BRASSICACEAE (CRUCIFERAE)

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Herbs annual, biennial, or perennial, sometimes subshrubs or shrubs, with a pungent, watery juice. Eglan- dular trichomes unicellular, simple, stalked or sessile, 2- to many forked, stellate, dendritic, or malpighiaceous (medifixed, bifid, appressed), rarely peltate and scal- elike; glandular trichomes multicellular, with uniseriate or multiseriate stalk. Stems erect, ascending, or prostrate, sometimes absent. Leaves exstipulate, simple, entire or vari- ously pinnately dissected, rarely trifoliolate or pinnately, palmately, or bipinnately compound; basal leaf ros- sette present or absent; cauline leaves almost always alternate, rarely opposite or whorled, petiolate or sessile, sometimes absent.

Inflorescence bracteate or ebracteate racemes, corymbes, or panicles, sometimes flowers solitary on long pedicels originating from axes of rosette leaves. Flowers hypogynous, mostly actinomorphic. Sepals 4, in 2 deccussate pairs, free or rarely united, not saccate or lateral (inner) pair saccate. Petals 4, alternate with sepals, arranged in the form of a cross (cruciform; hence the earlier family name Cruciferae), rarely rudimentary or absent. Stamens 6, in 2 whorls, tetradynamous (lateral (outer) pair shorter than median (inner) 2 pairs), rarely equal or in 3 pairs of unequal length, sometimes stamens 2 or 4, very rarely 8–24; filaments slender, winged, or appended, median pairs free or rarely united; anthers di- thecal, deshiscing by longitudinal slits. Pollen grains 3-colpate, trinicate. Nectar glands rece-ptacular, highly diversified in number, shape, size, and disposition around base of filaments, always present opposite bases of lateral filaments, median glands present or absent. Pistil 2-car- pelled; ovary superior, sessile or borne on a distinct gynophore, mostly 2-locular and with a false septum connecting 2 placentae; placenta- tion parietal, rarely apical; ovules anatropous or campylotropous, bitegmic, 1 to many per locule. Fruit typically a 2-valved capsule, generally termed siliques (siliqua) when length 3 × or more than width, or silicle (silicula) when length less than 3 × width, dehiscent or indehiscent, sometimes schizocarpic, nutletlike, lomentaceous, or samaroid, segment- ed or not, terete, angled, or flattened parallel to septum (latiseptate) or at a right angle to septum (angustiseptate); valves 2 (or 3–6); replum (persistent placenta) rounded, rarely flattened or winged; septum complete, perforated, reduced to a rim, or lacking; style 1, distinct, obsolete, or absent; stigma capitulate or conical, entire or 2-lobed, sometimes lobes decurrent and free or connate. Seeds without endosperm, uniseriately or biseriately arranged in each locule, aseriate when 1, winged or wingless, mucilaginous or not when wetted; cotyledons incum- bent (embryo notorrhizal: radicle lying along back of 1 cotyledon), acumbent (embryo pleuorrhizal: radicle applied to margins of both cotyledons), or conduplicate (embryo orthoplo- chal: cotyledons folded longitudinally around radicle), rarely spirally coiled (embryo spiri- lobal). Germination epigeal.

About 330 genera and 3500 species: all continents except Antarctica, mainly in temperate areas, with highest diversity in Irano-Turanian, Mediterranean, and W North American regions; 102 genera (eight endemic) and 412 species (115 endemic) in China.

Because of lack of a comprehensive classification based on phylogenetic relationships among genera, and in order to facilitate direct comparison between the accounts in FOC and FRPS, the sequence of genera follows Schulz (Nat. Pflanzenfam. 17b: 227–658. 1936). However, it should be emphasized that his system is largely artificial because he placed closely related genera in different tribes and remotely related genera in the same tribe. For example, Arabis, Aubrieta, Draba, and Macrobdium, which are very closely related on the basis of recent molecular studies, were placed by Schulz in four different tribes, whereas the unrelated Capsella, Lepidium, and Thlaspi were placed in one tribe. The delimitation of genera is often difficult, and mature fruits are needed for reliable identification.

The Brassicaceae include many important crop plants that are grown as vegetables (Brassica, Nasturtium, Raphanus) and sources of vegetable oils (Brassica) and condiments (Armoracia, Brassica, Eutrema, Sinapis). Oils of Brassica probably rank first in terms of tonnage of the world’s production of edible oils. The family includes many ornamentals in the genera Erysimum, Iberis Linnaeus, Lobularia, Malcolmia, and Matthiola. Of these, only Lobularia maritima has become naturalized in China. The family also includes more than 120 species of weeds. Arabidopsis thaliana, which is naturalized in China, has become the model organism in many fields of experimental biology.

The delimitation of genera in the Brassicaceae is often difficult because of the frequent independent evolution of what appear to be similar character states, the variability of a given character in one genus and its fixture in another, and the inadequate sampling of material by most authors. Fruit characters are essential in the identification of genera. However, a key emphasizing flowering material is given in addition to the one emphasizing fruit. The most reliable determination of genera can be achieved when the material has both fruit and flowers and when both keys are successfully used to reach the same genus.

The types of cotyledonary position, which in reality is the position of the radicle in relation to the cotyledons (e.g., radicle acumbent, incumbent, or conduplicate, though radicle referred to as “cotyledon” throughout) are important in the separation of many genera, and a cross section of the seed provides the easiest and simplest way of determining that position. The exact number of ovules per ovary can easily be determined from the fruit because aborted ovules persist through fruit dehiscence. However, it is more laborious to determine the ovule number from pistils and young fruit.


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### Key to fruiting material

1a. Fruit silicles (less than 3 × longer than broad).

2a. Fruit much wider than long, 2–16-spined, with prominently 3–20-veined lateral wings larger than the seed-bearing part. .......................... 15. *Pugionium*

2b. Fruit longer than wide or about as long as wide, not spiny, wingless or with veinless wings smaller than the seed-bearing part.

3a. Fruit flattened at a right angle to septum (angustiseptate).

4a. At least some of the trichomes branched.

5a. Cauline leaves sessile, auriculate or sagittate at base; fruit obdeltoid to obdeltoid-obcordate. 19. *Capsella*

5b. Cauline leaves petiolate or cuneate to petiolelike base, not auriculate or sagittate; fruit oblong, elliptic, obovate, or suborbicular.

6a. Fruiting pedicels strongly recurved, often forming a loop; fruit 1- or 2-seeded, often aborted on 1 side; plants rhizomatous perennials. 23. *Dipoma*

6b. Fruiting pedicels straight, erect, ascending, or divaricate; fruit more than 5-seeded, not aborted on 1 side; plants annual, biennial, or rarely non-rhizomatous perennials.

7a. Fruiting raceme bracteate throughout or rarely along proximal half; leaves 1- or 2-pinnatisect; fruit more than 20-seeded. 20. *Hedinia*

7b. Fruiting racemes ebracteate; leaves entire, dentate, or pinnatifid; fruit less than 20-seeded. 21. *Hornungia*

4b. Trichomes absent or exclusively simple.

8a. Seeds (or ovules) 4–24 per fruit.

9a. Fruit borne on solitary pedicels originating from basal rosette. 44. *Pegaeophyton*

9b. Fruit borne on racemes, panicles, or corymbs.

10a. Cauline leaves sessile, auriculate, sagittate, or amplexicaul; roots not fleshy, cylindric; fruit often winged apically. 18. *Thlaspi*

10b. Cauline leaves petiolate or sessile but not auriculate, sagittate, or amplexicaul; roots fleshy, fusiform or conical; fruit wingless or cristate apically.

11a. Plants 0.5–2 m tall; infructescence a large panicle; replum slender, not flattened; racemes ebracteate. 42. *Armoracia*

11b. Plants rarely to 0.3 m tall; infructescence a small raceme or corymb; replum broad, flattened at least basally; racemes often bracteate throughout.

12a. Cauline leaves sessile; fruit often cristate apically; fruit valves obscurely veined; seeds minutely reticulate. 24. *Dilophia*

12b. Cauline leaves petiolate; fruit not cristate apically; fruit valves with a prominent midvein; seeds papillate or foveolate. 88. *Taphrospermum*

8b. Seeds (or ovules) 1 or 2 per fruit.

13a. Fruit didymous, breaking into 2, closed, 1-seeded halves.

14a. Fruit halves broadly winged, 8–40 mm; root fleshy, 1–15 cm in diameter. 16. *Megacarpaea*

14b. Fruit halves wingless, 1–2 mm; roots not fleshy, slender, much narrower.

15a. Dwarf plants rarely more than 3 cm tall; all or most fruit on solitary pedicels originating from basal rosette; leaves palmately veined; fruit halves smooth; stamens 6. 17. *Megadenia*

15b. Plants often more than 10 cm tall; fruit in racemes; leaves pinnately veined; fruit halves prominently reticulate to rugose, very rarely smooth; stamens 2 or 4. 11. *Coronopus*

13b. Fruit not didymous, dehiscent and readily releasing seeds, or indehiscent.

16a. Fruit 1-seeded, obscurely differentiated into halves, without a septum, indehiscent, with thickened, central, seed-bearing part; fruiting pedicels reflexed; petals yellow.

17a. Fruit navicular, semiovoid to semiglobose, with strongly involute wing margins bearing 1 or 2 rows of tubercles; fruiting pedicels articulate at base. 31. *Tauscheria*

17b. Fruit oblong, elliptic, ovate, or pyriform, flat, wingless or wing margins neither involute nor tuberculat; fruiting pedicels not articulate.

18a. Fruit samaroid, more than 6 mm, wing margin not thickened. 13. *Isatis*

18b. Fruit achenelike, rarely to 5 mm, wing margin strongly thickened. 14. *Pachypterygium*

16b. Fruit 2-seeded, well differentiated into halves, with a well-developed septum, dehiscent or rarely indehiscent, not thickened at center; fruiting pedicels not reflexed; petals white or pink (yellow in *Lepidium perfoliatum*).
19a. Fruit indehiscent; nectar glands confluent; style 0.7–2 mm ........................................ 12. Cardaria
19b. Fruit dehiscent; nectar glands separate teeth; style (ours) absent or to 0.8(–1) mm.
20a. Fruit somewhat 4-angled; leaves leathery; caudex thick, with petiolar remains of
previous years; stamens 6 ................................ ........................................................................ 27. Stroganowia
20b. Fruit flat, not angled; leaves herbaceous rarely leathery; caudex absent or slender, rarely
thick
and with petiolar remains of previous years; stamens 2, 4, or 6 ............................................. 10. Lepidium
3b. Fruit flattened parallel to septum (latiseptate), terete, or angled.
21a. Fruit on solitary pedicels originating from basal rosette.
22a. Plants glabrous or with simple trichomes only; leaves entire, rarely toothed or pinnately lobed.
23a. Fruit readily detached from pedicel; valve apex persistently united with replum; replum not
flattened; valves marginal veins prominent; petals purple, pink, or blue .................... 64. Solms-laubachia
23b. Fruit not detached from pedicel; valve apex readily separated from replum at dehiscence;
replum strongly flattened; valves marginal veins obscure or absent; petals white ............... 44. Pegaeophyton
22b. Plants with at least some branched trichomes; leaves subapically toothed.
24a. Fruit ovate or lanceolate, not geocarpic; valves prominently veined; stigma 2-lobed ....... 57. Desideria
24b. Fruit oblong, geocarpic; valves obscurely veined; stigma entire ............................... 84. Pycnoplinthopsis
21b. Fruit in racemes.
25a. Plants glabrous or with simple trichomes only.
26a. Fruit indehiscent, with a woody or corky wall, sometimes breaking transversely into
segments.
27a. Style slender, 1.5–3.5 mm, readily caducous from a basal articulation; replum strongly
expanded laterally ..................................................................................................................... 33. Litwinowia
27b. Style obsolete, or fruit attenuate into a conical, persistent, stylelike beak without a basal
articulation; replum not expanded laterally.
28a. Cauline leaves petiolate, not auriculate; plants 0.5 –2.5 m tall; fruit rounded at apex,
strongly differentiated into a seedless basal segment and a larger, 1-seeded terminal
segment ................................ ................................ ............................................................. 7. Crambe
28b. Cauline leaves sessile, auriculate to amplexicaul; plants rarely to 0.5 m tall; fruit tapered
to apex, unsegmented.
29a. Fruiting pedicels divaricate, not articulate at base; fruit 2-seeded, not constricted at
middle; cotyledons spirilobal; petals white .......................................................................... 35. Bunias
29b. Fruiting pedicels reflexed, articulate at base; fruit 1–3-seeded, constricted between
seeds; cotyledons incumbent; petals purplish or pink ......................................................... 82. Goldbachia
26b. Fruit dehiscent, with a papery or membranous wall.
30a. At least some leaves dentate, lobed, or compound.
31a. Some or all cauline leaves auriculate or sagittate at base; seeds more than 50 per fruit;
petals yellow .......................................................................................................................... 60. Rorippa
31b. Cauline leaves not auriculate or sagittate at base; seeds less than 25 per fruit; petals white,
blue, or purple.
32a. Leaves trifoliolate, pinnately compound, pinnatisect, or rarely simple; racemes
ebracteate, if bracteate, then basal bracts trifoliolate; fruiting pedicels glabrous or
pubescent all around; petals white ......................................................................................... 26. Yinshania
32b. Leaves palmately 3–5-lobed; racemes bracteate throughout; fruiting pedicels puberulent
adaxially; petals purple, blue, or rarely pink ................................................................. 28. Lignariella
30b. All leaves entire.
33a. Raceme bracteate throughout; fruit 1- or 2-seeded; valves with 3 rows of crests; filaments
of median stamens appendaged ......................................................................................... 22. Hemilophia
33b. Racemes ebracteate; fruit more than 2-seeded; valves without rows of crests; filaments of
median stamens unappendaged.
34a. Fruit (0.8–)1–1.7 cm wide; valves with prominent midvein and lateral and marginal veins,
apex persistently united with replum ........................................................................ 64. Solms-laubachia
34b. Fruit rarely to 0.3 cm wide; valves obscurely veined or only with a prominent midvein, apex readily separated from replum at dehiscence.

