting pedicels 0.5–3 cm. Sepals ovate, 3–4.5 × 1–2 mm. Petals white, narrowly obovate, 0.9–1.5 cm × 5–7 mm, base cuneate, apex rounded or submarginate. Median filament pairs 5–7 mm, lateral pair 3–5.5 mm; anthers oblong, 1–1.8 mm. Ovules 12–16 per ovary. Fruit linear, 1.5–4 cm × 1.5–2 mm; valves flat, glabrous or pilose; style slender, 2–4 mm. Seeds brown, ovate or suboblong, 1.5–2.2 × 1–1.6 mm, wingless. Fl. May–Jul, fr. Jul–Aug.

River or streamsides, meadows; 1000–1700 m. Heilongjiang, Jilin, Nei Mongol [Korea, Mongolia, Russia].

10. *Cardamine pratensis* Linnaeus, Sp. Pl. 2: 656. 1753.

草甸碎米荠 *cao dian sui mi qi*

Herbs perennial, (8–)15–55(–80) cm tall, glabrous or rarely sparsely pilose basally. Rhizomes tuberous, to 5 mm in diam., without stolons. Stems erect, simple, 2–12(–18)-leaved. Rhizomal leaves to 30 cm; petiole (1–)2–7(–10) cm; terminal leaflet orbicular or broadly obovate, 0.3–2 cm in diam., with a petiolule to 1.5 cm, base rounded, rarely subreniform or cuneate, margin repand, apex rounded; lateral leaflets (0 or)2–8(–15) on each side of rachis, about as large as or smaller than terminal leaflet, orbicular, ovate, or obovate, petiolulate or sessile, margin crenate or repand. Cauline leaves including petiole 2–17 cm, pinnatisect, glabrous; petiole base not auriculate; terminal lobe linear, oblong, ovate, or lanceolate, 1–2.5(–3.5) cm × 5–8(–10) mm, petiolulate or sessile; lateral lobes 4–7(–13) on each side of rachis, similar to terminal lobe, base petiolulate or sessile and decurrent, margin entire or rarely dentate. Fruiting pedicels erect-ascending or subdivaricate, (0.5–)1.2–2.5(–3) cm, slender. Sepals oblong or ovate, (2.5–)3–5(–6) × 1–2 mm, erect or spreading, base saccate, margin membranous. Petals purple or lilac, rarely white, obovate, (0.6–)0.8–1.5(–1.8) cm × 3–7.5(–10) mm, clawed, apex rounded or emarginate. Median filament pairs 5–10 mm, lateral pair 3–6 mm; anthers narrowly oblong, (0.8–)1.2–2 mm. Ovules 20–30 per ovary. Fruit linear, (1.6–)2.5–4.5(–5) cm × (1.2–)1.5–2.3 mm; valves glabrous; style (0.5–)1–2.2(–2.7) mm, stout. Seeds light brown, oblong, 1.2–1.8(–2) × 1–1.4 mm. Fl. May–Jul, fr. Jun–Aug. $2n = 16, 24, 28–34, 38–44, 48, 56, 96$.

Moist grasslands, river or streamsides. Heilongjiang, Nei Mongol, Xinjiang, W Xizang [Japan, Kazakstan, Korea, Mongolia, Russia; Europe, North America].

11. *Cardamine trifida* (Lamarck ex Poir) B. M. G. Jones, Feddes Repert. Spec. Nov. Regni Veg. 69: 57. 1964.

细叶碎米荠 *xi ye sui mi qi*

Dentaria trifida Lamarck ex Poir, Encycl. Suppl. 2: 465. 1812; *Cardamine schulziana* Baehni; *C. tenuifolia* (Ledebour) Turczaninow (1842), not Hooker (1834); *D. alaunica* Golitsin; *D. tenuifolia* Ledebour; *Sphaerorrhiza trifida* (Lamarck ex Poir) Khokhrjakov.

Herbs perennial, (7–)12–30 cm tall. Rhizomes short, with many, slender petioles 0.5–10 cm that terminate into tubers; tubers fleshy, whitish, representing modified leaf blades, globose, ovoid, or subreniform, to 7 mm, sometimes slightly flattened and 3–7-toothed. Stems erect, simple, glabrous. Rhizomal leaves ternate, biternate, or palmately 5-foliolate; petiole 3–15 cm; terminal leaflet lanceolate, broadly ovate, or suborbicular in outline, to 2 × 1.3 cm, with a petiolule to 6 mm, base cuneate, margin crenate or dissected into 3 sublanceolate or ovate lobes, base cuneate or subcordate. Cauline leaves 1–3, sometimes 2 and subopposite, often restricted to distal 1/3 of stem, minutely scabrid at least along margin with trichomes to 0.1 mm, rarely also pilose with trichomes to 0.4 mm; petiole 0.4–2 cm; terminal leaflet linear or narrowly lanceolate, 0.5–5 cm × 1–6 mm, base cuneate or attenuate, margin entire or 3-toothed or -lobed, apex acute and mucronate; lateral leaflets 1 or 2 pairs, similar to terminal one or entire. Racemes 5–20-flowered. Fruiting pedicels ascending, 0.7–1.3 cm. Sepals oblong, 3.5–5 × 1.5–2 mm, glabrous. Petals purple or pink, rarely white, obovate or spatulate, 8–11(–14) × 3.5–5 mm, apex rounded. Median filament pairs 4–6 mm, slender; lateral pair 3.5–4.5 mm; anthers narrowly oblong 1.1–1.5 mm. Ovules 10–16 per ovary. Fruit linear, 2–3.5 cm × 1.2–1.6 mm; valves glabrous; style 1.5–4 mm. Seeds brown, oblong, 1–1.3 × 0.8–1 mm. Fl. May–Jun, fr. Jun–Jul. $2n = 32, 48$.

Moist meadows or slopes, shady places, forests, among shrubs. Heilongjiang, Jilin, Nei Mongol [Japan, Kazakstan, Korea, Mongolia, Russia (Far East, Siberia)].

12. *Cardamine fargesiana* Al-Shehbaz, Novon 10: 324. 2000.

法氏碎米荠 *fa shi sui mi qi*

Herbs perennial, 8–23 cm tall. Rhizomes ovoid or oblong, 2–5 × 1.5–2 mm. Stolons slender, densely pilose with crisped trichomes. Stems simple, erect, densely crisped pilose at base, gradually sparser upward, completely glabrous at raceme. Basal leaves 1–4 per plant, simple or rarely with a pair of leafletlike lobes; petiole 0.5–4.5 cm, densely crisped pilose; leaf blade orbicular, 5–12 mm in diam., palmately 5-veined, abaxially glabrous or sparsely pilose along proximal portion of veins, adaxially pilose with simple, straight trichomes to 0.5 mm, base cordate, margin entire or obscurely 5-angled, mucronate at vein tips. Cauline leaves 3–5, 0.9–2.2 × 0.7–1.5 cm, broadly ovate or oblong in outline, pinnatisect, abaxially glabrous, adaxially pilose; petiole absent and leaf base appearing

auriculate; rachis 2–15 mm; terminal lobe of lowermost leaf obovate, 4–14 × 2–6 mm, apically 3-toothed, sometimes with a minute tooth subbasally on each side, base cuneate into a petiolule to 3 mm, margin entire, apex mucronate; lateral lobes 4–6, linear to lanceolate-linear, margin entire, apex acute, proximal 2–4 attached at one point on each side of rachis. Racemes 3–7-flowered. Flowering pedicels ascending, 5–12 mm, straight, glabrous. Sepals ovate, 2.5–3 × 1.2–1.6 mm, glabrous, margin and apex membranous, lateral pair saccate. Petals white, broadly obovate, 5–6 × 2.5–3 mm, apex rounded. Median filament pairs 3–3.5 mm, slender, lateral pair 2–2.5 mm; anthers oblong, 0.8–1.1 mm, base sagittate. Pistil glabrous; style 1–1.5 mm; stigma entire. Fruit and seeds not seen.

• NE Sichuan (Chengkou Xian).

Known only from the type collection, *R. P. Farges 1341 bis* (P), said to have been collected in “Tchen-kéou-tin” (Chengkou) but no date or exact locality were given.

13. *Cardamine scaposa* Franchet, Pl. David. 1: 33. 1883.

裸茎碎米荠 *luo jing sui mi qi*

Cardamine denudata O. E. Schulz.

Herbs perennial, (4–)8–18 cm tall, scapose, glabrous throughout. Rhizomes slender, with slender stolons. Stems leafless, erect, simple. Rhizomal leaves simple; petiole (1–)2–9 (–12) cm; leaf blade reniform or suborbicular, (0.3–)0.6–1.7 (–2) × (0.5–)1–2.5 (–3) cm, base cordate, margin repand-crenate or entire. Cauline leaves absent. Racemes terminal, 2–7 (–10)-flowered. Fruiting pedicels erect or erect-ascending, 1–4 cm, proximal longest. Sepals ovate or oblong, 3–4 × 1.5–2.2 mm, margin membranous, lateral pair subsaccate. Petals white, broadly obovate, (0.8–)0.9–1.3 cm × 5–7 mm, cuneate into a clawlike base to 2 mm, apex rounded or submarginate. Median filament pairs 4.5–8 mm, slightly dilated at base; lateral pair 2.5–4.5 mm; anthers narrowly oblong, 1.5–1.8 mm. Ovules 8–14 per ovary. Fruit linear, 2–3.5 cm × 1.2–1.7 mm; valves glabrous, smooth; style 3–7.5 mm. Seeds brown, oblong, 2–3 × 1–1.5 mm, wingless. Fl. Apr–Jun, fr. Jun–Jul.

• Shrubby slopes, moist areas; 1400–2500 m. Hebei, Nei Mongol, Shaanxi, Shanxi, Sichuan.

The above first record from Sichuan is based on *Farges 570* (P). The type collection of *Cardamine denudata*, *G. Giral di 5480* (holotype, B), is indistinguishable from that of *C. scaposa*, *A. J. P. David 1815* (holotype, P; isotypes, LE, P). The former specimen was collected from Shaanxi, whereas the latter was from Nei Mongol.

This species is used medicinally.

14. *Cardamine franchetiana* Diels, Notes Roy. Bot. Gard. Edinburgh 5: 205. 1912.

宽翅碎米荠 *kuan chi sui mi qi*

Loxostemon delavayi Franchet, Bull. Soc. Bot. France 33: 400. 1886, not *Cardamine delavayi* Franchet (1886);

Loxostemon smithii O. E. Schulz; *L. smithii* var. *glabrescens* O. E. Schulz.

Herbs perennial, (5–)10–20 (–27) cm tall, hirsute or glabrescent. Rhizomes to 1 cm, with stolons and numerous bulbils; bulbils whitish, fleshy scales ovoid or subglobose, with rudimentary apical appendages. Stems simple, erect; underground proximal part whitish, slender or filiform, glabrous; aboveground part green or purplish, stout, pilose or glabrous. Rhizomal leaves 1 or 2, 4–12 (–18) cm; petiole 4–10 cm; terminal leaflet oblong, 4–10 × 2–6 mm, sessile or with a petiolule to 2 mm; lateral leaflets 2–4 pairs, similar to terminal one. Cauline leaves (1 or)2 or 3 (or 4), 1.5–5 cm; petiole 0.4–4 (–6) cm, base not auriculate; terminal leaflet oblong to oblong-elliptic, 4–11 × 1.5–3 mm, ciliate or glabrous, base cuneate, margin entire, apex mucronate; lateral leaflets (2 or)3–6 pairs, similar to terminal one. Racemes 3–8-flowered. Fruiting pedicels divaricate-ascending to ascending, 4–13 mm, straight. Sepals ovate or suboblong, 2–3 × 1.2–1.7 mm, margin membranous. Petals white or rarely lavender, broadly obovate or suborbicular, 6–9 × (3–)4–6 mm, base abruptly narrowed into a claw 1–2 mm, apex rounded. Median filament pairs 3–4 × 0.4–0.6 mm, flattened, not extended apically into a tooth; lateral pair slender, 2–3 mm; anthers oblong, 0.6–0.9 mm. Ovules 8–16 per ovary. Fruit linear, 1.5–2.5 cm × 1.5–2 mm; valves smooth, glabrous; style 1–3 mm. Seeds brown, broadly oblong or ovate, 1.3–1.6 × 0.9–1.2 mm, wingless. Fl. Jun–Jul, fr. Aug–Sep.

• Mountain slopes, deep valleys, rocky areas, scree, crevices of boulders, meadows, moist pastures; 2300–4800 m. Qinghai, Sichuan, Xizang, Yunnan.

15. *Cardamine pulchella* (J. D. Hooker & Thomson) Al-Shehbaz & G. Yang, Harvard Pap. Bot. 3(1): 77. 1998.

细巧碎米荠 *xi qiao sui mi qi*

Loxostemon pulchellus J. D. Hooker & Thomson, J. Proc. Linn. Soc., Bot. 5: 147. 1861.

Herbs perennial, (5–)8–15 (–20) cm tall, hirsute or glabrescent. Rhizomes to 1 cm, with stolons and numerous bulbils; bulbils whitish, fleshy scales ovoid or subglobose, with rudimentary apical appendages. Stems simple, erect; underground proximal part slender, glabrous; aboveground part green or purplish, slender or stout, pilose or glabrous; bulbils of leaf axils ovoid, to 3 × 2 mm. Rhizomal leaves 1 (or 2), (1.5–)3–7 cm; petiole (1–)2.2–6 cm; terminal leaflet broadly ovate or oblong, 3–10 × 2–4 (–7) mm, with a petiolule to 3 mm; lateral leaflets 1 (or 2) pairs, similar to terminal one. Cauline leaves 1–3, 1.2–5 cm; petiole 0.5–3.5 cm, base not auriculate; terminal leaflet oblong or narrowly elliptic, (4–)6–12 (–15) × (1–)1.5–4 (–6) mm, ciliate or glabrous, base cuneate, margin entire, apex mucronate; lateral leaflets 1 (or 2) pairs, similar to terminal one. Racemes 2–4 (or 5)-flowered. Fruiting pedicels ascending, 5–13 mm, straight. Sepals ovate, 1.5–3 × 1–1.5 mm, margin membranous. Petals deep purple or mauve, broadly obovate, 5–8 × 2–4 mm, apex rounded.

Median filament pairs 2–3 × 0.7–1.1 mm, flattened, extended apically into a tooth; lateral pair slender, 1–2 mm; anthers oblong, 0.5–0.6 mm. Ovules 12–16 per ovary. Fruit linear, 1–1.7 cm × 1–1.2 mm; valves smooth, glabrous; style 0.5–1 mm. Seeds brown, broadly oblong, 1.3–1.6 × 0.8–1.1 mm, wingless. Fl. May–Aug, fr. Jul–Sep.

Grassy marshlands, moist rocky places, stony streamsides, scree, mountain slopes; 3400–4600 m. Qinghai, Sichuan, Xizang, Yunnan [Bhutan, India, Nepal, Sikkim].

16. *Cardamine delavayi* Franchet, Bull. Soc. Bot. France 33: 397. 1886.

洱源碎米荠 *er yuan sui mi qi*

Herbs perennial, 15–45 cm tall, sparsely pilose on leaves and at nodes, or glabrous throughout. Rhizomes slender and much elongated, with a few stolons and no bulbils. Stems simple at base, rarely branched above, erect, strongly flexuous; nodes well spaced, lowermost internodes to 9 cm. Rhizomal leaves simple; petiole 3–12 cm; leaf blade reniform, cordate, or suborbicular, 1.2–2.5 × 1.5–3 cm, palmately veined, base cordate, margin entire or obscurely 5-lobed, endings of principal veins and leaf apex mucronate. Cauline leaves 2–5, trifoliolate; petiole of lowermost and middle ones 2–5 cm, not auriculate and sometimes ciliate at base; terminal leaflet broadly oblong or narrowly obovate, 0.7–2 × 0.7–1.5 cm, with a petiolule to 4 mm, margin entire, apex mucronate; lateral leaflets similar to terminal, slightly smaller. Uppermost cauline leaves trifoliolate; petiole 1–3.5 cm, not auriculate at base; terminal leaflet narrowly oblong or linear, sessile, 1–3 cm × (1–)2–4(–5) mm; lateral leaflets smaller. Racemes 7–15-flowered. Fruiting pedicels ascending, (1–)1.2–2(–2.3) cm, straight. Sepals ovate, 2–3 × 1–1.5 mm, margin membranous. Petals white, broadly obovate, 5–7 × 2.5–4 mm, apex rounded. Median filament pairs 2.5–4, not flattened; lateral pair 1.5–3 mm; anthers linear-oblong, 1–1.3 mm. Ovules 10–20 per ovary. Fruit linear, 2–3 cm × 1–1.3 mm; valves torulose, glabrous; style 2–4 mm. Seeds brown, oblong, 1.2–1.5 × 0.6–0.9 mm, wingless.

Open gravel along streams, forests and clearings; 2100–4000 m. Sichuan, Yunnan [Bhutan].

The above first records from Sichuan and Bhutan are based on *Smith 10441* (UPS) and *Cooper 4917* (BM, E), respectively.

17. *Cardamine repens* (Franchet) Diels, Notes Roy. Bot. Gard. Edinburgh 5: 204. 1912.

匍匐碎米荠 *pu fu sui mi qi*

Dentaria repens Franchet, Bull. Soc. Bot. France 32: 5. 1885; *Cardamine tenuifolia* (Ledebour) Turczaninow var. *repens* (Franchet) Franchet; *Loxostemon repens* (Franchet) Handel-Mazzetti.

Herbs perennial, 10–45 cm tall, glabrous throughout except for apices of leaf lobes. Rhizomes much elongated, with a few bulbils, 3–8 mm wide. Stems simple, erect, straight, stout. Rhizomal leaves simple or trifoliolate;

petiole 4–8 cm; leaf blade or terminal leaflet suborbicular or broadly cordate, to 1.5 cm in diam., base cordate, margin entire or obscurely 5-lobed, terminal leaflet with a petiolule to 7 mm. Cauline leaves 2–5, trifid or pinnatisect and with 2(or 3) lateral lobes on each side of midvein, lobes all decurrent, often 1- or 2-toothed, rarely entire; petiole 0.3–4 cm, winged, glabrous or ciliate, not auriculate or rarely with a small, toothlike, puberulent auricle to 0.3 mm; terminal lobe linear-lanceolate, 1.2–5 cm × 4–9 mm, base attenuate, margin entire, along distal half often minutely puberulent with stout trichomes rarely to 0.2 mm, apex acute; lateral lobes similar to terminal. Racemes 5–20-flowered. Fruiting pedicels ascending, 0.8–2.2 cm, straight, glabrous. Sepals ovate, 2.5–3 × 1.2–1.7 mm, glabrous, margin and apex membranous, lateral pair subsaccate. Petals white or lavender, broadly obovate or spatulate, 6–8 × 2.5–4 mm, apex rounded. Median filament pairs 2.5–4, slightly flattened; lateral pair 1.5–3 mm; anthers oblong, 0.8–1 mm. Ovules 8–14 per ovary. Fruit linear, 2–3 cm × ca. 1.5 mm; valves smooth, glabrous; style 1–5 mm. Seeds brown, oblong, 1.2–1.5 × ca. 0.7 mm, wingless. Fl. May–Jun, fr. Jun–Jul.

• Grassy slopes, moist rocky crevices; 2400–3400 m. Sichuan, Yunnan.

Although *Cardamine repens* was first recorded from Sichuan by Handel-Mazzetti (Symb. Sin. 7: 362. 1931, as *Loxostemon repens*), this record was overlooked in FRPS and Fl. Sichuan. (vol. 14. 1999). The occurrence of the species in Sichuan is here confirmed based on the same collection cited in that first record, *Handel-Mazzetti 2788* (NY, W, WU).

18. *Cardamine granulifera* (Franchet) Diels, Notes Roy. Bot. Gard. Edinburgh 5: 204. 1912.

颗粒碎米荠 *ke li sui mi qi*

Cardamine tenuifolia (Ledebour) Turczaninow var. *granulifera* Franchet, Bull. Soc. Bot. France 33: 399. 1886; *Loxostemon granulifer* (Franchet) O. E. Schulz.

Herbs perennial, 6–20(–30) cm tall, glabrous or sparsely pilose. Rhizomes much elongated, slender; bulbils few, spaced, rarely clustered. Stems simple, erect, straight, slender, sparsely pilose along proximal half, or glabrous. Rhizomal leaves simple or trifoliolate; petiole 0.7–4 cm; leaf blade or terminal leaflet suborbicular, broadly ovate, or cordate, 3–12 mm in diam., base cordate or rounded, margin entire or obscurely lobed. Cauline leaves 2–4, trifid or pinnatisect and with 2(or 3) lateral lobes on each side of midvein, lobes not decurrent; petiole 1–15(–28) mm, slender, wingless, glabrous, not auriculate at base; terminal lobe filiform to narrowly linear, 0.9–4.5 cm × 0.5–1.5(–2) mm, base attenuate, margin entire, scabrous with trichomes to 0.3 mm, apex acute. Racemes 3–10-flowered. Flowering pedicels ascending, to 1.2 cm, straight, glabrous. Sepals ovate, 2–1.5 × 1–1.5 mm, glabrous, margin and apex membranous, lateral pair subsaccate. Petals white or lavender, broadly obovate or

spatulate, 5–7 × 2–3 mm, apex rounded. Median filament pairs 3–4, slightly flattened; lateral pair 1.5–2.5 mm; anthers oblong, 0.6–0.8 mm. Mature fruit and seeds not seen. Fl. May–Jul.

• Moist shady forests, meadows; 2800–3800 m. Yunnan.

19. *Cardamine loxostemonoides* O. E. Schulz, Notizbl. Bot. Gart. Berlin-Dahlem 9: 1069. 1926.

弯蕊碎米荠 wan rui sui mi qi

Cardamine tibetana Rashid & H. Ohba; *Loxostemon incanus* R. C. Fang ex T. Y. Cheo & Y. C. Lan; *L. loxostemonoides* (O. E. Schulz) Y. C. Lan & T. Y. Cheo.

Herbs perennial, (5–)12–30(–35) cm tall, glabrous or sparsely to densely pilose. Rhizomes slender, with several bulbils and stolons; bulbils with fleshy, white, scaly leaves apically with rudimentary appendages. Stems somewhat decumbent and slender below, simple. Rhizomal leaves glabrous or pilose, compound; petiole (0.7–)2–15(–20) cm; terminal leaflet with a petiolule 3–10 mm, blade undivided and suborbicular, oblanceolate, or linear, or trifid and suborbicular or broadly obovate in outline and with obovate or oblong lobes the basal pair of which sometimes with a tiny lobule, terminal lobe 0.6–2(–3) cm × 2–5 mm; lateral leaflets 2–5 pairs, sessile or petiolulate, similar in shape and division to terminal lobe but smaller. Cauline leaves 1–4; petiole (0.3–)1–3(–4) cm, not auriculate at base; terminal and lateral leaflets similar in shape, size, and number to those of basal leaves. Racemes 2–14-flowered. Fruiting pedicels (5–)1–2.5 cm, ascending to suberect, glabrous. Sepals broadly ovate, 2.5–5 × 1.5–2.5 mm, glabrous, broadly membranous at margin and apex, base of lateral pair subsaccate. Petals purple with darker veins, broadly obovate, 0.8–1.2(–1.4) cm × 5–8 (–8.5) mm, not clawed, apex rounded. Median filament pairs (3.5–)4.5–6 mm, lateral pair 2.5–4 mm; anthers narrowly oblong, 1.4–2 mm. Ovules 14–20 per ovary. Fruit linear, 2.5–3.5 cm × 1.2–1.5 mm; valves glabrous; style 1–3 mm. Seeds brown, ovate, ca. 1.5 × 1 mm, wingless. Fl. Jun–Jul, fr. Aug–Sep.

Mountains slopes, along ditches, damp grounds by streams, open grass and gravel, scree; 2900–5500 m. Xizang, Yunnan [Bhutan, India, Kashmir, Nepal, Sikkim].

20. *Cardamine stenoloba* Hemsley, J. Linn. Soc., Bot. 29: 303. 1892.

狭叶碎米荠 xia ye sui mi qi

Cardamine pratensis Linnaeus subsp. *chinensis* O. E. Schulz; *Loxostemon stenolobus* (Hemsley) Y. C. Lan & T. Y. Cheo.

Herbs perennial, 5–25 cm tall, slender, glabrous except for leaves. Rhizomes slender, stoloniferous. Stems simple, branched above, flexuous. Basal leaves not rosulate, often withered by anthesis; petiole 1–1.5 cm; terminal leaflet orbicular, 2–4 mm in diam., with a petiolule 1–4 mm, sparsely pilose, base rounded, margin entire or obscurely lobed; lateral lobes similar to

terminal one. Middle and upper cauline leaves pinnatisect, margin scabrous with trichomes to 0.1 mm; petiole 3–8 mm, not auriculate at base; terminal lobe filiform, 1–2.5 cm × 0.4–0.7 mm, base attenuate and decurrent with adjacent lateral lobes, margin entire, apex acute, not mucronate; lateral lobes 1–3 pairs, sessile, decurrent, similar to terminal lobe but smaller. Racemes 2–8-flowered, rachis strongly flexuous. Pedicels of young fruit divaricate, 8–14 mm, slender, soon recurved, glabrous. Sepals ovate, 1.5–2 × 0.8–1 mm, glabrous, membranous at margin and apex. Petals white, obovate or broadly spatulate, 5–6 × 2.5–3 mm. Median filament pairs 2.5–3 mm, filiform; lateral pair 1.5–2 mm; anthers oblong, 0.5–0.6 mm. Median nectar glands oblong, to 0.5 mm. Ovules 8–12 per ovary. Fruit linear, 1.5–2.2 cm × ca. 1 mm; valves glabrous; style 1–1.5 mm. Seeds pale brown, oblong, ca. 1.8 × 0.8 mm, wingless.

• Shaanxi, Sichuan.

Cardamine stenoloba is known only from three collections, the syntypes A. Henry 8794 (listed as “8724” in the protologue) and Pratt 352 (both at K and mounted on the same sheet), and the type of *C. pratensis* subsp. *chinensis* (H. Biondi 439 at B). The species is here lectotypified on Pratt’s collection. It is most closely related to *C. elegantula* J. D. Hooker & Thomson (from Bhutan, Nepal, and Sikkim), from which it is readily distinguished by having finely pinnatisect middle and upper cauline leaves with 1–3 pairs of filiform, basally decurrent, acute lateral lobes and well-developed median glands to 0.5 mm. By contrast, *C. elegantula* has compound leaves with 5–7 pairs of elliptic or oblong, petiolulate, apically mucronate lateral leaflets and obsolete median glands.