35a. Fruit slightly 4-angled, on a short gynophore; stems leafy; lowermost leaves cordate to ovate,

often palmitely veined .................................................................................................................. 89. Eutrema

35b. Fruit terete, sessile; stems leafless; lowermost leaves linear or oblong, pinnately veined ................................................................................................................................. 96. Braya

25b. Plants with at least some trichomes branched.

36a. Plants with glandular trichomes, if eglandular then fruit strongly reflexed.

37a. Plants with glandular trichomes, if eglandular then fruit strongly reflexed.

38a. Fruiting pedicels divaricate; trichomes simple and forked; seeds wingless, 1 or 2; cotyledons spiriloabral; petals bright yellow ................................................................. 35. Bunias

38b. Fruiting pedicels strongly reflexed; trichomes dendritic; seeds winged, often more than 2; cotyledons accumbent; petals yellowish white ................................................. 67. Microstigma

37b. Plants eglandular, fruit erect to divaricate.

39a. Cauline leaves sessile, auriculate or sagittate; style less than 1 mm; stigma entire; fruit readily detached from divaricate pedicels; petals yellow ......................................................... 34. Neslia

39b. Cauline leaves petiolate, not auriculate or sagittate; style 1–7 mm; stigma deeply 2-lobed; fruit not readily detached from erect-ascending pedicels; petals white or pink.

40a. Fruit densely covered with silky trichomes 5–8 mm; style (2.5–)4–7 mm; petals yellow .................. 35. Bunias

40b. Fruit scabrous with minute trichomes less than 1 mm; style less than 2 mm; petals white ........ 29. Lachnoloma

36b. Fruit dehiscent, with papery wall.

41a. Raceme bracteate throughout or at least along proximal half.

42a. Fruit 1- or 2-seeded.

43a. Fruit valves with 3 rows of crests; fruiting pedicels straight or slightly curved, not forming a loop; leaves entire; filaments of median stamens appendaged ............................................ 22. Hemilophia

43b. Fruit valves without crests; fruiting pedicels often forming a loop; at least some leaves dentate or lobed near apex; filaments of median stamens unappendaged .............................................. 23. Dipoma

42b. Fruit more than 4-seeded.

44a. Fruit latiseptate; trichomes forked or stellate; cotyledons accumbent ........................................ 41. Draba

44b. Fruit terete; trichomes dendritic; cotyledons incumbent ......................................................... 100. Sophiopsis

41b. Raceme ebracteate.

45a. Leaves 1- or 2-pinnatisect or 3–5-foliolate.

46a. Branched trichomes forked; inflorescence paniculate, ultimate branches flexuous .. 26. Yinshania

46b. Branched trichomes dendritic; inflorescence non-flexuous racemes, if branched then fruit more than 10-seeded.

47a. Annuals or biennials; seeds mucilaginous when wetted; petals yellow ......................... 100. Sophiopsis

47b. Pulvinate perennials; seeds not mucilaginous when wetted; petals white ............ 101. Smelowskia

45b. At least some of the branched trichomes simple or forked, stalked, not appressed.

48a. Cauline leaves auriculate or sagittate at base; fruit orbypiform; valves connate at margin and hiding replum, beaklike apex caudate, extending into style ......................................................... 98. Camelina

48b. Cauline leaves often neither auriculate nor sagittate at base; fruit variously shaped but not orbypiform; valve margins not connate, apex not extending into a caudate beak.

49a. Branched trichomes exclusively malpighiaceous.

50a. Fruit 1- or 2-seeded; seeds orbicular; simple trichomes absent ........................................ 38. Lobularia

50b. Fruit more than 4-seeded; seeds oblong or ovate; simple trichomes present ........ 41. Draba

49b. Branched trichomes stellate or forked.

51a. Branched trichomes exclusively stellate, sessile, appressed.

52a. Seeds broadly winged (wing to 1 mm wide); petals deeply bifid; filaments not toothed or winged ........................................................................................................ 37. Galitzky

52b. Seeds wingless or narrowly margined (margin to 0.1 mm wide); petals obtuse or emarginate; filaments often toothed or winged ........................................................................ 36. Alyssum

51b. At least some of the branched trichomes simple or forked, stalked, not appressed.

53a. Cauline leaves absent.
54a. Style conical or subconical; fruit 5–10 mm wide; cotyledons incumbent, if accumbent; then septum reduced to a rim ................................................................. 58. *Eurycarpus*

54b. Style obsolete or cylindric; fruit rarely to 4 mm wide; cotyledons accumbent. ................................................................. 41. *Draba*

53b. Cauline leaves present.

55a. Fruit 1- or 2(−4)-seeded; stamens often toothed or winged .......................... 36. *Alyssum*

55b. Fruit more than 4-seeded; stamens neither toothed nor winged.

56a. Fruit torulose; cotyledons incumbent ............................................................ 96. *Braya*

56b. Fruit not torulose, smooth; cotyledons accumbent.

57a. Annuals or biennials; petals deeply bifid; seed narrowly margined .......... 39. *Berteroa*

57b. Perennials, or if annuals then styles obsolete; petals obsolete or rarely emarginate, sometimes absent; seeds not margined.

58a. Plants stoloniferous; filament bases broadly dilated ........................................ 40. *Coelonema*

58b. Plants cespitose perennials or rarely annuals; filament bases not dilated. ........ 41. *Draba*

1b. Fruit siliques (more than 3 × longer than broad).

59a. Fruit borne on solitary pedicels originating from basal rosette.

60a. Plants with glandular trichomes; fruit lomentaceous, breaking into 1-seeded corky units .... 68. *Chorispora*

60b. Plants without glandular trichomes; fruit dehiscent, not breaking into units.

61a. Stigma conical, prominently 2-lobed, lobes decurrent; seeds often broadly winged ....... 72. *Leiospora*

61b. Stigma capitate, entire or slightly 2-lobed and lobes not decurrent; seeds wingless.

62a. Plants with branched trichomes.

63a. Leaves entire; plants ca. 2 cm tall .................................................................................. 86. *Baimashania*

63b. At least some leaves coarsely dentate; plants much coarser.

64a. Fruit strongly flattened; valves prominently veined, apex persistently united with replum; style obsolete; calyx deciduous before fruit maturity; cotyledons accumbent. ............. 57. *Desideria*

64b. Fruit terete; valves obscurely veined, readily separated from replum at dehiscence; style distinct; calyx persistent at fruit base; cotyledons accumbent .................................................. 84. *Pycnoplinthopsis*

62b. Plants glabrous or with simple trichomes only.

65a. Fruit valves obscurely veined; replum flattened; fruiting pedicels persistent next season, puberulent along 1 line .................................................................................. 44. *Pegaeophyton*

65b. Fruit valves prominently veined; replum terete; fruiting pedicels neither persistent nor puberulent along 1 line.

66a. Style obsolete; valve apex persistently united with replum; cotyledons accumbent 64. *Solms-laubachia*

66b. Style distinct, to 1 mm; valve apex readily separated from replum at dehiscence; cotyledons incipient .................................................................................. 85. *Pycnoplinthus*

59b. Fruit borne on racemes, corymbs, or panicles.

67a. Glandular trichomes present.

68a. Branched trichomes present.

69a. Fruit and fruiting pedicels strongly reflexed; cotyledons accumbent .................... 67. *Microstigma*

69b. Fruit and fruiting pedicels divaricate to ascending; cotyledons incumbent.

70a. Fruit valves with a prominent midvein; branched trichomes forked; stigma lobes decurrent; glands on uniseriate, few-celled stalks; median filaments not united ......................... 75. *Hesperis*

70b. Fruit valves not or obscurely veined; branched trichomes dendritic; stigma lobes not decurrent; glands on multiseriate, multicellular stalks; median filaments united in pairs .................... 81. *Oreoloma*

68b. Branched trichomes absent.

71a. Stigma slightly lobed, lobes neither decurrent nor connivent; median filaments united in pairs or strongly flattened; lateral sepals not saccate ......................................................... 63. *Dontostemon*

71b. Stigma prominently lobed; lobes decurrent, connivent; median filaments neither united nor strongly flattened; lateral sepals saccate.

72a. Fruit terete; seeds wingless.

73a. Fruit breaking transversely into 1-seeded corky units; style 1–9 mm; cotyledons accumbent 68. *Chorispora*

73b. Fruit dehiscent, not breaking into corky units; style obsolete; cotyledons incipient ....... 75. *Hesperis*