Cardamine stenoloba was treated in *Loxostemon* in both FRPS (pp. 239, 241) and Fl. Sichuan. (14: 111–112. 1999), but the species has filiform stamens and no bulbils, and the illustrations of *L. stenolobus* in these two floras in fact represent young plants of *C. parviflora*.

21. *Cardamine simplex* Handel-Mazzetti, Symb. Sin. 7: 361. 1931.

单茎碎米荠 dan jing sui mi qi

Cardamine truncatolobata W. T. Wang; *Loxostemon axillus* Y. C. Lan & T. Y. Cheo.

Herbs perennial, (8–)13–35 cm tall, glabrous throughout or sparsely pilose. Rhizomes slender, thickened at stem base, with 1 or few stolons. Stems erect, slender, simple or 1- or 2-branched, flexuous. Basal leaves 1–3, 3- or 5(or 7)-foliolate; petiole (1.3–)2–6(–8) cm; terminal leaflet broadly obovate, 3–12 × 5–13 mm, with a petiolule 1–5(–8) mm, base subtruncate or rounded, margin entire or apically subtruncate or obtusely 3-lobed, ultimately mucronate; lateral leaflets 1 or 2(or 3) pairs, subsessile or petiolulate, somewhat similar to terminal leaflet but smaller. Cauline leaves (1 or)2–5(–7), 3- or 5-foliolate; petiole (0.8–)1.2–3 cm, not auriculate at base; terminal leaflet of uppermost leaves filiform, linear, or rarely narrowly oblanceolate, 0.5–2 cm × (0.3–)1–2 mm,

attenuate at base, margin entire, apex acute. Racemes lax, (2–)5–14(–16)-flowered, rachis often flexuous. Fruiting pedicels erect or ascending, (0.8–)1–2.5(–3) cm, straight, glabrous, proximal ones often much longer than distal. Sepals ovate or oblong, 2.5–3.5 × 1.3–1.8 mm, glabrous, lateral pair subsaccate. Petals white, obovate, (6.5–)7–9 × 3.5–5 mm, not clawed, apex rounded. Median filament pairs 4–5 mm, slender; lateral pair 3–3.5 mm; anthers oblong, 0.8–1.1 mm. Ovules 8–14 per ovary. Fruit linear, (1–)1.5–2.5(–2.8) cm × 1–1.2 mm; valves glabrous, smooth; style (1–)1.5–3(–4) mm. Seeds brown, oblong, 1.2–1.6 × 0.8–1.2 mm, wingless. Fl. May–Jul, fr. Jun–Aug.

• Meadows, damp turf, marshy areas, stream- or ditch-sides; 2500–3800 m. Sichuan, Yunnan.

The above first record of *Cardamine simplex* from Sichuan is based on McLaren AC-19 (E, LE, P) and the type collection of *C. truncatolobata*.

The type collection of *Cardamine simplex*, Handel-Mazzetti 4310 (holotype, WU; isotypes, E, GH, NAS, W), resembles that of *C. truncatolobata*, Lan Kaiyong, Li Liangqian & Fei Yong 341 (holotype, PE; isotypes, KUN, PE), in every morphological aspect except for having narrower leaflets on the uppermost leaves and slightly lax racemes.

22. *Cardamine trifoliolata* J. D. Hooker & Thomson, J. Proc. Linn. Soc., Bot. 5: 145. 1861.

三小叶碎米荠 san xiao ye sui mi qi

Cardamine flexuosoides W. T. Wang; *C. flexuosoides* var. *glabricaulis* W. T. Wang, nom. illeg.; *Loxostemon smithii* O. E. Schulz var. *wenchuanensis* Y. C. Lan & T. Y. Cheo.

Herbs perennial, (4–)6–18(–25) cm tall, often sparsely pilose at least basally. Rhizomes slender, thickened at stem base, with 1 or few stolons. Stems erect or decumbent, slender, simple or few branched. Basal leaves 1–3, 3- or 5(or 7)-foliolate, rarely simple; petiole 1–4(–5.5) cm; terminal leaflet broadly obovate or rarely ovate, 2–12 × 3–14 mm, with a petiolule 1–6(–8) mm, base subtruncate, cordate, or rounded, margin entire and obscurely 5-lobed or -crenate, apically subtruncate or obtusely 3-lobed; lateral leaflets 1(–3) pairs, subsessile or petiolulate, resembling terminal leaflet, or not lobed and oblong or ovate, smaller. Cauline leaves 1 or 2(or 3), 3(or 5)-foliolate; petiole 0.5–1.5 cm, not auriculate at base; terminal and lateral leaflets similar to those of basal leaves; petiolule 0.5–3 mm. Racemes lax, 2–8-flowered, rachis straight. Fruiting pedicels ascending or divaricate, 0.5–1.5(–2) cm, straight, glabrous. Sepals ovate or oblong, 2–3 × 1–1.4 mm, glabrous, lateral pair subsaccate. Petals white, obovate or spatulate, 5–8 × 2.5–4 mm, not clawed, apex rounded. Median filament pairs 3–4.5 mm, slender; lateral pair 2–3 mm; anthers oblong, 0.8–1 mm. Ovules 8–12 per ovary. Young fruit glabrous. Mature fruit and seeds not seen. Fl. May–Jul, fr. Jul–Sep.

Moist rocky crevices, meadows, moist forests, mossy banks, rocky areas; 2500–4300 m. Sichuan, Yunnan [Bhutan, India, Nepal, Sikkim].

The above first record of *Cardamine trifoliolata* from Sichuan is based on Pratt 762 (K) and the type collection of *Loxostemon smithii* var. *wenchuanensis*; the above first record from Yunnan is based on Rock 4166 (E, GH, US) and ACE 172 (K). As indicated above, accounts of *C. trifoliolata* in FRPS, Fl. Sichuan. (14: 89. 1999), Fl. Xizang. (2: 360. 1985), and Fl. Yunnan. (6: 58. 1995) are all based on misidentified plants of *C. fragariifolia*.

The name *Cardamine flexuosoides* var. *glabricaulis* was nomenclaturally superfluous when published and is therefore illegitimate because it was based on the same type collection, Wang Fatsuan 21010 (holotype, KUN; isotype, PE), of the already validly published *Loxostemon smithii* var. *wenchuanensis*. This collection is an excellent match to the type of *C. trifoliolata*, Griffith 1757 (holotype, K; isotype, BM), which was collected from Bhutan.

23. *Cardamine rockii* O. E. Schulz, Notizbl. Bot. Gart. Berlin-Dahlem 9: 473. 1926.

鞭枝碎米荠 bian zhi sui mi qi

Herbs perennial, (9–)15–45(–55) cm tall, pilose or subhirsute. Rhizomes elongated, 1–3 mm in diam. Stems decumbent basally, erect, simple, ridged, pilose, 4–10-leaved. Basal leaves not rosulate, similar to cauline ones; lower and middle cauline leaves (1.5–)3–12(–15) cm; petiole 0.5–4 cm, ciliate, not auriculate at base; terminal leaflet broadly ovate or suborbicular, (3–)5–12(–15) × (2–)4–8(–10) mm, symmetrical, with a petiolule 1–3 mm, base obtuse, truncate, or cuneate, margin 2–4-toothed on each side, teeth submucronate; lateral leaflets alternate or rarely opposite, 6–12 on each side of rachis, broadly to narrowly ovate or ovate-lanceolate, subequaling terminal leaflet, asymmetric, sessile or with a petiolule to 3 mm, pilose or rarely subglabrous, base oblique, proximal margin coarsely and unequally (2 or)3–5(or 6)-toothed, distal margin entire or 1–3-toothed, acute apex and teeth submucronate. Racemes terminal, many flowered. Flowering pedicels divaricate or ascending, 1–2 cm, slender, pilose. Sepals oblong to narrowly ovate, (2.5–)3–4 × (1–)1.2–1.6 mm, margin membranous, base of lateral pair subsaccate. Petals white, obovate, 7–9 × 2.5–4 mm, cuneate into a clawlike base to 2 mm, apex rounded or subemarginate. Median filament pairs 4–5 mm, slightly dilated, not flattened; lateral pair 2.5–3.5 mm; anthers narrowly oblong, 1–1.5 mm. Ovules 10–14 per ovary. Fruit and seeds not seen. Fl. May–Jul.

• Moist grassy areas, boggy places by streams, alpine meadows; 3100–4700 m. SW Sichuan, Yunnan.

24. *Cardamine purpurascens* (O. E. Schulz) Al-Shehbaz et al., Novon 10: 324. 2000.

紫花碎米荠 zi hua sui mi qi

Cardamine microzyga O. E. Schulz var. *purpurascens* O. E. Schulz, Notizbl. Bot. Gart. Berlin-Dahlem 11: 225. 1931; *Loxostemon purpurascens* (O. E. Schulz) R. C. Fang ex Y. C. Lan & T. Y. Cheo.

Herbs perennial, (8–)10–25(–30) cm tall, pilose. Rhizomes stout, 0.5–1.5 cm, often with several stolons.

Stems erect, simple, ridged, pilose, not flexuous. Basal leaves rosulate, 5–10 cm; petiole 1–3.5 cm, ciliate; terminal leaflet subreniform or orbicular, 4–8 × 4–10 mm, petiolule 1–3 mm, base rounded or cordate, margin entire or obscurely and obtusely 3–5-lobed; lateral leaflets 3–7 pairs, obovate or suborbicular, symmetric or not, slightly smaller than terminal lobe, entire or obscurely toothed, apex rounded. Cauline leaves 2–10, 1–5 cm; petiole (2–)4–10 (–15) mm, ciliate, not auriculate at base; terminal leaflet linear, oblong, or lanceolate, 3–9 × 0.5–2 mm, sessile or with a petiolule to 1.5 mm; lateral leaflets 4–7 pairs, narrowly oblong to oblong-ovate, subequaling terminal leaflet, symmetric or not, pilose, base oblique or cuneate, proximal margin entire or 1-toothed, distal margin entire, apex acute. Racemes terminal, many flowered. Fruiting pedicels divaricate or ascending, (0.7–) 1–2.2(–3) cm, slender, pilose. Sepals oblong or ovate, 3–4 × 1.5–2 mm, pilose, margin membranous, base of lateral pair saccate. Petals magenta-red, purple, or lavender, broadly obovate, 7–11 × 3–6 mm, cuneate into a clawlike base to 2 mm, apex rounded. Median filament pairs 4–5 mm, flattened below anther, to 1 mm wide; lateral pair 2.5–3.5 mm; anthers narrowly oblong, 0.9–1.2 mm. Ovules 10–16 per ovary. Fruit 1.6–2.5 cm × 1.2–1.8 mm; valves glabrous, smooth; style 1–2 mm. Seeds brown, broadly oblong, 1.2–1.5 × 0.9–1 mm, wingless. Fl. May–Jul.

• River banks, wood margins, marshy places, swampy meadows, *Rhododendron* scrub; 3500–4400 m. Sichuan, Yunnan.

25. *Cardamine microzyga* O. E. Schulz, Bot. Jahrb. Syst. 32: 545. 1903.

小叶碎米荠 xiao ye sui mi qi

Cardamine prattii Hemsley & E. H. Wilson.

Herbs perennial, 10–30(–45) cm tall, sparsely pilose. Rhizomes slender, to 15 cm or longer, 1–1.5 mm in diam., without stolons. Stems erect, simple, ridged, pilose. Basal leaves rosulate, 2–11 cm; petiole 0.5–5 cm, ciliate; terminal leaflet obovate, 2–8(–13) × 2–7(–10) mm, petiolule 0.5–4 mm, pilose, base cuneate, margin 1–3-toothed on each side, apex acute, submucronate; lateral leaflets 5–11 pairs, obovate or ovate, pilose, asymmetric, slightly smaller than terminal lobe, sessile or rarely with a petiolule to 5 mm, base oblique to subcuneate, proximal margin 1- or 2-toothed, rarely 1-lobed, distal margin often entire, apex acute. Cauline leaves 1–3, (2–)4–10(–25) cm; petiole 0.5–4(–9) cm, ciliate, not auriculate at base; terminal leaflet and 6–9 pairs of lateral leaflets similar in morphology to those of basal leaves. Racemes terminal, 10–20-flowered. Fruiting pedicels erect to erect-ascending, (0.7–)1–2 cm, slender, pilose. Sepals oblong or ovate, 2.5–4 × 1–1.7 mm, sparsely pilose or glabrous, margin membranous, base of lateral pair saccate. Petals purple or rarely white, broadly obovate, 6.5–10 × 3–6 mm, cuneate into a clawlike base to 2 mm, apex rounded. Median filament

pairs 3.5–5 mm, flattened; lateral pair 2.5–3.5 mm; anthers narrowly oblong, 0.8–1.1 mm. Ovules 10–14 per ovary. Fruit linear, 2.5–4 cm × 1.5–2 mm; gynophore 0.5–2 mm; valves smooth, glabrous; style 1–2.5 mm. Seeds brown, oblong, 1.8–2.1 × 1–1.3 mm, wingless. Fl. (Apr–)Jun–Sep, fr. Jul–Oct.