72b. Fruit (at least distal ones) flattened; seeds winged.
74a. Fruit dimorphic, lowermost indehiscent, corky, and terete; uppermost dehiscent and flattened; replum rounded ................................................................. 69. Diptychocarpus
74b. Fruit of 1 kind, dehiscent, flattened, terete; replum flattened.
75a. Cauline leaves absent, rarely few; fruit (2–)2.5–7 mm wide; seeds broadly winged, wing 0.5–3 mm wide ................................................................. 70. Parrya
75b. Cauline leaves several; fruit 1.5–2 mm wide; seeds narrowly winged, wing 0.1–0.4 mm wide.
76a. Basal leaves not rosulate; stigma capitate, lobes slightly decurrent ......................... 76. Clausia
76b. Basal leaves rosulate; stigma linear, lobes strongly decurrent .............................. 77. Pseudoclausia
67b. Glandular trichomes absent.
77a. Plants glabrous or with simple trichomes only.
78a. Fruit indehiscent, sometimes breaking transversely into corky, 1-seeded units.
79a. Cauline leaves auriculate or amplexicaul; style obsolete or rarely to 2 mm; lateral sepals not saccate.
80a. Fruit a samara, strongly angustiseptate, 1-seeded; petals yellow ................................. 13. Isatis
80b. Fruit nutletlike, terete or angled, 1–3 seeded, if 2- or 3-seeded then breaking transversely into 1-seeded units; petals purple or pink ........................................ 82. Goldbachia
79b. Cauline leaves not auriculate or amplexicaul; style distinct, 5–50 mm; lateral sepals often strongly saccate.
81a. Fruit 1-seeded, S-shaped, with a slender, stipelike base; fruiting pedicels articulate at base 30. Spirorhynchus
81b. Fruit more than 2-seeded, linear, lanceolate, or ovoid, sessile or nearly so; fruiting pedicels not articulate at base.
82a. Stigma capitate, entire or slightly lobed; cotyledons conduplicate; plants annual or biennial; petal veins darker in color than rest of petal ......................................................... 6. Raphanus
82b. Stigma conical, with prominently decurrent and connivent lobes; cotyledons accumbent; plants perennial; petals uniform in color .................................................. 68. Chorispora
78b. Fruit dehiscent.
83a. Raceme bracteate throughout or rarely only along proximal half.
84a. Cauline leaves palmately veined.
85a. Fruit flattened, valves coiled during dehiscence .................................................. 43. Cardamine
85b. Fruit terete or 4-angled, valves not coiled during dehiscence.
86a. Leaves with distinct apiculate callosities terminating ultimate veins .................. 89. Eutrema
86b. Leaves without apiculate callosities terminating ultimate veins.
87a. Taproot fleshy, fusiform; stigma 2-lobed; fruiting pedicels glabrous; cotyledons accumbent; median staminal filaments 1-toothed; petals white ........................................ 25. Platycraspedum
87b. Taproot not fleshy, slender; stigma entire; fruiting pedicels papillate adaxially; cotyledons incumbent; petals purple ................................................................. 28. Lignariella
84b. Cauline leaves pinnately veined.
88a. Fruit 90–200-seeded; plants annual ................................................................. 60. Rorippa
88b. Fruit 4–30-seeded; plants biennial or perennial with caudices, rhizomes, or fleshy taproots.
89a. Fruit valves with prominent midvein and marginal veins, apex persistently united with replum; at least some leaves dentate; fruit 14–26-seeded; style obsolete ...................... 57. Desideria
89b. Fruit valves usually obscurely veined, readily separated from replum at dehiscence; leaves entire; fruit 4–12-seeded; style more than 0.5 mm.
90a. Replum flattened; roots fleshy; plants without rhizomes or caudices; basal leaves not persistent ................................................................. 88. Taphrospermum
90b. Replum terete; roots not fleshy; plants with rhizomes or caudices; basal leaves or petioles often persistent.
91a. Fruit not torulose; cotyledons incumbent ...................................................... 45. Phaeonychium
91b. Fruit torulose; cotyledons accumbent ............................................................. 62. Lepidostemon
83b. Raceme ebracteate.
92a. Fruit angustiseptate ......................................................................................... 18. Thlaspi
92b. Fruit latiseptate, terete, or angled.
93a. Stigma conical or cylindric, with prominent, decurrent lobes.
94a. Fruit latiseptate; seeds broadly winged; cauline leaves absent or rarely few.
95a. Style distinct, 0.5–6 mm; valve apex readily separated at dehiscence from replum ... 70. Parrya
95b. Style absent; valve apex persistently united with replum ................................. 72. Leiospora
94b. Fruit terete or 4-angled; seeds wingless; cauline leaves several.
96a. Fruit not torulose, segmented, with stylelike, ensiform, 5-veined, terminal segment ... 5. Eruca
96b. Fruit torulose, unsegmented, with a distinct style 1–3 mm.
97a. Leaves pectinate-pinnatifid, terminal lobe about as large as lateral ones; cotyledons accumbent ............................... 63. Dontostemon
97b. Leaves simple or pinnatisect, terminal lobe considerably larger than lateral ones; cotyledons conduplicate ................................................................ 8. Orychophragmus
93b. Stigma capitulate, entire, or if lobed then lobes not decurrent.
98a. Cotyledons conduplicate; fruit often segmented, usually with a beaklike terminal segment; seeds globose, rarely ovoid, ellipsoid, or oblong.
99a. Fruit flattened; seeds biseriate ........................................................................ 4. Diplotaxis
99b. Fruit terete or 4-angled; seeds uniseriate.
100a. Fruit valves prominently 3–7-veined .............................................................. 3. Sinapis
100b. Fruit valves obscurely veined or only midvein prominent.
101a. Stigma entire; seeds globose; fruit often segmented, without style or with stylelike beak; petals yellow ............................................................... 2. Brassica
101b. Stigma distinctly 2-lobed, lobes subdecurrent; seeds oblong; fruit not segmented, with a distinct style; petals purple, lavender, or white ..................... 8. Orychophragmus
98b. Cotyledons accumbent or incumbent; fruit unsegmented, not beaked at apex; seeds variously shaped but never globose.
102a. Fruit valves without a midvein, always coiled during dehiscence; replum strongly flattened or winged ......................................................................................... 43. Cardamine
102b. Fruit valves with a prominent midvein or sometimes obscurely veined, never coiled during or after dehiscence; replum terete or rarely slightly flattened (a few Dontostemon).
103a. All leaves palmately veined, undivided and reniform, cordate, deltoid, or broadly ovate.
104a. Leaf margin with distinct, mucronate callosities terminating ultimate veins; fruit valves obscurely veined.
105a. Annuals; fruit more than 10-seeded; cotyledons accumbent .................. 47. Neomartinella
105b. Rhizomatous perennials; fruit less than 10 seeded; cotyledons incumbent ... 89. Eutrema
104b. Leaf margin without mucronate callosities; fruit valves prominently veined.
106a. Leaves flabellate, obovate, or spatulate; fruit latiseptate, valve apex persistently united with replum; cotyledons accumbent ...................................................... 57. Desideria
106b. Leaves reniform, ovate, or deltoid; fruit terete or 4-angled, valve apex readily separated from replum at dehiscence; cotyledons incumbent.
107a. Biennials; fruit torulose, valves 3-veined; seeds longitudinally striate .... 87. Alliaria
107b. Perennials; fruit not torulose, valves 1-veined; seeds reticulate ............... 89. Eutrema
103b. Leaves pinnately veined, pinnately divided, if undivided then shapes different from above.
108a. At least lowermost cauline leaves pinnatifid, pinnatisect, or pinnately compound.
109a. Fruit valves not veined or obscurely veined, if with a distinct midvein then seeds biseriate and colliculate.
110a. Leaves pinnatisect or lyrate; stems solid, not rooting from lowermost nodes; seeds foveolate or colliculate; petals yellow ......................................................... 60. Rorippa
110b. Leaves pinnately compound; stems hollow, rooting from lowermost nodes; seeds coarsely reticulate; petals white ......................................................... 61. Nasturtium
109b. Fruit valves with prominent midvein and marginal veins.
111a. Upper cauline leaves auriculate; stems distinctly angular ....................... 46. Barbarea
111b. Upper cauline leaves not auriculate; stems usually terete.
112a. Fruit flattened; stigma entire; cotyledons accumbent; petals white or pink 49. Sisymbriopsis
112b. Fruit terete; stigma 2-lobed; cotyledons incumbent; petals yellow .... 90. Sisymbrium
108b. Leaves entire or dentate.
113a. Cauline leaves absent.
114a. Fruit lanceolate, latiseptate; basal leaves setose-ciliate ............... 45. Phaeonychium
114b. Fruit ovoid, terete; basal leaves not setose-ciliate ........................ 96. Braya
113b. Cauline leaves present.
115a. Seeds foveolate or colliculate, 60–110 per fruit; petals yellow; cotyledons accumbent ........................ 60. Rorippa
115b. Seeds reticulate, fewer per fruit, (to 96 in Thellungiella salsuginea); petals white, lavender, or purple (yellow in Christolea); cotyledons incumbent (accumbent in some Dontostemon).
116a. Annuals.
117a. Raceme rachis with minute, twisted trichomes; plants not glaucous; cauline leaves not auriculate or amplexicaul; filaments of median stamens united in pairs ................................................................. 63. Dontostemon
117b. Raceme rachis glabrous; plants glaucous; cauline leaves auriculate or amplexicaul (except for Thellungiella parvula); filaments of median stamens free.
118a. Fruit 3–10 cm, valves with an obscure midvein; seeds 1.5–2 mm ... 9. Conringia
118b. Fruit 0.2–2 cm, valves with a prominent midvein; seeds 0.4–0.8 mm 97. Thellungiella
116b. Perennials.
119a. At least middle and lower cauline leaves petiolate, dentate; seeds transversely oriented in fruit; petals yellow ................................. 56. Christolea
119b. Leaves sessile, entire; seeds longitudinally oriented in fruit; petals white or purple.
120a. Seeds 20–60 per fruit; fruit terete or latiseptate; median staminal filaments united in pairs ......................................................................... 63. Dontostemon
120b. Seeds 2–10 per fruit; fruit slightly 4-angled; median staminal filaments free ................................ ................................................................. 89. Eutrema
77b. Plants with branched trichomes.
121a. Cauline leaves 1- or 2-pinnatisect or narrowly trifid.
122a. Fruit angustiseptate ................................................................................ 20. Hedinia
122b. Fruit terete or latiseptate.
123a. Fruit latiseptate; filaments of median stamens united in pairs.
124a. Fruit tardily dehiscent, not torulose; leaf segments filiform; stigma conical; seeds wingless ................................................................. 73. Leptaleum
124b. Fruit readily dehiscent, torulose; ultimate leaf segment oblong; stigma capitate; seeds narrowly winged distally ................................................................. 95. Synstemon
123b. Fruit terete or slightly 4-angled; filaments of median stamens free.
125a. Infructescence rachis flexuous; uppermost leaves narrowly trifid .................... 91. Ianhedgea
125b. Infructescence rachis straight; uppermost leaves pinnatisect, rarely pinnatifid.
126a. Dendritic trichomes absent; valves obscurely veined or not veined ............ 102. Sinosophiopsis
126b. Dendritic trichomes present; valves often prominently veined.
127a. Pulvinate perennials; petals white or rarely pale yellow; style 0.5–1.5 mm; seeds not mucilaginous when wetted ......................................................... 101. Smelowskia
127b. Annuals or biennials; petals yellow; style obsolete or rarely to 0.5 mm; seeds mucilaginous when wetted ................................. 100. Sophiopsis
128a. Fruit linear, 20–40-seeded, more than 1 cm, torulose ............................ 99. Descurainia
128b. Fruit obovoid to ellipsoid, rarely ellipsoid-linear, 4–16-seeded, rarely to 1 cm, not torulose ................................................................. 100. Sophiopsis
121b. Cauline leaves undivided, lyrate, or rarely pinnatifid.
129a. Fruit subapically 4-horned ..................................................................... 65. Tetracme
129b. Fruit not horned.
130a. Stigma conical, with strongly decurrent, connivent or united lobes.
131a. Fruit latiseptate; seeds broadly winged; trichomes stellate and/or dendritic; cotyledons accumbent.
132a. Perennials; fruit 6–11 cm × 1.5–2.7 mm; petals linear, circinately involute .... 66. Matthiola
132b. Annuals; fruit 3–5 cm × 3–6 mm; petals oblong-obovate to narrowly oblanceolate, flat 71. Cithareloma
131b. Fruit terete or 4-angled (latisepitate in *Malcolmia hispida* and *M. karelinii*); seeds wingless; trichomes simple and forked; cotyledons incumbent.

133a. Annuals; lateral sepals not saccate ................................................................. 74. *Malcolmia*
133b. Perennials or biennials; lateral sepals saccate .................................................. 75. *Hesperis*

130b. Stigma capitate, entire or slightly lobed, rarely with divergent lobes.