• Moist alpine meadows, streamsides; 2600–4600 m. Sichuan, Xizang.

The records in FRPS and Fl. Yunnan. (6: 69–70. 1995) of *Cardamine microzyga* from Yunnan are probably based on misidentified plants of *C. purpurascens*, a species that occurs in that province and was listed in Fl. Yunnan. as a synonym of *C. microzyga*. The above first record of *C. microzyga* from Xizang is based on *Soulié 1025* (P) and *Soulié 2466* (MO, P).

Cardamine microzyga var. *dupllobata* C. Y. Wu ex T. Y. Cheo (Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1980(6): 27. 1980), which is endemic to Sichuan, does not belong to *C. microzyga* because it has strongly 2- or 3-lobed, coarsely dentate leaflets with petiolules nearly as long as or longer than the leaflets. Unfortunately, the type collection, *T. T. Yü 6186* (holotype, PE; isotype, KUN), has no flowers or fruit. The present authors believe that this taxon represents a distinct species, but a formal recognition at that rank awaits the study of flowering and fruiting material.

26. *Cardamine gracilis* (O. E. Schulz) T. Y. Cheo & R. C. Fang, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1980(6): 27. 1980.

纤细碎米荠 xian xi sui mi qi

Cardamine multijuga Franchet var. *gracilis* O. E. Schulz, Repert. Spec. Nov. Regni Veg. 17: 289. 1921.

Herbs perennial, 10–35(–50) cm tall, glabrous throughout, semiaquatic. Rhizomes slender, to 10 cm or longer, 0.5–3 mm in diam. Stems erect, simple, striate angled, rooting from lower and sometimes middle nodes. Basal rosettes absent. Cauline leaves 10–20 per stem, (1.5–)2.5–7.5(–9) cm × (1.5–)4–14(–17) mm; petiole absent or rarely to 2 mm; terminal leaflet narrowly obovate, oblong, or rarely broadly ovate, (2–)3–8(–9) × (0.5–) 1.5–5(–7) mm, petiolule 0.5–2 mm, base cuneate or rarely obtuse, margin obscurely 1–3-toothed on each side, apex acute, submucronate; lateral leaflets (6 or)7–12(–15) pairs, linear or narrowly oblong, asymmetric, slightly smaller than terminal lobe, sessile or rarely with a petiolule to 0.5 mm, base oblique, proximal margin 1- or 2(or 3)-toothed, distal margin entire or rarely obscurely 1- or 2-toothed, apex acute; proximal pair of lateral leaflets auriclelike, attached at or just above node, often giving appearance of amplexicaul leaf base. Racemes terminal, 10–20-flowered. Fruiting pedicels divaricate, 0.8–2.2 cm, slender. Sepals oblong or ovate, 3–4 × 1.2–2 mm, spreading, margin membranous, base of lateral pair subsaccate. Petals lavender with darker veins, spatulate, 6–8 × 2–3 mm, spreading, apex rounded. Filaments spreading, dilated at base, subequal, median pairs 3.5–5 mm, lateral pair 3–4.5 mm; anthers narrowly oblong, 1.3–1.6 mm. Ovules 10–14 per ovary. Fruit linear, 2–4 cm × ca.

1.5 mm; gynophore ca. 0.5 mm; valves smooth, glabrous; style 4–6 mm. Seeds brown, oblong, 1.7–2 × ca. 1.3 mm, winged all around; wing ca. 0.4 mm wide. Fl. Jun–Aug, fr. Jul–Oct.

• Marshlands, lake shores, margins of ponds, ditches, open pastures; 2400–3300 m. Yunnan.

This species, as *Cardamine multijuga* var. *gracilis*, was said to occur in Bhutan (Fl. Bhutan 1(2): 432. 1984), but the present authors have seen no material from that country. On the basis of having white flowers with smaller (4–6 mm) petals, it is likely that the record from Bhutan belongs to another species.

27. *Cardamine multijuga* Franchet, Bull. Soc. Bot. France 33: 399. 1886.

多裂碎米荠 duo lie sui mi qi

Cardamine griffithii J. D. Hooker & Thomson subsp. *multijuga* (Franchet) O. E. Schulz.

Herbs perennial, (20–)40–100(–160) cm tall, glabrous throughout. Rhizomes creeping, without stolons. Stems erect, simple or branched above, rooting from lowermost nodes, striate angled, 11–25-leaved. Leaves sessile, cauline; lower and middle ones 2.2–6(–10) cm; terminal leaflet orbicular or broadly obovate, 3–12 × 3–11 mm, with a petiolule 0.5–6 mm, base subcordate or cuneate, margin repand and not ciliate, apex obtuse or rounded; lateral leaflets (7 or)8–11(–15) pairs, slightly smaller than terminal one, ovate or ovate-oblong, base obtuse, margin repand and not ciliate, apex obtuse or rounded; proximal pair of lateral leaflets auriclelike, attached at or just above node, often giving appearance of amplexicaul leaf base. Uppermost leaves smaller. Fruiting pedicels divaricate, 1–2 cm, slender, straight. Sepals oblong, 2.5–3 × 1.5–2 mm, spreading. Petals purple or lavender, obovate, 7–9 × 3–4 mm, not clawed, apex rounded. Filaments spreading, subequal, 4–5 mm; anthers narrowly oblong, 1.5–1.7 mm. Ovules 10–16 per ovary. Young fruit glabrous; styles 2–4 mm; stigma entire. Immature seeds wingless. Fl. Jun–Jul.

• Streamsides, marshy places; 200–2800 m. Yunnan.

Cardamine multijuga, which was previously reduced to the synonymy of *C. griffithii*, is known only from older collections. However, it is readily distinguished from *C. griffithii* by having cauline leaves with (7 or)8–11(–15) pairs of nonciliate lateral leaflets, spreading sepals, petals, and stamens, subequal stamens, entire stigmas, and styles 3–4 mm. By contrast, *C. griffithii* has cauline leaves with 2–4(or 5) pairs of ciliate lateral leaflets, erect sepals, petals, and stamens, tetradynamous stamens, strongly 2-lobed stigmas, and styles 0.5–1(–2) mm.

28. *Cardamine griffithii* J. D. Hooker & Thomson, J. Proc. Linn. Soc., Bot. 5: 146. 1861.

山芥碎米荠 shan jie sui mi qi

Cardamine griffithii var. *pentaloba* W. T. Wang.

Herbs perennial, (20–)30–100(–115) cm tall, glabrous throughout except for leaflet margin. Rhizomes creeping, without stolons. Stems erect, simple or

branched above, striate angled, (9–)12–28(–37)-leaved. Leaves sessile, cauline; lower and middle ones (1–)2–9(–11) × (0.7–)1–3.5(–4.5) cm; terminal leaflet orbicular, broadly ovate, or obovate, (0.5–)1–3(–3.5) × (0.3–)0.6–1.9(–2.5) cm, with a petiolule 2–10(–15) mm, base subcordate, rounded, or rarely cuneate, margin repand or entire and sparsely ciliate, apex obtuse or rounded; lateral leaflets 2–4(or 5) pairs, slightly to distinctly smaller than terminal one, base obtuse or rarely slightly oblique, margin entire or repand and sparsely ciliate, apex obtuse or rounded; proximal pair of lateral leaflets auriclelike, attached at or just above node, often giving appearance of amplexicaul leaf base. Uppermost leaves smaller. Fruiting pedicels ascending or divaricate, (0.4–)0.7–1.5 cm, slender, straight. Sepals ovate or oblong, 2.5–3 × 1.5–2 mm, erect. Petals purple or lavender, spatulate or obovate, 6–9 × (2.5–)3–5 mm, not clawed, apex rounded or submarginate. Staminal filaments erect, median pairs 3.5–4.5 mm, lateral pair 2.5–3 mm; anthers oblong, 0.9–1.1 mm. Ovules 10–22 per ovary. Fruit linear, (1.5–)2–4 cm × 0.9–1.2 mm; gynophore 0.5–1 mm; valves smooth, glabrous; style 0.5–1(–2) mm; stigma 2-lobed, distinctly broader than style. Seeds brown, oblong, 1.4–1.7 × 0.8–1.1 mm, wingless. Fl. May–Aug, fr. Jun–Sep.

Mountain slopes, valleys, streamsides, pastures, marshy places, moist forest floor, shady rocky areas; 2400–4500 m. Sichuan, Xizang, Yunnan [Bhutan, India, Nepal, Sikkim].

Records in FRPS and Fl. Guizhou. (7: 5. 1989) of *Cardamine griffithii* from Guizhou, Hubei, and Hunan are very likely based on misidentified plants of *C. hygrophila*. Although the present authors have not seen the type of *C. griffithii* var. *pentaloba*, it is very likely that this plant is only a minor variant of the species. Five-lobed terminal leaflets occur sporadically throughout the range of the species. However, if the type of this variety has terete, pilose stems, then it is *C. hygrophila*, and the type collection will represent a new record for Yunnan.

29. *Cardamine lyrata* Bunge, Mém. Acad. Imp. Sci. St.-Pétersbourg, Sér. 6, Sci. Math. 2: 29. 1833.

水田碎米荠 shui tian sui mi qi

Cardamine argyi H. Léveillé.

Herbs perennial, (20–)30–70(–80) cm tall, glabrous throughout. Rhizomes short, thick, not scaly. Stolons from rhizome or lower to middle stem nodes, to 80 cm. Stems erect, simple, striate angled, 8–15-leaved. Leaves on stolons simple or rarely with a basal pair of auriclelike leaflets; petiole 3–12 mm; leaf blade suborbicular, cordate, or reniform, (0.7–)1–2.2(–3) × 0.7–2(–2.3) cm, margin repand or entire, apex rounded. Cauline leaves sessile, middle ones (1.5–)3–5(–7) cm; terminal leaflet orbicular, ovate, or rarely oblong, 1–3 × (0.8–)1–3 cm, with a petiolule (0.3–)0.5–1.5(–2) cm, base cordate, subtruncate, or obtuse, margin repand or subentire, apex rounded; lateral leaflets 2–5 pairs, much smaller than terminal one, ovate, suborbicular, or oblong-ovate; proximal pair of lateral leaflets auri-

celike, attached at or just above node, often giving appearance of amplexicaul leaf base. Fruiting pedicels (0.7–)1–2(–2.5) cm, slender, divaricate, usually straight. Sepals ovate, 3–3.5 × 1–1.5 mm, margin membranous, lateral pair subsaccate. Petals white, obovate, 7–10 × 3–4 mm, not clawed, apex rounded or emarginate. Filaments slightly spreading, median pairs 4–5 mm, lateral pair 2.5–3.5 mm; anther narrowly oblong, 1–1.5 mm. Ovules 14–18 per ovary. Fruit linear, strongly flattened, (1.5–) 2–3(–3.5) cm × 1.5–2 mm; valves smooth, glabrous; styles slender, 1.5–3 mm. Seeds brown, oblong, 2–3 × 1–2 mm, winged all around; wing to 1 mm wide. Fl. Apr–Jun, fr. May–Jul.

Moist places, streambanks; near sea level to 1000 m. Anhui, Fujian, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Shandong, Sichuan, Zhejiang [Japan, Korea, Russia].

Although the type of *Cardamine argyi* was collected from Jiangsu, *Argy s.n.* (holotype, E), the name was not listed in FRPS or any provincial Chinese flora.

30. *Cardamine hygrophila* T. Y. Cheo & R. C. Fang, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1980(6): 26. 1980.

湿生碎米荠 *shi sheng sui mi qi*

Herbs perennial, (7–)10–25(–35) cm tall. Rhizomes compact, thick, not stoloniferous. Stems erect, terete, pilose at base, glabrous from the middle upward, often more than 1 from base. Basal leaves rosulate, (3–)5–9(–11) cm; petiole (0.7–)1.5–3.5 (–4.5) cm; terminal leaflet orbicular or reniform, (0.5–)1–3 × (0.5–)1.5–3.5 cm, with a petiolule 1–2 cm, base cordate or subtruncate, margin entire, repand, or obscurely coarsely crenate, apex rounded; lateral leaflets 2 or 3(–5) pairs, much smaller than terminal one. Cauline leaves 2–5(–7), glabrous; middle ones 1.5–6(–8) cm; terminal leaflet suborbicular or broadly ovate, rarely oblong or subanceolate, (0.5–)1.2–3(–3.5) × (0.5–)1–2.5(–3) cm, with a petiolule 5–12(–20) mm, base rounded or subcuneate, margin obscurely to strongly angled, rarely entire, often mucronulate at angles, apex obtuse to subacute; lateral leaflets (1 or)2 or 3 pairs, smaller and somewhat similar to terminal ones; proximal pair of lateral leaflets auriclelike, attached at or just above node, often giving appearance of amplexicaul leaf base. Fruiting pedicels divaricate or ascending, (0.7–)1–2.2(–3) cm, slender, glabrous, straight. Sepals ovate or oblong, 2.5–3 × 2–2.5 mm. Petals white, obovate, 6–9 × 3–4 mm, not clawed, apex rounded. Filaments subequal in length, somewhat spreading, 4.5–6 mm; anthers narrowly oblong, 1–1.3 mm. Ovules 12–22 per ovary. Fruit linear, 1.5–4 cm × 1–1.5 mm; gynophore to 1 mm; valves smooth, glabrous; style slender, 2–4 mm; stigma entire, narrower than style. Seeds brown, oblong, 1.3–1.8 × 0.7–1 mm. Fl. and fr. Apr–Jun.