134a. At least fruit, pedicels, and distal portions of stem exclusively or predominately with malpighiaceous trichomes and without simple trichomes ones.
135a. Fruit indehiscent, breaking transversely into 1-seeded segments; septum absent; lowermost parts of plant with stalked trichomes ................................................................. 79. *Cryptospora*
135b. Fruit dehiscent; septum present; all parts of plant with sessile, appressed trichomes.
136a. Cotyledons accumbent; petals white becoming purple; anthers of median stamens 1-lobed ........................................................................................................... 78. *Atelanthera*
136b. Cotyledons incumbent; petals yellow or orange; anthers of median stamens 2-lobed 83. *Erysimum*

137a. Fruit (3–)3.5–7(–10) mm wide.
138a. Fruit on a recurved gynophore 3–5 mm; stamens long exserted, 7–10 mm ........ 1. *Macropodium*
138b. Fruit sessile; stamens included or slightly exserted, less than 7 mm.
139a. Racemes bracteate throughout .......................................................................... 57. *Desideria*
139b. Racemes ebracteate.
140a. Fruit strongly reflexed, 4-angled, indehiscent; seeds winged ......................... 67. *Microstigma*
140b. Fruit erect to divaricate, latisepitate, dehiscent; seeds wingless.
141a. Fruit margins strongly indurated, bases of valves and replum persistently united; petals white; filaments of median stamens winged ........................................... 62. *Lepidostemon*
141b. Fruit margins not indurated, bases of valves and replum readily separated at dehiscence; petals purplish; median stamens slender ........................................ 58. *Eurycarpus*

137b. Fruit to 2(–2.5) mm wide.
142a. Fruit indehiscent, breaking transversely into 1-seeded segments; filaments of median stamens united to middle or nearly to apex ........................................ 80. *Sterigmostemum*
142b. Fruit dehiscent; filaments of median stamens free, rarely united only at base (*Synstemon petrovii*).
143a. Seeds winged at least distally.
144a. Cotyledons incumbent; filaments of median stamens united at base; petal claws pilose ......................................................................................................................... 95. *Synstemon*
144b. Cotyledons accumbent; filaments of median stamens free; petal claws glabrous.
145a. Cauline leaves auriculate at base, or absent; valves obscurely veined or only midvein distinct; fruit elliptic-linear in cross section ......................................... 48. *Arabis*
145b. Cauline leaves petiolate; valves with prominent midvein and 2 marginal veins and conspicuous lateral ones; fruit rectangular in cross section .......... 49. *Sisymbriopsis*

143b. Seeds wingless.
146a. Fruit latisepitate.
147a. Fruiting stems leafless.
148a. Annuals or biennials.
149a. Fruit valve obscurely veined; seeds biseriate ................................................. 41. *Draba*
149b. Fruit valve with a prominent midvein; seeds uniseriate ................................ 55. *Drabopsis*
148b. Perennials with well-developed caudex.
150a. Seeds biseriate; petals yellow ......................................................................... 41. *Draba*
150b. Seeds uniseriate; petals white or pink.
151a. Plants robust, not pulvinate, 8–30 cm tall; cotyledons incumbent; petals 6.5–10 mm ........................................................................................................ 45. *Phaeonychium*
151b. Plants slender, pulvinate, to 2 cm tall; cotyledons accumbent; petals 3–4 mm .................................................................................................................. 86. *Baimashania*

147b. Fruiting stems leafy.
152a. Racemes bracteate throughout or at least along proximal part.
153a. Cotyledons accumbent; fruits often twisted; seeds biseriate ......................... 41. *Draba*
153b. Cotyledons incumbent; fruits not twisted; seeds uniseriate.
154a. Fruit linear; seeds uniseriate ........................................................................ 45. *Phaeonychium*
154b. Fruit lanceolate or elliptic; seeds biseriate ..................................................... 92. *Aphragmus*

152b. Racemes ebracteate.
155a. Plants exclusively with appressed, stellate trichomes; lateral sepals subsaccate; replum constricted between seeds; seeds 6–12 per fruit .... 54. *Stevenia*

155b. Plants with more than 1 kind of trichomes; lateral sepals often not sacate; replum not constricted between seeds; seeds (16–)20–80 per fruit.

156a. Seeds biseriate; fruit narrowly oblong, lanceolate, lanceolate-linear, or rarely linear, often slightly to strongly contorted ......................... 41. *Draba*

156b. Seeds uniseriate; fruit narrowly linear, not contorted.

157a. Cauline leaves sessile, auriculate, sagittate, or amplexicaul at base; at least some trichomes stellate .............................................................. 48. *Arabis*

157b. Cauline leaves petiolate, not auriculate at base; trichomes simple and forked

146b. Fruit terete or 4-angled.

158a. Cauline leaves sessile, auriculate, sagittate, or amplexicaul at base.

159a. Fruit nearly 4-angled, appressed to rachis; plants glaucous distally; cotyledons accumbent ......................................................................... 59. *Turritis*

159b. Fruit terete, variously oriented, if appressed to stem then racemes bracteate and/or fruit pubescent; plants not glaucous distally; cotyledons incumbent.

160a. Branched trichomes sessile, all stellate ......................... 53. *Pseudoarabidopsis*

160b. Branched trichomes forked, submalpighiaceous, subdendritic, and stellate, often more than 1 type present.

161a. Fruit with submalpighiaceous trichomes; petals yellow or rarely creamy white; racemes ebracteate ........................................ 52. *Olimarabidopsis*

161b. Fruit glabrous or with stellate or forked trichomes; petals purple, pink, or white; racemes often bracteate at least basally ............ 51. *Crucihimalaya*

158b. Cauline leaves petiolate or narrowed to a petiolelike base, never auriculate, or fruiting stems leafless.

162a. Fruit pubescent.

163a. Plants with exclusively stalked, stellate trichomes; filaments of median stamens strongly flattened or winged at base ........................................ 93. *Berteroella*

163b. Plants with a mixture of simple, forked, stellate, or submalpighiaceous trichomes; filaments of median stamens slender.

164a. Fruit linear, sometimes curved or twisted; stems often subdecumbent; plants annual, if perennial then racemes bracteate at least basally .......... 94. *Neotorularia*

164b. Fruit oblong, ovoid, or rarely linear; stems erect; plants perennial, with ebracteate racemes .............................................................. 96. *Braya*

162b. Fruit glabrous.

165a. Fruiting stems leafy.

166a. Plants with exclusively simple and forked trichomes; upper cauline leaves entire; seeds 0.3–0.5 mm .............................................................. 50. *Arabidopsis*

166b. Plants with some stellate and/or dendritic trichomes; at least some upper cauline leaves dentate, denticulate, or lobed; seeds larger .......... 51. *Crucihimalaya*

165b. Fruiting stems leafless.

167a. Annuals; fruit linear; fruiting pedicels nearly as wide as fruit .... 94. *Neotorularia*

167b. Perennials; fruit ovoid, oblong, or rarely linear; fruiting pedicels narrower than fruit .............................................................. 96. *Braya*

**Key to flowering material**

Leads marked with a club (***) indicate that mature fruits are necessary for the identification of genera in the subordinate couplet(s).

1a. Flowers on solitary pedicels originating from basal rosette.

2a. Stigma conical, with prominent, decurrent, connivent lobes; lateral sepals strongly saccate.

3a. Plants with glandular trichomes; leaves pinnatisect or pinnatifid ........... 68. *Chorispora*

3b. Plants eglandular; leaves entire or dentate ........................................ 72. *Leiospora*

2b. Stigma capitulate, entire, if 2-lobed (*Desideria*) then lobes neither decurrent not connivent; lateral sepals not saccate.

4a. Stigma distinctly 2-lobed; leaves subapically 3–9-toothed ........................................ 57. *Desideria*

4b. Stigma entire; leaves entire or laterally toothed, if subapically toothed then sepals united or petals yellow.

5a. Plants with branched trichomes.
6a. Annuals with submalpighiaceous trichomes; petals yellow; filaments of median stamens broadly winged ................................................................. 62. *Lepidostemon*

6b. Perennials without submalpighiaceous trichomes; petals white, pink, or purple; filaments of median stamens slender.

7a. Leaves entire; petals 3–4 mm; sepals free; dendritic trichomes absent .................. 86. *Baimashania*

7b. Leaves dentate; petals 6–13 mm; sepals united; dendritic trichomes present ...... 84. *Pycnoplinthopsis*

5b. Plants glabrous or with simple trichomes.

8a. Sepals united.

9a. Petioles ciliate; calyx lobes sparsely pilose; pedicels less than 1 cm ............... 64. *Solms-laubachia*

9b. Petioles and calyx lobes glabrous; pedicels 1.5–4 cm ........................................ 85. *Pycnoplinthus*

8b. Sepals free.

10a. Leaf margin with distinct, mucronate callosities at vein endings ................. 47. *Neomartinella*

10b. Leaf margin without mucronate callosities.

11a. Leaves palmately veined; ovary subdidymous, 2-ovuled; nectar glands 4 .......... 17. *Megadenia*

11b. Leaves pinnately veined; ovary not didymous, more than 2-ovuled; nectar glands 2 and lateral, or confluent and subtending bases of all stamens.

12a. Petals 1–2.5 cm; leaves entire; nectar glands 2, lateral .................................. 64. *Solms-laubachia*

12b. Petals usually less than 1 cm (rarely to 1.5 cm in *P. scapiflorum* subsp. *robustum*); leaves dentate, if entire then sepals to 3 mm; nectar glands confluent, subtending bases of all stamens 44. *Pegaeophyton*

1b. Flowers in racemes, corymbs, or panicles.

13a. Plants glabrous or with simple trichomes only.

14a. Stamens (8–)12–16(–24) ..................................................................................... 16. *Megacarpaea*

14b. Stamens 2, 4, or 6.

15a. Stamens 2.

16a. Fruit not didymous; lateral racemes absent ..................................................... 10. *Lepidium*

16b. Fruit didymous even when immature; lateral racemes present, leaf-opposed .......... 11. *Coronopus*

15b. Stamens 6 or rarely 4.

17a. Petals absent.

18a. Ovules 1 or 2 per ovary; pistil or fruit as long as wide ........................................ 10. *Lepidium*

18b. Ovules more than 16 per ovary; pistil or fruit considerably longer than broad.

19a. Plants glauces; rachis of raceme flexuous; leaves linear to linear-oblancoate ..... 97. *Thellungiella*

19b. Plants not glauces; rachis of raceme straight; leaves differently shaped ........... 60. *Rorippa*

17b. Petals present.

20a. Filaments of median stamens united ................................................................. 63. *Dontostemon*

20b. Filaments of median stamens free.

21a. Plants with glandular trichomes.

22a. Stigma entire or subentire; lateral sepals not saccate.

23a. Leaves entire; ovary globose; pedicels articulate at base ............................... 33. *Litwinowia*

23b. Leaves dentate, serrate, or pinnatifid; ovary linear; pedicels not articulate at base 63. *Dontostemon*

22b. Stigma strongly 2-lobed, capitulate, conical, or linear; lateral sepals strongly saccate.

24a. Stigma capitulate; lobes neither connivent nor decurrent.

25a. Petals oblong-oblancoate, 0.7–1 cm; style usually more than 2 mm ............. 69. *Diptychocarpus*

25b. Petals obovate, 1.1–2.5 mm; style less than 2 mm ........................................... 76. *Clausia*

24b. Stigma conical or linear; lobes strongly connivent and connivent.

26a. Petals yellow, if purple then to 1 cm; anthers oblong, 0.5–1.5(–2) mm ............. 68. *Chorispora*

26b. Petals purple; anthers linear or rarely oblong-linear, (2.5–)3–5 mm.

27a. Perennials; flowering stems leafless ................................................................. 70. *Parrya*

27b. Annuals or biennials; flowering stems leafy.

28a. Petals obovate, 5–10 mm wide; glandular trichomes on few-celled, uniseriate stalks ...................................................................................... 75. *Hesperis*

28b. Petals linear or linear-oblancoate, 1.5–3 mm wide; glandular trichomes on multicellular, multiseriate stalks .............................................. 77. *Pseudoclausia*

21b. Plants without glandular trichomes.

29a. Stigma conical, with decurrent, connivent lobes.

30a. Annuals or biennials, rarely rhizomatous perennials; flowering stems several to many leaved;

basal leaves not rosulate.
31a. Terminal lobe of basal and lowermost cauline leaves about same size as lateral lobes; filaments of median stamens flattened, sometimes 1-toothed .......................... 63. *Dontostemon*

31b. Terminal lobe of basal and lowermost cauline leaves considerably larger than lateral lobes, sometimes lateral lobes absent; filaments of median stamens slender, not toothed.

32a. Petals yellow with dark brown or purple veins; anthers obtuse; uppermost leaves subsessile ................................................................. 5. *Eruca*

32b. Petals white, lavender, or purple, without darker veins; anthers apiculate; uppermost cauline leaves petiolate, sometimes also auriculate ........................... 8. *Orychophragmus*

30b. Perennials with a distinct caudex; flowering stems leafless, rarely 1- or 2-leaved; basal leaves rosulate.

33a. Style absent; leaf blade about as long as broad ...................................................... 72. *Leiospora*

33b. Style distinct; leaf blade much longer than broad.

34a. Ovaries and fruit torulose; petal claws to 8 mm; seeds wingless ........................ 68. *Chorispora*

34b. Ovaries and fruit not torulose; petals claws longer; seeds winged even at early stages of development ................................................................. 70. *Parrya*

29b. Stigma capitate, entire, if lobed then lobes neither connivent nor decurrent (rarely slightly decurrent in *Eruca* and *Orychophragmus*).

35a. Lateral pair of sepals slightly to strongly saccate.

36a. Sepals united; developing and mature fruit winged and/or spiny ......................... 15. *Pugionium*

36b. Sepals free; fruit wingless, not spiny.

37a. Petals yellow.

38a. Cauline leaves sessile, auriculate or amplexicaul; petals without darker colored veins.

39a. Cauline leaves entire; petals (7–)9–30 mm .......................................................... 2. *Brassica*

39b. Cauline leaves coarsely dentate, pinnatifid, or pinnatisect; petals 3–6(–7) mm 46. *Barbarea*

38b. At least some cauline leaves petiolate, not auriculate or amplexicaul; petals with darker colored veins.

40a. Style 2-lobed, lobes slightly decurrent; pistil sessile ........................................ 5. *Eruca*

40b. Style entire; pistil short stipitate on a sterile lower segment ........................ 6. *Raphanus*

37b. Petals purple, lavender, pink, or white.

41a. Pedicels articulate at base; ovaries and young fruit ovoid to oblong.

42a. Cauline leaves entire or rarely dentate, auriculate; style obsolete .............. 82. *Goldbachia*

42b. Cauline leaves dentate, sinuate, or pinnately lobed, not auriculate; style prominent

................................ ................................ ................................................... 30. *Spirorhynchus*

41b. Pedicels not articulate at base; ovaries and young fruit linear.

43a. Stigma entire; pistil short stipitate on a sterile lower segment ................. 6. *Raphanus*

43b. Stigma 2-lobed, lobes slightly decurrent; pistil sessile ............................. 8. *Orychophragmus*

35b. Lateral pair of sepals not saccate.

44a. Petals yellow.

45a. Cauline leaves sessile, auriculate, sagittate, or amplexicaul.

46a. Leaves strongly dimorphic, basal and lowermost cauline ones 2- or 3- pinnatifid or -pinnatisect, uppermost entire ......................................................... 10. *Lepidium*

46b. Leaves usually monomorphic, undivided, if divided than basal and lowermost cauline ones not as above.

47a. At least some cauline leaves coarsely dentate to pinnately divided; ovaries and young fruit with numerous ovules ........................................ 60. *Rorippa*

47b. Cauline leaves entire; ovaries and young fruit 1(or 2)-ovuled.***

48a. Racemes few, not grouped in panicles; young or mature fruit navicular, with incurved margins ................................................................. 31. *Tauscheria*

48b. Racemes often many, grouped in panicles; fruit flat, not navicular.

49a. Fruit margin thickened; petals to 2 mm ......................................................... 13. *Pachypterygium*

49b. Fruit margin not thickened; petals more than 2 mm, if shorter (*Isatis minima*) then pistils and developing fruit distinctly longer than broad ........................................ 13. *Isatis*

45b. Cauline leaves petiolate, if sessile then not auriculate, sagittate, or amplexicaul.

50a. Cespitose perennials (2–)3–12(–17) cm tall; ovaries and young fruit ovoid .......... 96. *Braya*
50b. Annuals or biennials, rarely noncespite perennial, often much taller; ovaries and young fruit linear.

51a. Stigma entire.

52a. Stems often leafless, rarely few leaved; nectar glands 4, separated .......... 44. *Diplotaxis*

52b. Stems leafy; nectar glands confluent, subtending bases of all filaments .......... 60. *Rorippa*

51b. Stigma 2-lobed.

53a. Nectar glands confluent, subtending bases of all filaments; seeds oblong; cotyledons incipient ................................................................. 90. *Sisymbrium*

53b. Nectar glands 4, not confluent; seeds globose; cotyledons conduplicate.***

54a. Fruit valves obscurely veined or with a prominent midvein ......................... 2. *Brassica*

54b. Fruit valves with 3–7, prominent longitudinal veins ..................................... 3. *Sinapis*

44b. Petals purple, lavender, pink, or white.

55a. Racemes bracteate throughout or along proximal half.

56a. Leaves and bracts palmately veined or trifoliolate.

57a. Bracts and/or uppermost leaves trifoliolate ........................................... 26. *Yinshania*

57b. Bracts and uppermost leaves simple.

58a. Petals purple or rarely pink; pedicels puberulent adaxially along entire length 28. *Lignariella*

58b. Petals white; pedicels glabrous.

59a. Filaments of median stamens strongly flattened, 1-toothed; stigma 2-lobed 25. *Platycraspedum*

59b. Filaments of median stamens slender, toothless; stigma entire.

60a. Leaf margin with mucronate callosities at vein endings; ovules 6–10 per ovary ................................................................. 89. *Eutrema*

60b. Leaf margin without mucronate callosities; ovules more than 14 per ovary 43. *Cardamine*

56b. Leaves and bracts pinnately veined.

61a. Filaments of median stamens winged, toothed, or appendaged.

62a. Petals emarginate, 4–5.5 mm wide; ovules 2 per ovary ....................... 22. *Hemilophia*

62b. Petals obtuse; ca. 2.5 mm wide; ovules ca. 8 per ovary ................. 62. *Lepidostemon*

61b. Filaments of median stamens slender, not toothed or appendaged.

63a. Plants with a distinct caudex; stigma 2-lobed.

64a. Leaves entire; ovules 4–8 per ovary; nectar glands confluent, subtending bases of all filaments ................................................................. 45. *Phaeonychium*

64b. Leaves dentate; ovules 14–26 per ovary; nectar glands 2, lateral .......... 57. *Desideria*

63b. Plants with a fleshy, obconical to fusiform taproot; stigma entire.

65a. Cauline leaves sessile; racemes not elongated in fruit; anthers distinctly apiculate at apex ........................................................................... 24. *Dilophia*

65b. Cauline leaves petiolate; racemes often elongated in fruit; anthers obtuse at apex ................................................................. 88. *Taphrospermum*

55b. Racemes ebracteate.

66a. Some or all leaves trifoliolate, pinnately compound, or pinnatisect.

67a. Petals purple or pink; ovaries and fruit didymous; ovules 2 per ovary; taproot thick, 1–4 cm in diam. ................................................................. 16. *Megacarpaea*

67b. Sepals, petals, and stamens spreading; petals 1.5–3.5(–4) mm; ovules often 10 or less per ovary ................................................................. 26. *Yinshania*

68a. Sepals, petals, and stamens usually erect to ascending; petals more than 4 mm (except in weedy spp. of *Cardamine*); ovaries more than 14 per ovary.***

69a. Fruit latiseptate, valves coiled during dehiscence; seeds uniseriate ...... 43. *Cardamine*

69b. Fruit terete, valves not coiled during dehiscence; seeds (ours) biseriate 61. *Nasturtium*

66b. Leaves simple, entire, dentate, lyrate, or rarely pinnatifid.

70a. Ovules 2 per ovary.

71a. Filaments of median stamens with a lateral tooth 0.5–1 mm; pistil 2-segmented ................................................................. 7. *Crambe*

71b. Filaments of median stamens toothless; pistil unsegmented.

72a. Leaves palmately veined ................................................................. 89. *Eutrema*
72b. Leaves pinnately veined.
73a. Nectar glands confluent, subtending bases of all filaments.
74a. Racemes many, grouped in corymbose panicles; plants often densely pubescent ................................................................. 12. Cardaria
74b. Racemes few, not grouped in panicles; plants glabrous or sparsely pilose 35. Bunias
73b. Nectar glands 4 or 6, distinct.***
75a. Fruit 4-angled; caudex thick, with petiolar remains of previous years; racemes grouped in panicles ........................................... 27. Stroganowia
75b. Fruit flat; caudex often thin, with or without petiolar remains of previous years; racemes simple, rarely grouped in corymbose panicles .......... 10. Lepidium

70b. Ovules 4 or more per ovary.
76a. Leaves palmately veined.
77a. Leaf margin with apiculate callosities at vein endings, if without then ovules 10 or less.
78a. Pistil linear; ovules (20–)30–40 per ovary ........................................ 47. Neomartinella
78b. Pistil oblong; ovules 4–10 per ovary ........................................ 89. Eutrema
77b. Leaf margin without apiculate callosities at vein endings.
79a. Perennials; fruit flattened; seeds reticulate ........................................ 43. Cardamine
79b. Biennials; fruit quadrangular-subterete; seeds longitudinally striate ...... 87. Alliaria
76b. Leaves pinnately veined.
80a. Cauline leaves auriculate, sagittate, or amplexicaul at base, if not (Thellungiella parvalata) then petals to 1.5 mm and racemes flexuous.
81a. Petals purple, 10–17 mm; perennials with stout rhizomes ................. 43. Cardamine
81b. Petals white, lavender, pink, or rarely purple, 1.5–7 mm; annuals, biennials, or perennials with a slender caudex.
82a. Plants not glaucous; pistil and young fruit angustiseptate ..................... 18. Thlaspi
82b. Plants glaucous; pistil and young fruit terete or latiseptate.
83a. Petals 5–7 mm, with purple veins extending to apex; leaves deeply cordate-amplexicaul ......................................................... 9. Conringia
83b. Petals 1.5–3 mm, without purple veins; leaves auriculate or not, rarely deeply sagittate-amplexicaul .......................................... 97. Thellungiella
80b. Cauline leaves not auriculate or sagittate, or absent.
84a. Cauline leaves absent or 1 or 2, entire.
85a. Cauline leaves absent, basal ones setose ciliate; stigma 2-lobed; nectar glands confluent, subtending bases of all stamens ....................... 45. Phaeonychium
85b. Cauline leaves 1 or 2, rarely absent, basal ones pilose or crisped pubescent; stigma entire; nectar glands 2 or 4, lateral.
86a. Petals 10–17 mm; fruit flat, prominently veined, 10–30 mm 64. Solms-laubachia
86b. Petals 4–6 mm; fruit terete, not veined, 4–7 mm ............................. 96. Braya
84b. Cauline leaves several, dentate, crenate, or pinnatifid.
87a. Racemes in large corymbose panicles; fruit angustiseptate; leaves polymorphic on same plant ......................................................... 42. Armoracia
87b. Racemes simple; fruit latiseptate; leaves not polymorphic.
88a. Stigma 2-lobed; petals purple, 10–15 mm .................................... 57. Desideria
88b. Stigma entire; petals white, 2.5–8(–10) mm.***
89a. Anthers obtuse at apex; fruit with a prominent midvein and marginal veins; cotyledons accumbent ................................. 49. Sisymbriopsis
89b. Anthers apiculate at apex; fruit obscurely veined or only with a distinct midvein; cotyledons incipient ........................................... 56. Christolea

13b. Plants with branched trichomes.
90a. Petal claws crisped pilose; filaments of median stamens united at base ........................................... 95. Systemon
90b. Petal claws glabrous or petals absent; filaments of median stamens free, if united then stigma strongly 2-lobed.
91a. Cauline leaves 1–3-pinnatisect, narrowly trifid, or 3–5-foliolate.
92a. Pulvinate perennials with thick caudices covered with petiolar remains of previous years 101. Smelowskia
92b. Annuals, biennials, or non-pulvinate perennials, without petiolar remains of previous years.
93a. Flowers yellow.
94a. Pistil and fruit linear; ovules 20–40 per ovary; raceme ebracteate ......................... 99. Descurainia
94b. Pistil and fruit obovoid to ellipsoid; ovules 16 or less per ovary; raceme bracteate, if not then ovules 4–8 per ovary ................................................................. 100. *Sophiopsis*

93b. Flowers white, pink, or lavender.

95a. Racemes bracteate throughout or at least along proximal half.
96a. Pistil oblong to suborbicular; fruit angustiseptate ................................ 20. *Hedinia*
96b. Pistil linear; fruit terete .......................................................... 102. *Sinosophiopsis*

95b. Racemes ebracteate.
97a. Stigma conical, 2-lobed; filaments of median stamens united ..................... 73. *Leptaleum*
97b. Stigma capitate, entire; filaments of median stamens free.
98a. Racemes grouped in panicles; ovary and fruit ellipsoid ................................ 26. *Yinshania*
98b. Racemes simple; ovary and fruit linear.
99a. Rachis of raceme flexuous; ovules 6–20 per ovary; trichomes exclusively dendritic; uppermost leaves narrowly trifid ....................................................... 91. *Ian hedgea*
99b. Rachis of raceme straight; ovules 20–40 per ovary; trichomes simple and forked; uppermost cauline leaves pinnatisect ................................ 102. *Sinosophiopsis*

91b. Cauline leaves undivided, lyrate, or pinnatifid.