• Valleys, streambanks; 1400–2200 m. Guangxi, Guizhou, W Hubei (Badong Xian), Hunan, Sichuan.

The above first record from Guizhou is based on *S Guizhou Team 1148* (NAS); the above first record from Hubei is based on *Wilson 240* (E, US, W) and *Wilson 291* (K, W); the above first record from Hunan is based *Anonymous 700* (MO).

The plants are used as a vegetable or as forage.

31. *Cardamine engleriana* O. E. Schulz, Bot. Jahrb. Syst. 32: 407. 1903.

光头山碎米荠 *guang tou shan sui mi qi*

Cardamine griffithii J. D. Hooker & Thomson var.

grandifolia T. Y. Cheo & R. C. Fang.

Herbs perennial, 10–24(–30) cm tall, sparsely to densely pilose, often glabrescent above, rarely glabrous throughout. Rhizomes slender, with 1 or few filiform stolons. Stems erect, simple, terete, crisped pilose at base. Basal leaves not rosulate, often withered by anthesis; petiole 0.5–2 cm; terminal leaflet reniform or suborbicular, 0.5–1.5 × 0.7–1.7 cm, base cordate, margin shallowly crenate or repand; lateral leaflets 2, much smaller than terminal ones, sometimes absent and leaf simple. Middle and upper cauline leaves trifoliolate, sessile, to 10 cm; terminal leaflet reniform, suborbicular, or broadly ovate, 1.5–6(–7) × 1.2–4(–5) cm, with a petiolule 0.3–2.5(–5.2) cm, base cordate, rounded, or cuneate, glabrous, ciliate, or trichomes forming small tufts at teeth, margin crenate, repand, or obscurely to distinctly 2–6-toothed on each side, apex obtuse or acute; lateral leaflets 2, auriclelike, attached at or just above node, often giving appearance of amplexicaul leaf base, suborbicular, ovate, obovate, or reniform, 3–16(–25) × 2–13(–17) mm, much smaller than terminal leaflet, margin entire, 1- or 2-toothed, or repand. Racemes 3–10-flowered. Fruiting pedicels 0.5–1.7 cm, divaricate or ascending, slender. Sepals ovate, 2.5–3 × 1–1.5 mm, lateral pair subsaccate. Petals white, obovate, 6–8 × 2–3 mm, apex rounded. Median filament pairs 3–4.5 mm; lateral pair 1.5–3 mm; anther oblong, 0.7–1 mm. Ovules 8–16 per ovary. Fruit linear, slightly flattened, 1.5–2.5 cm × 1–1.2 mm; valves smooth, glabrous; style 1–2 mm. Seeds brown, oblong, 1.5–1.8 × 0.8–1 mm, wingless. Fl. and fr. Apr–Jul.

• Shady slopes, woodlands, moist places in ravines; 800–2900 m. Anhui, Fujian, Gansu, Hubei, Hunan, Shaanxi, Sichuan.

The above first record from Anhui is based on *K. Yao 9028* (MO).

32. *Cardamine komarovii* Nakai, Repert. Spec. Nov. Regni Veg. 13: 271. 1914.

翼柄碎米荠 *yi bing sui mi qi*

Alliaria auriculata Komarov, Trudy Imp. S.-

Peterburgsk. Bot. Sada 18: 437. 1901, not *Cardamine auriculata* S. Watson (1882); *Arabis cebennensis* de Candolle var. *coreana* H. Léveillé.

Herbs perennial, 12–75 cm tall. Rhizomes short, stout. Stems erect, simple at base, branched above, finely striate, pubescent or glabrescent. Basal leaves rosulate; petiole 2–5 cm, winged at base, glabrous or pilose; leaf blade broadly cordate or suborbicular, 1.5–4 × 1.5–3.5 cm, margin coarsely dentate, the teeth submucronate. Cauline leaves 3–8, simple; petiole winged, (0.5–)1–4 cm, auriculate-amplexicaul at base; auricles oblong or

lanceolate, 2–10 × 0.5–4 mm, entire; leaf blade cordate or broadly ovate, (2–)3–7.5(–9) × (1.2–)2.5–6 cm, pilose at least along veins and margins, rarely glabrous, base cordate, margin coarsely and irregularly toothed, sometimes incised on distal leaves, apex acuminate or obtuse. Racemes ebracteate. Fruiting pedicels divaricate or ascending, 1–2.5 cm, slender, pilose or glabrous. Sepals oblong, 2.5–3 × 1.2–1.6 mm, glabrous or pilose, base not saccate. Petals white, broadly obovate, 3–4 × ca. 1.5 mm, apex rounded. Filaments 2–3 mm; anthers oblong, ca. 1.5 mm. Ovules 6–12 per ovary. Fruit linear, 2–4 cm × ca. 1 mm; gynophore stout, 0.2–0.7 mm; valves glabrous or sparsely pilose, not torulose, acuminate; style 2–3 mm, slender. Seeds brown, oblong, 1.5–2 × 1–2 mm. Fr. Jun.

Streamsides, moist areas; 700–1000 m. Heilongjiang, Jilin, Liaoning [Korea].

33. *Cardamine circaeoides* J. D. Hooker & Thomson, J. Proc. Linn. Soc., Bot. 5: 144. 1861.

露珠碎米荠 lu zhu sui mi qi

Cardamine agyokumontana Hayata; *C. circaeoides* var. *diversifolia* O. E. Schulz; *C. heterandra* J. Z. Sun & K. L. Chang; *C. insignis* O. E. Schulz; *C. macrocephala* Z. M. Tan & S. C. Zhou; *C. reniformis* Hayata; *C. violifolia* O. E. Schulz; *C. violifolia* var. *diversifolia* O. E. Schulz, nom. inval.; *C. violifolia* var. *pilosa* K. L. Chang & H. L. Huang.

Herbs perennial, (5–)9–36(–45) cm tall, sparsely to densely pilose at least on leaves. Rhizomes slender, sometimes with a few stolons. Stems slender, erect or decumbent, simple or rarely branched above middle. Basal leaves not fleshy, simple or rarely 2–4-foliolate; petiole 1–9(–12) cm, glabrous or rarely ciliate; leaf blade or terminal leaflets cordate or ovate, rarely suborbicular, (0.7–)1.5–5.5(–6.7) × (0.7–)1.5–4.3(–5) cm, always longer than wide, pilose or glabrous, base cordate, sometimes obtuse, subtruncate, or subcuneate, margin often repand-crenate, sometimes coarsely crenate, crenulate, or subentire, often distinctly mucronate at vein endings, apex obtuse; lateral leaflets (when present) petiolulate or sessile, much smaller than terminal one. Cauline leaves 1–4, simple or rarely 1 of which 2- or 3-foliolate, petiolate or rarely uppermost subsessile; petiole (0.4–)1–5(–6) cm, with basal auricles 0.4–2 × 0.2–0.4 mm; leaf blade similar to that of basal leaves, cordate, sometimes ovate to ovate-lanceolate, 1–3.5(–6) × 1–3(–3.5) cm. Fruiting pedicels 3–12(–15) mm, ascending, divaricate, or reflexed, sometimes secund, glabrous, slender. Sepals ovate or oblong, 2–3.5 × 0.8–1.5 mm, glabrous, margin often membranous, base not saccate. Petals white, spatulate, (4–)5–7(–8) × (1.5–)2–2.5(–4) mm. Median filament pairs (2.5–)3.5–5 mm, lateral pair (2–)2.5–3.5 mm; anthers oblong, 0.5–1

mm. Ovules 20–42 per ovary. Fruit linear, 1.3–3(–3.3) cm × 0.8–1.2(–1.5) mm; valves torulose, glabrous; style (0.5–)1–2 mm. Seeds brown, ovate or broadly oblong, 0.8–1.1 × 0.6–0.9 mm, wingless. Fl. and fr. Feb–Jul.

Ravines, along streams and ditches, rocky places, mixed woods, moist pastures, roadsides, forests; 400–3300 m. Gansu, Guangdong, Guangxi, Hunan, Sichuan, Taiwan, Yunnan [India, Laos, Myanmar, Sikkim, Thailand, Vietnam].

Although the present authors have not seen the type collection of *Cardamine agyokumontana*, the protologue of the species and the examination of numerous, simple-leaved specimens from Taiwan leave no doubt that this taxon is conspecific with *C. circaeoides*. Records in FRPS of *C. circaeoides* (as *C. violifolia*) from Anhui, Hubei, and Zhejiang (also in Fl. Zhejiang 3: 55. 1993) are based on misidentified plants of *C. anhuiensis*.

Both *Cardamine violifolia* and *C. violifolia* var. *diversifolia* are based on the same type collection, Henry 3298 (holotype, B; isotypes, BM, E, GH, P, US), and the latter name is therefore invalid under Art. 26.2 of the St. Louis Code. The only difference between the two taxa is the presence in var. *diversifolia* of trifoliolate instead of simple leaves, though such variation is very common in, and can be observed on the holotype specimen of, *C. circaeoides*. Schulz (Bot. Jahrb. Syst. 32: 280–623. 1903) separated *C. violifolia* from *C. circaeoides* mainly on account of the former having minutely auriculate instead of nonauriculate petiolar bases. However, he overlooked the occurrence of minute petiolar auricles in every specimen he cited under *C. circaeoides*, including the type collection. In fact, all of the Chinese and non-Chinese material of *C. circaeoides* examined by the present authors has petiolar auricles. The type collection of *C. insignis*, A. Henry 13090 (holotype, B; isotypes, E, K, LE, MO), is indistinguishable from those of both *C. circaeoides* and *C. violifolia*, and Schulz's distinction of these species based on the orientation of the pedicels does not hold.

34. *Cardamine calthifolia* H. Léveillé, Bull. Acad. Int. Géogr. Bot. 24: 281. 1914.

驴蹄碎米荠 lu ti sui mi qi

Herbs perennial, 11–30 cm tall, sparsely pilose at least on leaves. Rhizomes stout, to 7 cm in diam., with a few stolons. Stems stout, thickest at base, erect, simple. Basal leaves fleshy, simple; petiole (3.5–)6–15(–20) cm, glabrous; leaf blade reniform, (1–)1.5–3 × (1.5–)3–6 cm, always wider than long, glabrous, base broadly cordate, margin repand, mucronate at vein endings, apex rounded. Cauline leaves 2–5, simple, petiolate or rarely uppermost subsessile; petiole (0.3–)1–3.5 cm, base not auriculate or rarely with minute auricles to 0.3 × 0.3 mm; leaf blade reniform, 1–2.5 × 1.5–4 cm, base cordate, margin dentate-repand and mucronate at vein endings. Flowering pedicels 1–2 cm, divaricate, straight, glabrous, stout. Sepals ovate or oblong, 2.5–4 × 1.5–2 mm, glabrous, margin membranous, base of lateral pair saccate. Petals violet, deep magenta, or rarely pale lavender or white, obovate, 7–10 × 3.5–5 mm. Median filament pairs 3.5–5 mm, lateral pair 2–3.5 mm; anthers oblong, 0.9–1.1 mm. Fruit and seeds not seen. Fl. Mar–Apr.

Shady wet places, moist stony pastures; 2400–3000 m. Guangdong, Sichuan, Yunnan [Myanmar].

The above first records from Guangdong, Sichuan, and Myanmar are based on *Guo Subai* 80086 (IBSC, MO), *T. C. Lee* 4452 (E), and

Kermode 17204 (K), respectively. Although the type of *Cardamine calthifolia* was collected from Yunnan ("Kiao-me-ti," May, *Maire s.n.* (holotype, E)), it was not mentioned in FRPS or in Fl. Yunnan. (vol. 6. 1995). Additional collections from Yunnan include *Forrest 26240* (E, K, US, W) and *Forrest 29415* (E).

35. *Cardamine calcicola* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 11: 203. 1919.

岩生碎米荠 *yan sheng sui mi qi*

Herbs perennial, 10–35 cm tall, sparsely to densely pilose on stem and petioles with crisped trichomes to 1.2 mm. Rhizomes thick, short, often with several stolons. Stems erect, simple, pilose or distal parts subglabrous, not flexuous. Basal leaves rosulate, simple or rarely trifoliolate; petiole 1–10 cm, often densely pilose; leaf blade or terminal leaflet reniform, 0.7–3 × 1–4 cm, sparsely pilose or subglabrous, base cordate, margin subentire, repand, or 7–9-crenate, apex acute or obtuse. Cauline leaves 2–6, 3–7-foliolate; petiole 0.2–2.5 cm, not auriculate at base; terminal leaflet obovate, 0.7–2.5 × 0.6–2.5 cm, with a petiolule 1–8 mm, sparsely pilose or subglabrous, base cuneate and often decurrent with adjacent lateral leaflets, margin entire or obscurely to strongly dentate, apex acute or rounded; lateral leaflets much smaller than terminal one, sessile or rarely shortly petiolulate. Fruiting pedicels divaricate or ascending, 0.7–1.6 cm, straight. Sepals oblong, 3–4 × 1–2 mm, margin and apex membranous, base not saccate. Petals white, obovate, 6–9 × 3–5 mm, apex rounded. Median filament pairs 2.5–3.5 mm, lateral pair 2–2.5 mm; anthers narrowly oblong, 1–1.3 mm. Ovules 12–14 per ovary. Fruit linear, 2–3 cm × 1–1.5 mm; valves glabrous, smooth; style 0.5–2 mm. Seeds brown, oblong-ovate, 1.3–1.9 × 0.8–1.3 mm, wingless. Fl. and fr. May–Jul.

• Crevices of limestone cliffs, moist rocky pastures, valleys; 2600–3700 m. Yunnan.

Cardamine calcicola is a rare and highly restricted species known to the present authors from only a few collections, including *Handel-Mazzetti 6564* (E, GH, US, W, WU) and *Forrest 26329* (BM, E, K). It was recorded from Sichuan in FRPS and Fl. Sichuan. (14: 92. 1999), but the present authors have seen no material from that province, and the records may well be misidentifications.

36. *Cardamine anhuiensis* D. C. Zhang & J. Z. Shao, Bull. Bot. Res., Harbin 6(2): 127. 1986.

安徽碎米荠 *an hui sui mi qi*

Cardamine jinshaensis Q. H. Chen & T. L. Xu.

Herbs perennial, 11–35 cm tall, sparsely pilose or glabrous. Rhizomes stout, often without stolons. Stems erect, simple or sometimes 1- or 2-branched above, not flexuous. Basal leaves trifoliolate or simple; petiole 2–17 cm; terminal leaflet or leaf blade suborbicular or rarely ovate-orbicular or reniform-orbicular, 0.6–3.5 × 1–5 cm, base cordate or rarely subtruncate, margin crenate or rarely repand-crenate; petiolule of terminal leaflet 0.7–1.4 cm, that of lateral leaflets much shorter; lateral leaflets similar to terminal but much smaller. Cauline leaves 3(or 5)-foliolate; petiole 1.3–3.5 cm,

base not auriculate; terminal leaflet ovate-orbicular or subreniform, 1.5–3 × 1–3.2 cm, with a petiolule to 6 mm, margin crenate or crenate-repand; lateral leaflets similar to terminal one, shortly petiolulate or subsessile. Fruiting pedicels divaricate to divaricate-ascending, 0.6–1.5 cm, slender. Sepals oblong, 2–2.8 × 0.8–1.2 mm, base not saccate. Petals white, spatulate, 4–6 × 1.5–2.5 mm, apex rounded. Median filament pairs 2.5–4 mm, lateral pair 1.5–2.5 mm; anthers oblong, 0.5–0.7 mm. Ovules 24–30 per ovary. Fruit linear, 2–4 cm × 1–1.5 mm; valves smooth, glabrous; style 1–3 mm. Seeds brown, oblong, 1.2–2 × 0.8–1.3 mm, wingless. Fl. and fr. Mar–May.

• Shady slopes, along ditches; near sea level to 1000 m. Anhui, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Zhejiang.

The above first records from Hunan, Jiangxi, and Zhejiang are based on *T. L. Chen 777* (NAS), *Tan Ceming & Xie Guowen 94273* (MO), and *P. L. Chiu 1273* (MO), respectively.

Cardamine jinshaensis is hardly distinct from *C. anhuiensis* except for having leaflets repand-crenate and orbicular-ovate (vs. distinctly crenate and subreniform).

It is quite likely that *Cardamine anhuiensis* is conspecific with the earlier published *C. glechomifolia* H. Léveillé (Repert. Spec. Nov. Regni Veg. 11: 495. 1913), which was described from Korea. The holotype of the latter is so fragmentary that additional collections from Korea and adjacent parts of China are needed to confirm whether or not the two are indeed the same taxon.

37. *Cardamine hydrocotyloides* W. T. Wang, Acta Bot. Yunnan. 9: 8. 1987.

德钦碎米荠 *de qin sui mi qi*

Herbs perennial, 10–26 cm tall. Rhizomes short, thickened and somewhat fleshy at stem base, with several stolons bearing simple leaves. Stems erect, subglabrous or puberulent with often curved trichomes, simple from rhizomal branches, not flexuous. Rhizomal and lowermost cauline leaves simple; petiole 1.5–6 cm, puberulent or glabrous, not auriculate at base; leaf blade reniform or suborbicular, 0.5–2.5 × 0.8–3.5 cm, papery, glabrous or sparsely pilose adaxially, base cordate, margin repand-crenate or subentire; stolon leaves simple, similar to rhizomal leaves but smaller and with shorter petioles. Uppermost cauline leaves usually 3-foliolate, rarely simple; petiole 0.3–2 cm; terminal leaflet suborbicular, reniform, or ovate-suborbicular, 0.6–2 × 0.8–3 cm, with a petiolule 0.5–7 mm, base cordate, rounded, or subtruncate, margin entire or repand, rarely slightly lobed; lateral leaflets similar to terminal one, petiolulate. Fruiting pedicels 0.9–2 cm, divaricate or ascending, slender, glabrous or puberulent. Sepals ovate, 2–2.5 × 1–1.5 mm, glabrous, not saccate. Petals white, obovate, 5–6 × 3–4 mm, apex rounded. Median filament pairs 3–3.5 mm, slender, toothless; lateral pair 2–2.5 mm; anthers oblong, 0.8–1 mm. Ovules 10–14 per ovary. Fruit linear, 1–2.8 cm × 1–1.3 mm; valves glabrous, smooth; style 1–3 mm.

Seeds brown, oblong, ca. 1.3×0.8 mm, wingless. Fl. and fr. Jul–Aug.

- Forests, along ditches and trails; 3200–3400 m. Sichuan, Yunnan.

The above first record from Sichuan is based on *Al-Shehbaz et al.* 9348 (MO), collected ca. 36 km S of Xiancheng. The filaments in all the material examined by the present authors, including the type collection and paratypes, are slender, and the dentate filaments mentioned in the protologue could not be observed.

38. *Cardamine lihengiana* Al-Shehbaz, *Novon* 10: 326. 2000.

李恒碎米荠 *li heng sui mi qi*

Herbs perennial, 30–50 cm tall, glabrous throughout. Rhizomes slender, without stolons. Stems erect, angled, with internodes usually more than 2 cm. Rhizomal and lower cauline leaves simple; petiole 1–4 cm, not auriculate at base; leaf blade reniform or suborbicular, 0.7–2.5 \times 1–3 cm, palmately veined, base cordate, margin repand-crenate, obscurely to distinctly 5- or 7-angled, apex obtuse, obscurely mucronulate. Middle and upper cauline leaves with axillary flowers, simple or rarely 1 or 2 with a lateral, leafletlike lobe, suborbicular or ovate, angled, not crenate, progressively smaller upward. Racemes bracteate throughout, very lax. Fruiting pedicels ascending, 1.5–3 cm, slender, straight. Sepals ovate, 1.5–1.8 \times 0.9–1 mm, apex membranous, base not saccate. Petals white, obovate, 3.5–4.5 \times 1.5–2 mm, not clawed, apex rounded. Median filament pairs ca. 2.5 mm, lateral pair ca. 2 mm; anthers oblong, ca. 0.6 mm. Ovules 20–24 per ovary. Fruit linear, 2–3.6 cm \times ca. 1 mm, sessile; valves glabrous, smooth; style 1–2 mm. Seeds brown, oblong, 1.2–1.4 \times 0.7–0.9 mm, wingless. Fl. and fr. Jun.

- About 1900 m. Yunnan.

Cardamine lihengiana is the most distinctive of all Eurasian species in the genus on account of its having very lax racemes that are bracteate throughout.

39. *Cardamine yunnanensis* Franchet, *Bull. Soc. Bot. France* 33: 398. 1886.

云南碎米荠 *yun nan sui mi qi*

Cardamine bijiangensis W. T. Wang; *C. hirsuta* var. *oxycarpa* J. D. Hooker & T. Anderson; *C. heterophylla* T. Y. Cheo & R. C. Fang (1980), not Host (1797), nor Lapeyrouse (1813), nor Bory (1820), nor Hooker (1835), nor (Nuttall) Wood (1870), nor (J. G. A. Forster) O. E. Schulz (1903); *C. inayatii* O. E. Schulz; *C. levicaulis* W. T. Wang; *C. longipedicellata* Z. M. Tan & G. H. Chen (1996), not Rollins (1940); *C. longistyla* W. T. Wang; *C. muliensis* W. T. Wang; *C. sikkimensis* H. Hara; *C. sinica* Rashid & H. Ohba; *C. weixiensis* W. T. Wang.

Herbs short-lived perennial with slender rhizomes, rarely annual, (10–)15–45(–60) cm tall, often pilose or puberulent, sometimes glabrescent distally. Stems simple or branched from base, angled. Basal leaves petiolate, often withered by flowering, 3–5-foliolate, rarely simple; petiole 1–6(–8) cm; leaf blade or terminal leaflet suborbicular, ovate, or lanceolate, 0.5–3 \times 0.5–

2.5 cm, dentate, crenate, or rarely subsinuate; lateral leaflets absent or 1 or 2 pairs. Middle cauline leaves 3–7-foliolate; petiole (1–)2–7(–8.5) cm, basally auriculate; auricles toothlike, linear, or lanceolate, (0.4–)1–3(–4) \times 0.2–1(–1.5) mm; terminal leaflet lanceolate, elliptic, oblong, ovate, or suborbicular, (1–) 1.3–4.5(–6) \times (0.4–)0.6–2(–3) cm, sparsely pilose adaxially, often glabrous abaxially, with a petiolule (2–)4–14(–20) mm, base obtuse or cuneate, margin ciliate to ciliolate and dentate, crenate, sinuate, or rarely repand, apex acute or acuminate; lateral leaflets 1–3 pairs, shortly petiolulate to subsessile, similar to terminal one and often oblique at base. Uppermost leaves often trifoliolate, rarely simple. Fruiting pedicels ascending or divaricate, 0.5–1.8(–2.3) cm, straight, slender. Sepals oblong or nearly ovate, 2–3 \times 1–1.5 mm, base not saccate. Petals white, obovate, (2.5–)3.5–5(–6) \times 2–3 mm, not clawed. Median filament pairs 2.5–4 mm, lateral pair 2–3 mm; anthers oblong, 0.5–0.8 mm. Ovules 8–18 per ovary. Fruit linear, 1.5–2.8(–3) cm \times 1–1.3 mm; valves smooth, sparsely pilose; style (0.5–)1–2.5 (–3.5) mm. Seeds brown, narrowly oblong, 1.3–1.8 \times 0.7–1 mm, wingless. Fl. Mar–Jul, fr. Apr–Sep.

Moist shady places, mountain slopes, valleys, grasslands, meadows, thickets, forest openings, damp stream beds; 900–4200 m. Sichuan, Xizang, Yunnan [Bhutan, India, Nepal, Sikkim].

A critical comparison of the type collection of *Cardamine yunnanensis*, *Delavay 1843* (holotype, P; isotypes, E, F, P, US), with those of all the names synonymized above (except the later homonym *C. longipedicellata*) reveals the remarkable similarities among them in all aspects of flowers, fruit, and indumentum. They all have angled stems, auriculate petiolar bases, compound leaves, petiolulate terminal and often lateral leaflets, often oblique bases of lateral leaflets, and sparsely pilose young ovaries and/or fruit. The principal differences among them, which are all trivial, are in the number, shape, and margin of leaflets and length of style. In fact, the type collection of *C. yunnanensis* includes plants with styles 0.5–3 mm. Unfortunately, none of the protologues of the taxa synonymized above can provide a comparison with *C. yunnanensis*, and this perhaps explains why the basic similarities between those taxa and *C. yunnanensis* were overlooked. The present authors believe that none of the taxa synonymized above merits recognition at specific or infraspecific rank. They have also examined the “types” of the invalid names *C. dubia* H. Li (Fl. Dulongjiang Region, 75. 1993, not Zapalowicz, 1912) and *C. gongshanensis* H. Li (loc. cit.; both *nomina nuda*), and these taxa clearly belong to *C. yunnanensis*. Although they have not examined the type collection of *C. longipedicellata*, the detailed description in the protologue corresponds perfectly well with typical plants of *C. yunnanensis*.

40. *Cardamine paucifolia* Handel-Mazzetti, *Symb. Sin.* 7: 359. 1931.

少叶碎米荠 *shao ye sui mi qi*

Cardamine yunnanensis Franchet var. *obtusata* C. Y. Wu ex T. Y. Cheo & R. C. Fang.

Herbs perennial, 15–40 cm tall, sparsely pilose or glabrescent. Rhizomes slender. Stems simple, slightly angled. Basal leaves often withered by flowering, trifoliolate; petiole 1.5–4.5 cm; leaflets similar to those of cauline leaves, smaller. Cauline leaves 1–4,

trifoliolate; petiole 1.5–6 cm, not auriculate at base; terminal leaflet lanceolate, ovate, or broadly elliptic, 3–6.5 × 1–3.5 cm, sparsely pilose or glabrous, with a petiolule 5–12 mm, base obtuse or cuneate, margin ciliate and dentate or crenate, apex acute or acuminate; lateral leaflets 2, shortly petiolulate or sessile and base decurrent to rachis, nearly as large as terminal one, base oblique. Uppermost leaf often with a sessile terminal leaflet decurrent basally with lateral leaflets. Fruiting pedicels ascending or divaricate, 7–11 mm, straight, slender. Sepals oblong, 3.5–4.5 × 1.2–1.5 mm, base not saccate. Petals white, narrowly obovate, 6–8.5 × 1.5–3.5 mm, not clawed. Median filament pairs 3.5–4 mm, lateral pair ca. 3 mm; anthers oblong, 1.1–1.6 mm. Ovules 10–16 per ovary. Fruit linear, 3–5 cm × 1–1.5 mm; valves smooth, glabrous; style 1.5–2.5 mm. Seeds brown, narrowly oblong, 1.5–2 × 0.6–0.8 mm, apically winged. Fl. and fr. Mar–Jul.