100a. Plants exclusively or at least uppermost parts with malpighiaceous trichomes.

101a. Flowers yellow.
102a. Pistil and fruit oblong; seeds biseriate; cotyledons accumbent .................... 41. *Draba*
102b. Pistil and fruit linear; seeds uniseriate; cotyledons incumbent .................... 83. *Erysimum*

101b. Flowers white, lavender, pink, or purple.

103a. Raceme bracteate throughout; rhizomatous perennials; filaments of median stamens inflated basally ................................................................. 22. *Hemilophia*
103b. Raceme ebracteate; annuals; filaments of median stamens not inflated basally.

104a. At least lowermost parts with simple and stalked forked trichomes; fruit indehiscent, breaking at maturity into 1-seeded segments; stigma 2-lobed; seeds 2.5–3.5 mm .............. 79. *Cryptospora*
104b. Trichomes exclusively malpighiaceous; fruit dehiscent; stigma entire; seeds 0.7–1.4(–2) mm.

105a. Pistil and fruit lenticular, ovate, or suborbicular; anthers of median stamens 2-lobed; ovules 2 per ovary; raceme many flowered ............................................................. 38. *Lobularia*
105b. Pistil and fruit linear; anthers of median stamens 1-lobed; ovules 10–25 per ovary; raceme 2–5-flowered ............................................................. 78. *Atelanthera*

106a. Sepals united ................................................................. 57. *Desideria*
106b. Sepals free.

107a. Cauline leaves auriculate, sagittate, or amplexicaul.

108a. Ovary and fruit oblong to ovate; seeds biseriate ............................................. 41. *Draba*
108b. Ovary and fruit of other shapes; seeds uniseriate.

109a. Flowers pale to bright yellow.

110a. Ovary and fruit globose, sublenticular, or obpyriform; nectar glands 2 or 4, lateral, median glands absent.

111a. Fruit globose or sublenticular, 1.7–2.2 mm; ovules 2–4 per ovary; stamens slightly tetradynamous ............................................................. 34. *Neslia*
111b. Fruit obpyriform, larger; ovules numerous per ovary; stamens in 3 pairs of unequal length ............................................................. 98. *Camelina*

110b. Ovary and fruit linear; nectar glands confluent, subtending bases of all filaments.

112a. Plants pubescent with short-stalked or subsessile stellate trichomes; fruit pubescent; pedicels divaricate ........................................................... 52. *Olimarabidopsis*
112b. Plants glabrous and glaucous distally, pubescent with simple and forked trichomes basally; fruit glabrous; pedicels appressed to rachis ................................ 59. *Turritis*

109b. Flowers white, pink, or purple.

113a. Pistil and fruit obdeltoid to obcordate-obdeltoid ............................................ 19. *Capsella*
113b. Pistil and fruit linear.

114a. Plants with exclusively stellate, appressed, sessile trichomes ........ 53. *Pseudoarabidopsis*
114b. Plants with more than 1 kind of trichomes.
115a. Fruit latisepate; cotyledons accumbent ........................................ 48. Arabis
115b. Fruit terete; cotyledons incumbent .............................................. 51. Crucihimalaya
107b. Cauline leaves petiolate, tapered to a petioloike base, or sessile but not auriculate or sagittate, sometimes absent and flowering stems leafless.
116a. Shrubs or subshrubs ........................................................................ 48. Arabis
116b. Herbs.

117a. Filaments of median stamens united to apex or rarely only to middle.
118a. Plants without glandular trichomes; lateral sepals not saccate; fruit indehiscent, breaking at maturity into 1-seeded segments ........................................... 80. Sterigmostemum
118b. Plants sparsely to densely covered with glandular trichomes; lateral sepals saccate; fruit tardily dehiscent ................................................... 81. Oreoloma

117b. Filaments of median stamens free.
119a. Petals deeply bifid.
120a. Perennials with a distinct caudex; trichomes exclusively stellate, appressed; lateral sepals saccate ........................................................................ 57. Galitzkya
120b. Annuals or biennials; trichomes a mixture of simple, forked, and stellate; lateral sepals not saccate ....................................................... 39. Berteroa

119b. Petals undivided, entire or emarginate, or absent.
121a. Ovaries and fruit about as long as broad or slightly longer, rarely to 3× longer.
122a. Raceme bracteate throughout or rarely along proximal half.
123a. Plants stoloniferous; ovules 2 or 4 per ovary.
124a. Leaves entire; filaments of median stamens appendaged; nectar glands confluent, subtending bases of all stamens .......................................... 22. Hemilophia
124b. Leaves dentate; filaments of median stamens unappendaged; nectar glands 4, lateral, median glands absent ............................................. 23. Dipoma
125a. Petals yellow; plants coarsely pilose; cotyledons accumbent .............. 41. Draba
125b. Petals purple or white; plants minutely puberulent; cotyledons incumbent 92. Aphragmus
122b. Raceme ebracteate.
126a. Lateral sepals saccate; stigma 2-lobed; petals linear, strongly differentiated into claw and limb, 0.7–1.5 cm.
127a. Petals pink, 7–10 mm; plants without glandular trichomes; fruiting pedicels erect-ascending; fruit densely white silky ........................................ 29. Lachnoloma
127b. Petals yellowish to creamy white, 10–15 mm; plants often with glandular trichomes; fruiting pedicels reflexed; fruit not silky ....................... 67. Microstigma
126b. Lateral sepals not saccate; stigma entire, if 2-lobed (Euclidium) then petals less than 1.5 mm; petals variously shaped and often smaller, if linear then not differentiated into claw and limb, sometimes absent.
128a. Plant with glandular trichomes ........................................................................ 35. Bunias
128b. Plant without glandular trichomes.

129a. Filaments winged, appendaged, toothed, or papillate ....................... 36. Alyssum
129b. Filaments slender, unappendaged, toothless, glabrous.
130a. Annuals.
131a. Stigma 2-lobed; petals less than 1.5 mm; fruit indehiscent .......... 32. Euclidium
131b. Stigma entire; petals more than 1.5 mm, if less or absent then ovary more than 6-ovuled; fruit dehiscent.
132a. Ovules 4 per ovary or fruit ..................................................................... 36. Alyssum
132b. Ovules 8 or more per ovary or fruit.
133a. Petals 0.6–1.2 mm; fruit angustiseptate; cotyledons incumbent 21. Hornungia
133b. Petals larger, rarely absent; fruit latisepate; cotyledons accumbent 41. Draba
130b. Perennials.
134a. Plants stoloniferous; bases of median filaments broadly dilated ... 40. Coelonema
134b. Plants cespitose, often with a distinct caudex; bases of median filaments not dilated.***

135a. Fruit 5–10 mm wide; style conical or subconical .................................. 58. Eurycarpus
135b. Fruit rarely to 4 mm wide, if wider then stems leafy; style obsolete or cylindric.
136a. Fruit torulose; cotyledons incumbent ............................................... 96. Braya
136b. Fruit not torulose; cotyledons accumbent ........................................ 41. Draba

121b. Ovaries and fruit at least 5 × longer than broad.
137a. Stigma conical, lobes decurrent, connivent; sepals erect.
138a. Annuals; anthers 0.3–1.2 mm.
139a. Lateral sepals not saccate; fruit 0.5–1.7 mm wide; seeds wingless ....... 74. Malcolmia
139b. Lateral sepals strongly saccate; fruit 3–6 mm wide; seeds winged ..... 71. Cithareloma
138b. Perennials or biennials; anthers 2.5–4 mm.
140a. Petals linear, circinately involute; seeds winged; cotyledons accumbent 66. Matthiola
140b. Petals obovate, flat; seeds wingless; cotyledons incumbent ............... 75. Hesperis

137b. Stigma capitulate, entire, if lobed then lobes neither decurrent nor connivent; sepals ascending or slightly spreading.
141a. Petals less than 1.5 mm; mature ovaries and young fruits with 4, subapical horns .............................................................................................................. 65. Tetracme
141b. Petals more than 1.8 mm; ovaries and fruits without horns.
142a. Stems leafless.
143a. Petals yellow; nectar glands 2 or 4, lateral.***
144a. Biennial, perennial, or rarely annual; seeds biseriate; fruit valves obscurely veined .............................................................. 41. Draba
144b. Annuals; seeds uniseriate; fruit valves with a distinct midvein ......... 45. Phaeonychium
143b. Petals white, lavender, or pink; nectar glands confluent, subtending bases of all filaments.***
145a. Fruit valves with prominent midvein and marginal veins; cotyledons incumbent ................................................................. 45. Phaeonychium
145b. Fruit valves obscurely veined or only midvein distinct; cotyledons accumbent ............................................................................... 48. Arabis

142b. Stems leafy.
146a. Pistils and fruit on a distinct gynophore to 5 mm; petals linear to linear-oblong, length 9–12 × width ............................................... 1. Macropodium
146b. Pistil and fruit sessile; petals suborbicular, spatulate, oblanceolate, or rarely oblong, length-width ratio much less.
147a. Petals yellow ................................................................ ............................ 41. Draba
147b. Petals white, lavender, or purple.
148a. All cauline leaves entire.
149a. Annuals; cotyledons incumbent.
150a. Trichomes simple and forked; style to 0.5 mm; ovules 40–70 per ovary ................................................................................. 50. Arabidopsis
150b. Trichomes mostly stellate, 4–6-rayed; style (1–)1.5–2.5 mm; ovules 6–14 per ovary ................................................................. 93. Berteroella
149b. Perennials; cotyledons accumbent.
151a. Trichomes a mixture of simple, forked, or stellate ...................... 41. Draba
151b. Trichomes exclusively stellate ....................................................... 54. Stevenia
148b. At least some cauline leaves dentate or lobed.
152a. Filaments of median stamens winged basally; valves with thickened margin, base united persistently with replum ...................... 62. Lepidostemon
152b. Filaments of median stamens not winged; fruit valves not thickened at margin, base readily separated from replum at dehiscence.
153a. Pistil or fruit glabrous.
154a. Trichomes exclusively simple and forked ............................ 50. Arabidopsis
154b. At least some trichomes stellate or dendritic.***
155a. Fruit terete; cotyledons incumbent ........................................... 51. Crucihimalaya
155b. Fruit latiseptate; cotyledons accumbent.
156a. Seeds biseriate, wingless ......................................................... 41. Draba
156b. Seeds uniseriate, winged or margined at least distally ............. 48. Arabis
153b. Pistil or fruit pubescent.
157a. Nectar glands 2 or 4, lateral, median glands absent; stigma often entire.***
158a. Fruits latiseptate, not torulose; cotyledons accumbent; seeds biseriate ......................................................... 41. Draba
158b. Fruits terete, torulose; cotyledons incumbent; seeds uniseriate 94. Neotorularia
157b. Nectar glands confluent, subtending bases of all filaments; stigma often 2-lobed.
159a. Petals 6–9 mm; cotyledons incumbent ..................... 45. Phaeonychium
159b. Petals 2–4 mm (unknown in Desideria stewartii); cotyledons accumbent.***
160a. Valve apex readily separated from replum during dehiscence; fruiting pedicels appressed to rachis ................. 49. Sisymbriopsis
160b. Valve apex persistently united with replum; fruiting pedicels not appressed to rachis ................................... 57. Desideria


Herbs perennial, rhizomatous, puberulent. Trichomes simple and minutely forked. Stems erect, unbranched. Basal leaves long petiolate, rosulate, simple, entire, serrate, or denticulate. Cauline leaves petiolate, uppermost sessile, not auriculate, entire or serrate. Racemes numerous flowered, dense, ebracteate or rarely lowermost few flowers bracteate, elongated in fruit. Fruiting pedicels slender or thickened, divaricate. Sepals oblong-linear, base of lateral pair not saccate, margin narrowly membranous. Petals white; blade linear-oblong or linear-lanceolate, apex obtuse; claw shorter than sepals. Stamens 6, distinctly exserted, subequal in length; filaments dilated at base, filiform; anthers oblong-linear, twisted after dehiscence, obtuse at apex. Nectar glands 2, lateral, semiannular or annular; median glands absent. Ovules 8–22 per ovary. Fruit dehiscent siliques, linear, strongly latiseptate; valves papery, with a prominent midvein and distinct lateral veins, glabrous, torulose; gynophore 0.3–3 cm; replum rounded; septum complete, membranous, translucent, veinless; style obsolete, rarely to 1 mm, subconical; stigma capitate, entire. Seeds uniseriate, winged, ovate or orbicular, strongly flattened; seed coat smooth, not mucilaginous when wetted; cotyledons accumbent.