- Ravines, streamsides; 1500–2600 m. Yunnan.

Cardamine paucifolia was not mentioned in FRPS, whereas in Fl. Yunnan. (6: 59. 1995) it was reduced to the synonymy of *C. trifoliolata*. However, *C. paucifolia* is most closely related to *C. yunnanensis*, from which it is readily distinguished by having trifoliolate leaves, no petiolar auricles, larger flowers, glabrous fruit, and apically winged seeds.

The type collection of *Cardamine yunnanensis* var. *obtusata*, *C. W. Wang* 64172 (holotype, KUN; isotypes A, NAS), has no petiolar auricles and glabrous fruit, and therefore clearly belongs to *C. paucifolia*. By contrast, the three paratypes of this variety, *T. T. Yü* 16025 (A, KUN), *T. T. Yü* 11281 (KUN, NAS), and *Handel-Mazzetti* 8876 (E, WU), have distinctly auriculate petioles and pilose fruit, and they are assigned to *C. yunnanensis*. Also belonging to *C. paucifolia* is the invalidly named *C. dulongensis* H. Li (Fl. Dulongjiang Region, 75. 1993, *nomen nudum*).

41. *Cardamine impatiens* Linnaeus, Sp. Pl. 2: 655. 1753.

弹裂碎米荠 *tan lie sui mi qi*

Cardamine basisagittata W. T. Wang; *C. dasycarpa* Marschall von Bieberstein; *C. glaphyropoda* O. E. Schulz; *C. glaphyropoda* var. *crenata* T. Y. Cheo & R. C. Fang; *C. impatiens* var. *angustifolia* O. E. Schulz; *C. impatiens* var. *dasycarpa* (Marschall von Bieberstein) T. Y. Cheo & R. C. Fang; *C. impatiens* subsp. *elongata* O. E. Schulz; *C. impatiens* var. *eriocarpa* de Candolle; *C. impatiens* var. *fumaria* H. Léveillé; *C. impatiens* var. *microphylla* O. E. Schulz; *C. impatiens* var. *obtusifolia* Knaf; *C. impatiens* var. *pilosa* O. E. Schulz; *C. nakaiana* H. Léveillé; *C. senanensis* Franchet & Savatier. Herbs biennial or rarely annual, (12–)20–65(–90) cm tall, glabrous or rarely sparsely pubescent near base. Stems erect, simple at base, usually branched above, angled, sometimes flexuous. Basal leaves rosulate, often withered by flowering; petiole 1–4 cm, not auriculate; leaf blade pinnatisect and appearing compound. Cauline leaves to 15 per stem; petiole auriculate, 2–6 cm; auricles lanceolate or linear, 1–8(–10) × (0.1–)0.3–1.8 (–2.2) mm, often ciliate; leaf blade (1–)3–18(–22) × (0.6–)1–5.5(–7) cm, pinnatisect;

terminal lobe orbicular, obovate, ovate, or lanceolate, 1–4(–5) × 0.5–1.7 cm, with a petiolule to 5 mm, entire or obscurely to strongly 3–5(–9)-toothed or -lobed; lateral lobes (4–)6–11 on each side of midvein, oblong, lanceolate, or ovate, sessile or long petiolulate, smaller than terminal lobe, margin dentate, sublaciniate, or rarely entire; uppermost leaves with narrower segments. Fruiting pedicels divaricate or ascending, 3.5–12(–15) mm, slender. Sepals oblong, 1.2–2(–2.5) × 0.7–1(–1.2) mm. Petals white, oblanceolate, 1.5–4(–5) × 0.6–1.2 mm, rarely absent. Stamens 6; filaments 2–3(–4) mm; anthers ovate, 0.3–0.5 mm. Ovules 10–30 per ovary. Fruit linear, (1–)1.6–3(–3.5) cm × 0.9–1.5 mm; valves glabrous or rarely pilose, torulose; style 0.6–1.6(–2) mm. Seeds brown, oblong, 1.1–1.5 × 0.8–1 mm, compressed, sometimes apically narrowly winged. Fl. and fr. Feb–Jul. $2n = 16, 32$.

Shady or moist slopes, streamsides, fields, roadsides; near sea level to 4000 m. Anhui, Fujian, Gansu, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan, Zhejiang [Afghanistan, Bhutan, India, Japan, Kashmir, Kazakhstan, Korea, Kyrgyzstan, Nepal, Pakistan, Russia, Sikkim, Tajikistan, Uzbekistan; SW Asia, Europe; naturalized in S Africa and North America]. The division of *Cardamine impatiens* into infraspecific taxa based on the size, shape, margin, and indumentum of leaf lobes is definitely artificial. Leaf characters do not correlate in any pattern with geographical distribution. In fact, some of the morphological extremes described as taxa native to Asia appear sporadically in the native European or naturalized American populations. The so-called var. *dasycarpa*, which was described from the Caucasus, represents a form that can be found within populations of typical *C. impatiens*. Furthermore, a critical evaluation of the type collections of *C. basisagittata* and *C. glaphyropoda* shows beyond doubt that they are merely minor variants of *C. impatiens*. Wang (Acta. Bot. Yunnan. 9: 16. 1987) designated *Smith* 2969 (UPS) as the lectotype of *C. glaphyropoda*, but the specimen at B would have been a more appropriate choice because it was annotated in Schulz's handwriting. This species is used medicinally and as a source of seed oil.

42. *Cardamine changbaiana* Al-Shehbaz, Novon 10: 323. 2000.

天池碎米荠 *tian chi sui mi qi*

Cardamine resedifolia Linnaeus var. *morii* Nakai. Herbs perennial, 2–8 cm tall, scapose, glabrous throughout. Rhizomes slender, 0.4–0.7 mm in diam. Stems erect, leafless or rarely 1-leaved. Basal leaves rosulate, fleshy; petiole 0.3–3.5 cm; leaf blade simple or rarely 3-lobed, broadly ovate, subcordate, or oblong, 2–10 × 1.5–8 mm, base cordate or obtuse, margin entire or repand, apex rounded or obtuse. Cauline leaves absent, rarely 1 and petiolate, similar but narrower than basal leaves, petiole base not auriculate. Racemes terminal, 2–5(–7)-flowered, ebracteate. Fruiting pedicels erect to erect-ascending, 2–7 mm, straight. Sepals oblong, 1.3–1.7 × 0.6–0.8 mm. Petals white, obovate, 3–3.5 × 1.5–1.8 mm, base tapering into a claw 0.4–1 mm, apex rounded or submarginate. Filaments 1.4–2 mm; anthers oblong, 0.5–0.8 mm. Ovules 8–12 per ovary. Fruit linear, 1–2 cm × 1.3–2 mm; gynophore

0.3–1 mm; valves smooth, glabrous; style 0.5–2 mm. Seeds brown, oblong to ovate-oblong, 1.2–1.5 × 0.8–1.1 mm, wingless and not margined. Fl. and fr. Jul–Aug.

Rocky slopes; 2400–2500 m. S Jilin (Changbai Shan) [Korea].

43. *Cardamine nipponica* Franchet & Savatier, Enum. Pl. Jap. 1: 281. 1875.

日本碎米荠 *ri ben sui mi qi*

Herbs perennial, 3–10 cm tall, glabrous throughout. Rhizomes slender, many branched, with petiolar remains of previous years. Stems erect, 2- or 3-leaved. Basal leaves rosulate, (3 or)5- or 7-foliolate; petiole 0.7–2.5 cm; terminal leaflet suborbicular, broadly ovate, or elliptic, 1.5–6 × 1–4 mm, base cuneate or obtuse, margin entire, apex acute and submucronate; lateral leaflets (1 or)2–4 pairs, subsessile, obovate, base cuneate, margin entire, slightly smaller than terminal one. Cauline leaves 3- or 5-foliolate; petiole 4–11 mm, base auriculate or amplexicaul; auricles lanceolate or toothlike, 0.2–2 × 0.1–0.4 mm, apex acute or subcaudate; terminal leaflet narrowly oblanceolate or linear, 2–10 × 0.5–1 mm; lateral leaflets 2 pairs, smaller than but similar to terminal lobe. Racemes 3–6-flowered, ebracteate; rachis flexuous in fruit. Fruiting pedicels divaricate or ascending, 3–8 mm, straight. Sepals oblong, 1.7–2.2 × ca. 0.8 mm. Petals white, spatulate, 5–6 × ca. 1.5 mm, apex rounded. Median filament pairs ca. 2.5 mm, lateral pair ca. 1.5 mm; anthers ovate, 0.4–0.5 mm. Ovules 10–16 per ovary. Fruit linear, 1.5–3 cm × 0.8–1.2 mm; valves smooth, glabrous; style 0.8–2 mm. Seeds brown, oblong, 1–1.5 × 0.6–0.9 mm, apically winged. Fl. and fr. Jul–Aug.

Alpine slopes. Taiwan [Japan].

44. *Cardamine caroides* C. Y. Wu ex W. T. Wang, Acta Bot. Yunnan. 9: 17. 1987.

细裂碎米荠 *xi lie sui mi qi*

Herbs perennial, 7–15 cm tall, glabrous or sparsely to densely pilose with trichomes to 0.7 mm. Rhizomes thick, to 10 × 5 mm, with numerous stolons. Stems erect, simple, thick at base, pilose or glabrous at base. Rhizomal and lowermost cauline leaves pilose; petiole 1–3 cm; leaf blade pinnatisect into linear to linear-oblanceolate lobes; terminal lobe obovate in outline, to 8 × 4 mm, cuneate basally into a petiolule 1–4 mm, deeply trifid or apically three toothed; lateral lobes 1–4 on each side of rachis, 2–8 × 0.5–2 mm, undivided or unequally 2- or 3-fid, margin entire, apex acute. Cauline leaves 2–4, including petiole 1.5–4.5 cm, similar to lowermost cauline leaves but with fewer and narrower lobes, petiole base not auriculate. Racemes ebracteate, 6–14-flowered. Pedicels of young fruit ascending or suberect, 0.7–1.5 cm, slender, glabrous, subappressed to rachis. Sepals ovate or suboblong, 2–2.5 × 0.8–1.5 mm, sparsely pilose, subapically membranous, lateral pair subsaccate. Petals lavender, obovate, 5–6 × 2–2.5 mm, apex obtuse. Median filament pairs 2.5–3.5 mm, flattened and to 0.5 mm

wide; lateral pair 1.5–2 mm; anthers oblong, 0.6–0.8 mm. Ovules 12–16 per ovary. Young fruit ca. 2 cm × 0.8 mm; valves glabrous; style 1–1.5 mm. Mature seeds not seen. Fl. Jul.

• About 3800 m. Sichuan.

Cardamine caroides, which at present is known only from the holotype, *T. T. Yü 6889* (PE), is a delicate plant resembling *C. parviflora*, but is distinct on account of its stoloniferous rhizomes and larger flowers.

45. *Cardamine parviflora* Linnaeus, Syst. Nat., ed. 10, 2: 1131. 1759.

小花碎米荠 *xiao hua sui mi qi*

Cardamine brachycarpa Franchet (1879), not Opiz (1826); *C. fallax* (O. E. Schulz) Nakai; *C. flexuosa* subsp. *fallax* O. E. Schulz; *C. flexuosa* subsp. *fallax* f. *microphylla* O. E. Schulz; *C. flexuosa* var. *fallax* (O. E. Schulz) T. Y. Cheo & R. C. Fang; *C. koshiensis* Koidzumi; *C. manshurica* (Komarov) Nakai; *C. parviflora* f. *hispida* Franchet; *C. parviflora* var. *manshurica* Komarov; *C. scutata* Thunberg subsp. *fallax* (O. E. Schulz) H. Hara.

Herbs annual, (7–)10–30(–40) cm tall, slender, glabrous or sparsely to densely pilose throughout. Stems erect, 1 to several from base, often branched above, somewhat flexuous. Basal leaves rosulate or not, often withered by anthesis; petiole 0.5–1.5 cm; leaf blade 1.5–5 cm, pinnatisect; lateral lobes 3–5 on each side of midvein, oblong, obovate, or suborbicular, sessile or petiolulate, subequaling or smaller than terminal lobe, entire or 3(–5)-toothed or -lobed. Cauline leaves including petiole (1.5–)2–6(–7) × 0.8–2.2 cm, pinnatisect or pectinate; petiole not auriculate at base; lateral lobes (2–)4–7(or 8) on each side of midvein, filiform, linear, or narrowly oblong, 3–10(–16) × 0.3–3 mm, sessile, entire or rarely 1–3-toothed; terminal lobe similar to lateral ones or slightly larger. Fruiting pedicels divaricate or ascending, 4–10 mm, slender. Sepals oblong, 1–1.5(–2) × 0.3–0.5 mm, membranous at margin and apex. Petals white, oblanceolate, (1.5–)1.8–2.5(–3) × 0.4–0.8(–1) mm. Stamens 6; filaments 1.4–2.5 mm; anthers ovate, 0.2–0.4 mm. Ovules 20–50 per ovary. Fruit linear, (0.5–)1–2(–2.5) cm × 0.6–0.9 mm; valves glabrous, torulose; style 0.3–0.7(–1) mm. Seeds pale brown, oblong-ovate, 0.6–0.9 × 0.4–0.6 mm, narrowly margined or not. Fl. May–Jun, fr. Jun–Jul. $2n = 16$.

River banks, along ditches, meadows, roadsides; near sea level to 2500 m. Anhui, Guangxi, Hebei, Heilongjiang, Jiangsu, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Taiwan, Xinjiang, Zhejiang [Japan, Kazakstan, Korea, Mongolia, Russia; N Africa, SW Asia, Europe, North America].

The above first records from Guangxi and Yunnan are based on *Tsang 21800* (A, GH, P) and *Maire s.n.* (B, E, LE, W), respectively.

Cardamine parviflora has often been confused with and treated as distinct from *C. flexuosa* subsp. *fallax*. However, syntypes of the latter name, as well as the types of *C. brachycarpa*, *C. flexuosa* f. *micro-*

phylla, and *C. parviflora* f. *hispidula*, are morphologically the same as *C. parviflora*, and are therefore here reduced to synonymy.

46. *Cardamine hirsuta* Linnaeus, Sp. Pl. 2: 655. 1753.
碎米荠 *sui mi qi*

Cardamine hirsuta var. *formosana* Hayata.

Herbs annual, (3–)10–35(–45) cm tall, sparsely hirsute at least along petioles of basal leaves, often glabrous above. Stems erect, ascending, or decumbent, 1 to several from base, simple or branched above, not flexuous. Basal leaves rosulate; petiole ciliate, 0.5–5 cm; leaf blade (1.5–)2.5–10(–13) cm, lyrate-pinnatisect; terminal lobe reniform or orbicular, 0.4–2 × 0.6–3 cm, margin entire, repand, dentate, or 3–5-lobed; lateral lobes (1–)3–7(–11) on each side of midvein, petiolulate, oblong, ovate, obovate, or orbicular, smaller than terminal lobe, entire, repand, crenate, or 3-lobed. Cauline leaves 1–4(–6), rarely absent, shortly petiolate, including petiole (0.5–)1.2–5.5(–7) cm; petiole base not auriculate; lateral lobes (2–)4–7(–10) on each side of midvein, ovate, oblong, oblanceolate, or linear, sessile or shortly petiolulate, entire, repand, or dentate. Fruiting pedicels erect or ascending, (2–)3–10(–14) mm, slender. Sepals oblong, 1.5–2.5 × 0.3–0.7 mm. Petals white, spatulate, 2.5–4.5 (–5) × 0.5–1.1 mm, sometimes absent. Stamens 4 and lateral pair often absent, rarely 5 or 6; filaments 1.8–3 mm; anthers ovate, 0.3–0.5 mm. Ovules 14–40 per ovary. Fruit linear, (0.9–)1.5–2.5(–2.8) cm × (0.8–)1–1.4 mm; valves glabrous, torulose; style 0.1–0.6(–1) mm. Seeds light brown, oblong or subquadrate, 0.9–1.3(–1.5) × 0.6–0.9(–1.1) mm, narrowly margined. Fl. Feb–May, fr. Apr–Jul. $2n = 16$.

Mountain slopes, roadsides, fields, clearings, wastelands, damp places, grassy areas; near sea level to 3000 m. Throughout China [India, Indonesia, Japan, Laos, Malaysia, New Guinea, Pakistan, Philippines, Sikkim, Sri Lanka, Thailand, Turkmenistan, Vietnam; SW Asia, Europe; naturalized in S Africa, Australia, North and South America].

A highly variable species, especially with respect to plant size, density of indumentum, number, shape, size, and margins of lateral leaf lobes, and flower morphology (e.g., presence vs. absence of petals and stamen number). The species has been divided into more than 15 subspecies, varieties, and forms. However, all of these taxa are based on characters that can be highly variable even within the same population. Only one synonym pertinent to China is cited above. For additional synonymy, the reader should consult Schulz (Bot. Jahrb. Syst. 32: 464–473. 1903).

Most of the specimens identified as *Cardamine hirsuta* in the Chinese herbaria consulted by the present authors belong to *C. flexuosa*. The two species can be separated easily by the above key. Furthermore, about 80% of the plants of *C. hirsuta* have flowers with four stamens and 18% have five, whereas about 97% of those of *C. flexuosa* have six stamens.

47. *Cardamine flexuosa* Withering, Arr. Brit. Pl., ed. 3, 3: 578. 1796.

弯曲碎米荠 *wan qu sui mi qi*

Barbarea arisanensis (Hayata) S. S. Ying; *Cardamine arisanensis* Hayata; *C. debilis* D. Don (1825), not

Banks ex de Candolle (1821); *C. flexuosa* subsp. *debilis* O. E. Schulz; *C. flexuosa* subsp. *debilis* var. *occulata* (Hornemann) O. E. Schulz; *C. flexuosa* var. *debilis* (O. E. Schulz) T. Y. Cheo & R. C. Fang; *C. flexuosa* var. *ovatifolia* T. Y. Cheo & R. C. Fang; *C. hirsuta* Linnaeus var. *flaccida* Franchet; *C. hirsuta* subsp. *flexuosa* (Withering) J. D. Hooker; *C. hirsuta* var. *omeiensis* T. Y. Cheo & R. C. Fang; *C. hirsuta* var. *sylvatica* (Link) Syme; *C. occulata* Hornemann; *C. scutata* Thunberg subsp. *flexuosa* (Withering) H. Hara; *C. sylvatica* Link; *C. zollingeri* Turczaninow; *Nasturtium obliquum* Zollinger.

Herbs annual or biennial, (6–)10–50 cm tall, sparsely to densely hirsute basally or throughout, or glabrous. Stems erect, ascending, or decumbent, 1 to several from base, simple or branched, flexuous or straight. Basal leaves not rosulate, often withered by anthesis, petiolate; leaf blade (2–)4–10(–14) cm, lyrate; terminal lobe reniform, broadly ovate, or suborbicular, repand or 3–5-lobed; lateral lobes, (1 or)2–6(or 7) on each side of midvein, petiolulate or subsessile, oblong, ovate, or elliptic, smaller than terminal lobe, entire, repand, crenate, or 3(–5)-lobed. Cauline leaves 3–15, including petiole (2–)3.5–5.5(–7) cm; petiole base not auriculate; terminal lobe 3–5-lobed; lateral lobes 2–7 on each side of midvein, suborbicular, ovate, oblong, oblanceolate, or linear, similar to or slightly smaller than terminal lobe, sessile or shortly petiolulate, entire, repand, dentate, or 3(–5)-lobed. Fruiting pedicels divaricate or ascending, (5–)6–14(–17) mm, slender. Sepals oblong, 1.5–2.5 × 0.7–1 mm. Petals white, spatulate, 2.5–4(–5) × 1–1.7 mm. Stamens 6, rarely 4 and lateral pair absent; filaments 2–3 mm; anthers ovate, 0.3–0.5 mm. Ovules 18–40 per ovary. Fruit linear, (0.8–)1.2–2.8 cm × 1–1.5 mm; valves glabrous, torulose; style 0.3–1(–1.5) mm. Seeds brown, oblong or subquadrate, 0.9–1.5 × 0.6–1 mm, narrowly margined or not. Fl. Feb–May, fr. Apr–Jul. $2n = 32$.

Fields, roadsides, grasslands, disturbed sites, streamsides, clearings, running water, wet forests, dry sites, greenhouses; near sea level to 3600 m. Throughout China [Bangladesh, Bhutan, India, Indonesia, Japan, Kashmir, Korea, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sikkim, Thailand, Vietnam; native to Europe; naturalized in Australia and North and South America].

The above first records from Myanmar and Thailand are based on Keenan et al. 3918 (E) and Maxwell 90–149 (MO), respectively.

Cardamine flexuosa is one of the most variable species of Brassicaceae, especially in stem direction, plant height, density of indumentum, flower size, degree of zigzagging of the raceme rachis, orientation of fruiting pedicels and, most dramatically, number, shape, size, base (sessile vs. petiolulate), and margin of lateral leaf lobes. Although Schulz (Bot. Jahrb. Syst. 32: 464–473. 1903) recognized 20 infraspecific taxa in *C. flexuosa*, an examination of the types of most of these reveals that he confused the limits of at least four different species, including *C. parviflora*, *C. scutata*, and the North American *C. pennsylvanica* Muhlenberg ex Willdenow. Only a small fraction of the vast number of variants of *C. flexuosa* have been accorded

infraspecific ranks, but all of those occur sporadically throughout the range of the species, and the present authors prefer to avoid the recognition of infraspecific taxa that are based on unreliable characters, especially the morphology of lateral leaf lobes.

Although *Cardamine occulata* was based on Chinese material, it was not mentioned in FRPS, and it represents only a minor variant of *C. flexuosa*.

Cardamine flexuosa is used medicinally.

48. *Cardamine scutata* Thunberg, Trans. Linn. Soc. London 2: 339. 1794.

圆齿碎米荠 *yuan chi sui mi qi*

Cardamine angulata Hooker var. *kamtschatica* Regel; *C. autumnalis* Koidzumi; *C. baishanensis* P. Y. Fu; *C. dentipetala* Matsumura; *C. drakeana* H. Boissieu; *C. flexuosa* Withering var. *kamtschatica* (Regel) Matsumura; *C. flexuosa* subsp. *regeliana* (Miquel) O. E. Schulz; *C. flexuosa* var. *regeliana* (Miquel) Komarov; *C. flexuosa* var. *manshurica* Komarov; *C. hirsuta* Linnaeus var. *latifolia* Maximowicz; *C. hirsuta* var. *regeliana* (Miquel) Maximowicz; *C. hirsuta* var. *rotundiloba* Hayata; *C. regeliana* Miquel; *C. regeliana* var. *manshurica* (Komarov) Kitagawa; *C. scutata* var. *longiloba* P. Y. Fu; *C. scutata* var. *regeliana* (Miquel) H. Hara; *C. scutata* var. *rotundiloba* (Hayata) T. S. Liu & S. S. Ying; *C. sylvatica* Link var. *regeliana* (Miquel) Franchet & Savatier; *C. taquetii* H. Léveillé; *C. zhejiangensis* T. Y. Cheo & R. C. Fang; *C. zhejiangensis* var. *huangshanensis* D. C. Zhang.

Herbs annual or biennial, rarely short-lived perennial, (5–) 15–50(–70) cm tall, glabrous or sparsely pilose. Stems erect, simple at base, simple or branched above, not flexuous. Basal leaves not rosulate, often withered by anthesis; petiole to 3.5 cm; leaf blade pinnatisect, with 1–4 lateral lobes on each side of midvein; terminal lobe subreniform, suborbicular, rhomboid-ovate, or broadly obovate, much larger than lateral ones, (1–) 1.5–2.5 × 0.7–2 cm, repand, crenate, or 3–5-lobed; lateral lobes petiolulate or sessile, oblong, ovate, or suborbicular. Cauline leaves similar to basal ones; petiole to 3 cm, base not auriculate; lateral lobes 1–5 on each side of midvein, much smaller than terminal lobe; terminal lobe (0.7–)2–5(–6.5) × (0.5–)1.5–4(–5) cm, repand, crenate, or coarsely 3–5(–7)-lobed. Racemes with a straight rachis. Fruiting pedicels divaricate or ascending, (0.3–) 0.6–1.4(–1.8) cm, slender. Sepals oblong, 1.5–2.5(–3) × (0.7–) 0.9–1.4 mm. Petals white, spatulate, 2.5–4.5(–6) × (1–)1.5–2.5 mm. Stamens 6; filaments 2–3.5 mm; anthers ovate, 0.3–0.6 mm. Ovules 20–40 per ovary. Fruit linear, (0.9–)1.5–2.8(–3.5) cm × (0.8–)1–1.4 mm; valves glabrous or rarely sparsely puberulent or pilose, torulose; style (0.3–)0.6–1.5 mm. Seeds brown, oblong or subquadrate, 0.9–1.5 × 0.6–0.9 mm, narrowly margined or not. Fl. Apr–Jul, fr. May–Aug. $2n = 32$.

Valleys, shady slopes, damp sites, along ditches, rock crevices, mountain slopes, roadsides, streamsides; near sea level to 2100 m. Anhui, Guangdong, Guizhou, Jiangsu, Jilin, Sichuan, Taiwan, Zhejiang [Japan, Korea, Russia (Far East)].

The above first record from Sichuan is based on Fang 14128 (A).

Except for the smaller size of plant, the type collection of *Cardamine zhejiangensis* agrees very well with typical plants of *C. scutata*. The number of lateral leaf lobes varies a great deal among the annual species of *Cardamine*, and therefore it cannot be used as a reliable distinguishing character.

Cardamine dentipetala, described from Japan, differs from *C. scutata* only in having puberulent or pilose (vs. glabrous) fruit. However, some populations of *C. dentipetala* have plants with glabrescent or pilose fruit, and the distinction between the two species is clearly artificial.