Two species: China, Japan, Kazakhstan, Mongolia, Russia; one species in China.


Herbs (20–)30–50(–63) cm tall, sparsely puberulent with trichomes ca. 0.1 mm. Stems glabrous basally, puberulent above. Basal leaves rosulate; petiole (1–)3–10(–15) cm; leaf blade oblong, elliptic, or lanceolate, 3–8 × (1.5–)2–3.5 cm, glabrous or margin puberulent, base obtuse or cuneate, margin entire, denticulate, or serrulate, apex obtuse or subacute. Lowermost cauline leaves petiolate, uppermost sessile; middle cauline leaves sessile or shortly petiolate, lanceolate-oblong, or elliptic, 3–9 × 0.6–2.5 cm, margin entire, apex acute. Fruiting pedicels stout, 0.5–2 mm, horizontal, puberulent. Sepals oblong-linear, 4–5 × 1–1.5 mm, glabrous. Petals white, linear to linear-oblancoate, 6–10 × 0.7–1 mm; claw slender, 3–5 mm. Filaments white, 5–8 mm; anthers purplish, oblong-linear, 1.5–2 mm. Ovules 12–18 per ovary. Fruit linear, (1.8–)2.2–4(–4.8) cm × 3–4.5 mm, glabrous, strongly torulose; gynophore 3–6 mm, puberulent, strongly recurved; style 0.2–1 mm. Seeds brown, orbicular or ovate-oblong, 2.5–3.2 × 1.8–3 mm; wing 0.2–0.5 mm. Fl. Jul–Aug, fr. Aug–Sep. 2n = 30.

Alpine meadows, river banks; 2000–2200 m. Xinjiang [Kazakhstan, Mongolia, Russia].


Herbs annual, biennial, or perennial, rarely subshrubs or shrubs, often glaucous. Trichomes absent or simple. Stems erect or ascending, simple or branched, leafy or rarely leafless. Basal leaves petiolate, rosulate or not, simple, entire, dentate, lyrate-pinnatifid, or pinnatisect. Cauline leaves petioloate or sessile, base cuneate, attenuate, auriculate, sagittate, or amplexicaul, margin entire, dentate, or lobed. Racemes ebracteate, elongated in fruit. Fruiting pedicels ascending, divaricate, or reflexed. Sepals ovate or oblong, erect, ascending, or rarely spreading, base of lateral pair saccate or not. Petals yellow, rarely white or pink; blade obovate, spatulate, or rarely oblong-lanceolate, apex obtuse or emarginate; claw distinct, subequaling or longer than sepals. Stamens 6, tetradynamous; anthers ovate or oblong, obtuse at apex. Nectar glands 4, median and lateral, rarely 2 and lateral. Ovules 4–50 per ovary. Fruit dehiscent siliques, linear or rarely oblong, terete, 4-angled, or latiseptate, sessile or shortly stipitate, segmented; valvular...
segment dehiscent, 4–46-seeded, longer than terminal segment, smooth or torulose, valves with a prominent midvein and obscure lateral veins; terminal segment seedless or 1(-3)-seeded; replum rounded; septum complete, translucent or opaque, veinless or with a distinct midvein; style obsolete or distinct; stigma capitate, entire or 2-lobed. Seeds uniseriate or rarely biseriate, wingless, globose or rarely oblong, plum or rarely slightly flattened; seed coat reticulate, mucilaginous or not when wetted; cotyledons conduplicate.

About 40 species: primarily in the Mediterranean region, especially SW Europe and NW Africa; six species in China.

Brassica includes the most important vegetables and oilseed plants of the Brassicaceae, and China is the center where human selection has created numerous cultivars, more so than elsewhere in the world. Most of these were described by Liberty H. Bailey as species based primarily on minor differences in leaf morphology. In fact, Bailey (Gent. Herb. 1: 53–108. 1922; 2: 211–267. 1930; 4: 319–330. 1940) recognized 25 crop species of Brassica (including two presently assigned to Sinapis and ten as “new”), of which 23 species names clearly belong to only six species (nos. 1–5 of the present account, plus B. carinata A. Braun). Critical study of all of Bailey’s types by one of the present authors (Al-Shehbaz), along with comprehensive cytological, crossing, and molecular studies conducted by numerous researchers over the past several decades, reveal that all of Bailey’s “species and infraspecific taxa” clearly belong to four species: B. juncea (2n = 36), B. napus (2n = 38), B. oleracea (2n = 18), and B. rapa (2n = 20).

Cultivated forms (or taxa) with the same chromosome number are indistinguishable in fruit, seed, and flower characters, and they interbreed freely and produce fully fertile offspring. Furthermore, such forms often lose their identity outside of cultivation and become basically indistinguishable from the weedy forms of the species to which they belong. Because the Chinese Brassica are maintained only in cultivation as distinct crops and have well-established Chinese names, they have been recognized in most of Chinese floras as distinct species. However, they are best treated as varieties, just as the numerous and morphologically far more diversified forms of B. oleracea are recognized worldwide (see below). As many as 18 species of Brassica have been recognized in China, but the easternmost native range of the genus hardly reaches C Asia.

On the basis of the enormous array of cultivated infraspecific taxa of B. juncea and B. rapa in China, it is evident that these two species have been domesticated there for thousands of years.

1a. Upper cauline leaves sessile, base minutely auriculate, amplexicaul, or deeply cordate.

1b. Upper cauline leaves petiolate or subsessile, base not auriculate, amplexicaul, or cordate.

2a. Plants glabrous throughout; sepal erect; all filaments erect at base; petals (1.5–)1.8–2.5(–3) cm 1. B. oleracea

2b. Plants often sparsely pubescent basally; sepal ascending or rarely suberec; filaments of lateral stamens curved

at base; petals (0.6–)0.7–1.6(–1.8) cm.

3a. Flowers overtopping buds; petals bright yellow, rarely creamy or whitish yellow, 0.7–1(–1.3) cm; plants

rarely glaucous ........................................................... 2. B. rapa

3b. Flowers not overtopping buds; petals pale or creamy yellow, (0.9–)1.6(–1.8) cm; plants often

glaucous ................................................................. 5. B. napus


野甘蓝 ye gan lan

Herbs biennial or perennial, rarely annual, (0.3–)0.6–1.5 (–3) m tall, glabrous, glaucous. Stems erect or decumbent, branched at or above middle, sometimes fleshy at base. Basal and lowermost cauline leaves long petiolate, sometimes strongly overlapping and forming a head; petiole to 30 cm; leaf blade ovate, oblong, or lanceolate in outline, to 40 × 15 cm, margin entire, repand, or dentate, sometimes pinnatifid or pinnatisect and with a large terminal lobe and smaller, 1–13, oblong or ovate lateral lobes on each side of midvein.

Upper cauline leaves sessile or subsessile in some cultivar forms, oblanceolate, ovate, or oblong, to 10 × 4 cm, base amplexicaul, auriculate, or rarely cuneate, margin entire, repand, or rarely dentate. Racemes sometimes fleshy and condensed into a head. Fruiting pedicels usually straight, ascending or divaricate, (0.8–)1.4–2.5(–4) cm. Sepals oblong, 0.8–1.5 cm × 1.5–2.7 mm, erect. Petals creamy yellow or rarely white, (1.5–)1.8–2.5(–3) × (0.6–)0.8–1.2 cm, ovate or elliptic, apex rounded; claw 0.7–1.5 cm. Filaments 0.8–1.2 cm; anthers oblong, 2.5–4 mm. Fruit linear, (2.5–)4–8(–10) cm × (2.5–)3–4(–5) mm, terete, sessile or on a gynophore to 3 mm, divaricate or ascending; valvular segment (2–)3–7.5(–9) cm, 10–20-seeded per locule,
valves with a prominent midvein; terminal segment conical, (3–)4–10 mm, seedless or 1 (or 2)–seeded; style obsolete. Seeds dark brown or blackish, globose, 1.5–2.5 mm in diam., minutely reticulate. Fl. Mar–Jun, fr. Apr–Jul. 2n = 18*.

Cultivated. Throughout China [native to W Europe; cultivated worldwide].

Wild populations of var. oleracea are known only from the coastal cliffs of W Europe. Of the 15 varieties and 16 forms recognized by Helm (Kulturpflanze 11: 92–210. 1963), seven varieties are cultivated in China, the most commonly grown of which are vars. botrytis, capitata, gongylodes, and italica. The other varieties are less commonly grown.

1a. Inflorescence fleshy, forming a compact, globose or obconical head.
   2a. Flower buds white, densely and tightly compact; rachis and pedicels white
      .............................................................. 1b. var. botrytis

2b. Flower buds green, somewhat loosely grouped; rachis and pedicels green 1c. var. capitata

1b. Inflorescence not fleshy, never compact, open, not forming heads.
   3a. Stem base fleshy, globose 1e. var. gongylodes
   3b. Stem base not fleshy, cylindric or narrowly conical.
      4a. Basal and lower cauline leaves numerous, densely or somewhat loosely grouped in heads.
      5a. Leaves green, strongly overlapping into a compact, closed head
      .............................................................. 1a. var. capitata

      5b. Leaves yellow, pink, purple, or red, rarely green, loosely grouped into an open head 1f. var. acephala

4b. Basal and lower cauline leaves few to several, widely spaced, not forming heads.
   6a. Flowers yellow; axillary buds forming small, globose or obovoid heads .... 1d. var. gemmifera
   6b. Flowers white; axillary buds not formed or loose and not forming heads ....... 1g. var. albilora

   甘蓝  gan lan

Brassica capitata (Linnaeus) H. Léveillé.

Stem base highly shortened, not fleshy, conical. Basal and lower cauline leaves green, numerous, strongly overlapping into a compact, globose, oblong, or rarely subconical, closed, apically rounded or flattened head. Axillary leafy buds not forming heads. Inflorescence neither fleshy nor condensed into a head. Flowers yellow. 2n = 18*.

Cultivated as a vegetable. Throughout China [widely cultivated elsewhere].

   花椰菜 hua ye cai

Stem base elongated, not fleshy, cylindric. Basal and lower cauline leaves green, few to several, widely spaced, not grouped into a head. Axillary leafy buds not forming heads. Inflorescence green, somewhat loose, usually obconical, with fleshy peduncle, rachis, pedicels, and flowers. Flowers yellow. 2n = 18*.

Recently introduced and cultivated as a vegetable. Previously mainly in Guangdong, but now more commonly in other parts of China [widely cultivated elsewhere].

   绿花菜 lu hua cai

Brassica oleracea var. italica de Candolle, Syst. Nat. 2: 585. 1821; B. gemmifera (de Candolle) H. Léveillé; B. oleracea subsp. gemmifera (de Candolle) Schwarz.

Stem base strongly elongated, not fleshy, cylindric. Basal and lower cauline leaves green, few to several, widely spaced, not overlapping into a head. Axillary leafy buds forming small, subglobose or obovoid heads. Inflorescence neither fleshy nor condensed into a head. Flowers yellow. 2n = 18*.

Introduced and cultivated as a vegetable. Sichuan, Zhejiang, and a little in Yunnan [widely cultivated elsewhere].

   擘蓝 pie lan

Brassica caulorapa (de Candolle) Pasquale; B. oleracea var. caulorapa de Candolle.

Stem base highly shortened, fleshy, globose. Basal and lower cauline leaves green, numerous, not overlapping into a head. Axillary leafy buds not forming heads. Inflorescence neither fleshy nor condensed into a head. Flowers yellow. 2n = 18*.

Cultivated as a vegetable for the fleshy stem base. Widespread in China [widely cultivated elsewhere].

Brassica campestris Linnaeus (Sp. Pl. 2: 666. 1753). Johann Metzger (Systematische Beschreibung der kultivirten Kohlarten. 68 pp. Heidelberg. 1833), who was the first to unite the two species, adopted B. rapa for the combined species, and therefore this name has priority (St. Louis Code, Art. 11.5). Except for being an annual with nonfleshy taproots, B. campestris is absolutely indistinguishable from the biennial B. rapa with fleshy taproots. In fact, plants of B. rapa that escape from cultivation fail to produce fleshy roots. Therefore, B. campestris deserves no higher than a varietal rank of B. rapa, and it is here reduced to synonymy under var. oleifera.

Forms with 3- or 4-valved fruit have been recognized as Brassica trilocularis Roxburgh and B. quadrirvalvis J. D. Hooker & Thomson, respectively. They were treated by Jafri (Fl. W. Pakistan 55: 24, 1973) as subspecies of B. rapa, but both have 2n = 20, and therefore they should be recognized as a variety of B. rapa. Of the six varieties recognized in B. rapa, the following four are grown and naturalized in China.

1a. Taproot fleshy, napiform; plants biennial 2a. var. rapa
1b. Taproot not fleshy, cylindric; plants annual or rarely biennial.

2a. Basal leaves rarely up to 10, not rosulate or rarely obscurely rosulate; petals neither thickened nor broadly winged .............................................. 2b. var. oleifera
2b. Basal leaves more than 10, often many more, forming compact rosettes or heads; petals fleshy and thickened, or strongly flattened and winged

3a. Basal leaves forming compact, oblong or subobovoid heads; petals strongly flattened, with incised or toothed wings ........................................................................ 2c. var. glabra
3b. Basal leaves not forming compact heads; petals fleshy, semiterete or oblong in cross section, wingless ........................................................................ 2d. var. chinensis

2a. Brassica rapa var. rapa

barbara derchiensis S. S. Ying; Brassica campestris Linnaeus subsp. rapa (Linnaeus) J. D. Hooker; B. campestris subsp. rapifera (Metzger) Sinskaya; B. campestris var. rapa (Linnaeus) Hartman; B. rapa subsp. rapifera Metzger; Raphanus rapa (Linnaeus) Crantz.

Plants biennial. Taproot fleshy, napiform. Basal leaves rarely up to 10, not rosulate or obscurely rosulate; petiole slender, neither fleshy nor winged; leaf blade lyrate-plinatifid or rarely sinuate-dentate. Fl. Mar–May, fr. May–Jul. 2n = 20*.

Cultivated for its fleshy roots. Throughout China [widely cultivated elsewhere].


云台 yun tai
Brassica asperifolia Lamarck; B. campestris Linnaeus; B. campestris var. chinoleifera Viehoever; B. campestris subsp. nipposinica (L. H. Bailey) G. Olsson; B. campestris (Linnaeus) subsp. oleifera (de Candolle) Schübler & Martius; B. campestris var. oleifera de Candolle; B. chinensis Linnaeus var. angustifolia V. G. Sun; B. chinensis var. utilis M. Tseng & S. H. Lee; B. dubiosa L. H. Bailey; B. nipposinica L. H. Bailey; B. perviridis (L. H. Bailey) L. H. Bailey; B. rapa subsp. campestris (Linnaeus) Clapham; B. rapa subsp. nipposinica (L. H. Bailey) Hanelt; B. rapa subsp. oleifera (de Candolle) Metzger; B. rapa var. campestris (Linnaeus) Petermann; B. rapa var. chinoleifera (Viehoever) Kitamura; B. rapa var. perviridis L. H. Bailey.

Plants annual or rarely biennial. Taproot not fleshy, cylindric. Basal leaves rarely up to 10, not rosulate or obscurely rosulate; petiole slender, neither fleshy nor winged; leaf blade subentire, sinuately lobed, pinnatifid, or incised with irregularly serrate lobes. Fl. Mar–May, fr. May–Jul. $2n = 20^*$. Cultivated. Throughout China [widely cultivated elsewhere].

Plants annual or biennial. Taproot not fleshy, cylindric. Basal leaves usually more than 20, strongly rosulate, forming oblong or subobovoid, compact heads; petiole strongly flattened, with incised or dentate wings; leaf blade dentate. Fl. May–Jun, fr. Jun–Jul. $2n = 20^*$. Long cultivated as the most important domestic vegetable. Throughout China [widely cultivated elsewhere].


Black mustard, green mustard
Brassica chinensis Linnaeus, Amoen. Acad. 4: 280. 1759; B. antiquorum H. Léveillé; B. campestris Linnaeus subsp. chinensis (Linnaeus) Makino; B. campestris subsp. chinensis var. amplexicaulis (Tanaka & Ono) Makino; B. campestris subsp. narinosa (L. H. Bailey) G. Olsson; B. campestris var. chinensis (Linnaeus) T. Itô; B. campestris var. narinosa (L. H. Bailey) Kitamura; B. campestris var. parachinensis (L. H. Bailey) Makino; B. chinensis var. communis M. Tseng & S. H. Lee; B. chinensis var. parachinensis (L. H. Bailey) Sinskaya; B. chinensis var. rosularis M. Tseng & S. H. Lee; B. napus Linnaeus var. chinensis (Linnaeus) O. E. Schulz; B. narinosa L. H. Bailey; B. oleracea var. tsienkentsiensis H. Léveillé; B. parachinensis L. H. Bailey; B. oleracea Linnaeus var. chinensis (Linnaeus) Prain; B. rapa subsp. chinensis (Linnaeus) Hanelt; B. rapa subsp. chinensis var. parachinensis (L. H. Bailey) Hanelt; B. rapa subsp. narinosa (L. H. Bailey) Hanelt; B. rapa subsp. chinensis var. rosularis (M. Tseng & S. H. Lee) Hanelt; B. rapa var. amplexicaulis Tanaka & Ono; Raphanus chinensis (Linnaeus) Crantz (1769), not Miller (1768).

Plants annual or rarely biennial. Taproot not fleshy, cylindric. Basal leaves usually more than 20, strongly rosulate, not forming compact heads; petiole fleshy or thickened, semiterete or transversely oblong in cross section, wingless; leaf blade entire or repand. Fl. Apr–May, fr. May–Jun. $2n = 20^*$. Cultivated primarily as an oilseed plant and less so as a vegetable. Throughout China [widely cultivated elsewhere]. Some forms are grown in S China for seed oil. They are known as Brassica chinensis var. oleifera Makino & Nemoto, but such distinction is dubious.


Black mustard
Sinapis nigra Linnaeus, Sp. Pl. 2: 668. 1753; Sisyrium nigrum (Linnaeus) Prantl. Herbs annual, 0.3–2(–3.1) m tall, sparingly hisutate at least basally. Stems erect, branched above. Basal and lowermost cauline leaves with petioles to 10 cm; leaf blade oblate, oblong, or lanceolate in outline, 6–30 × 1–10 cm, lyrate-pinnatifid or pinnatisect; terminal lobe ovate, dentate; lateral lobes 1–3 on each side of midvein, much smaller than terminal lobe, dentate. Upper cauline leaves petiolate, lanceolate or linear-oblong, to 5 × 1.5

cm, base cuneate, margin entire or rarely dentate. Fruiting pedicels straight, slender, erect or ascending, subapressed to rachis, (2–)3–5(–6) mm. Sepals oblong, 4–6–(7–) cm × 1–1.5 mm, spreading or ascending. Petals yellow, (5–7.5–11(–13) × (2.5–)3.5–4.5(–5.5) mm, ovate, apex rounded; claw 3–6 mm. Filaments 3.5–5 mm; anthers oblong, 1–1.5 mm. Fruit linear or narrowly oblance-elliptic, (0.5–)1.2–2(–2.7) cm × (1.5–)2–3(–4) mm, 4-angled, sessile, subappressed to rachis; valvular segment (0.4–)0.8–2(–2.5) cm, 2–5(–8)-seeded per locule; valves with a prominent midvein, slightly torulose; terminal segment (1.5–)2–4.5 cm, 6–15(–20)-seeded per locule; 4-angled, sessile, divaricate or ascending; valvular Filaments 4–7 mm; anthers oblong, 1.5–2 mm. Fruit linear or narrowly conical, (1–)2–5(–6) mm, seedless. Seeds dark brown, gray, or blackish, globose, 1.2–2 mm in diam., minutely reticulate. Fl. and fr. Apr – Jul. 2n = 36*.

Variation in the basal leaf morphology of *Brassica juncea* is tremendous, and minor variants have been recognized at specific, subspecific, and varietal ranks. All these “taxa” have 2n = 36, and they can be readily crossed and produce fully fertile offspring. Seven varieties and three species were recognized in FRPS. Of these, only three major types are recognized here as varieties. *Brassica juncea* var. megarrhiza and *B. napiformis* represent one taxon (var. napiformis), while *B. juncea* var. tumida is quite distinct in leaf morphology. Both varieties are recognized here. The other varieties, which are based solely on the type of leaf margin, are reduced to the synonymy of var. *juncea*. These include var. gracilis (margin doubly serrate or incised), var. multisecta (margin with linear or filiform lobes), var. foliosa (margin sinuate-dentate), var. crisipolia (margin sharply dentate or incised), and var. multiceps (margin unlobed, slightly incised, or irregularly doubly serrate). *Brassica integrifolia* was described from European plants of *B. juncea* that became naturalized in St. Croix, an island in the Caribbean Sea. It is said to differ from *B. juncea* in having undivided leaves and smaller fruit, but these alleged differences are unrealistic, and *B. integrifolia* does not merit any taxonomic status.

1a. Plants biennial; taproots fleshy, napiform, conical, oblong, or obovoid, 7–10 cm in diam. ………………………………. 4b. var. napiformis

1b. Plants annual; taproots slender, cylindric, rarely to 1.5 cm in diam.

2a. Basal leaves with slender, nonfleshy petiole; midvein not flattened; leaf blade 4–30 cm ………………………………. 4a. var. juncea

2b. Basal leaves with fleshy, inflated petioles; midvein strongly flattened; leaf blade 40–80 cm ………………………………. 4c. var. tumida

4a. brassica juncea var. juncea

4b. Brassica juncea var. napiformis

4c. Brassica juncea var. tumida

Fruiting pedicels straight, divaricate, (1–)1.2–2.3(–3) or dentate, sometimes absent. Upper cauline leaves midvein, much smaller than terminal one, entire, repand, or entire; lateral lobes 1–6 on each side of sometimes undivided; terminal lobes ovate, dentate, 5–25(–40) × 2–7(–10) cm, pinnately lobed or lyrate, 5–25(–40) × 2–7(–10) cm, pinnately lobed or lyrate, cm; leaf blade ovate, oblong, or lanceolate in outline, fleshy taproots. Stems erect, branched above. Basal and Herbs annual or biennial, 30–150 cm tall, glabrous or European rape

Brassica napus

Cultivated as a vegetable. Mainly in Sichuan and Yunnan [distr

4a. Taproot not fleshy, slender; plants annual 5a. var. napus

5a. Brassica napus var. napus

欧州油菜(原变种) ou zhou you cai (yuan bian zhong)

Brassica campestris Linnaeus subsp. napus (Linnaeus)

J. D. Hooker; B. campestris var. napus (Linnaeus)

Babington; B. napus subsp. oleifera (de Candolle)

Metzger; B. napus var. arvensis (Duchartre) Thellung;

B. napus var. leptorrhiza Spach; B. napus var. oleifera de Candolle; B. oleracea Linnaeus var. arvensis Duchartre; B. oleracea var. hongnoensis H. Léveillé; B. oleracea var. pseudocolza H. Léveillé.

Plants annual. Taproots slender, not fleshy. 2n = 38*.

Cultivated. Throughout China [widely cultivated and naturalized elsewhere].

The source of canola oil.

5b. Brassica napus var. napobrassica


蔓菁甘蓝 man jing gan lan

Brassica oleracea var. napobrassica (Linnaeus)

Linnaeus, Sp. Pl. 2: 667. 1753; B. campestris Linnaeus var. napobrassica (Linnaeus) de Candolle; B. napobrassica (Linnaeus)

Miller; B. napus subsp. napobrassica (Linnaeus) Hanelt;

B. napus var. edulis Delile; B. napus var. rapifera Metzger; B. rutabaga de Candolle ex H. Léveillé.

Plants biennial. Roots fleshy, napiiform. 2n = 38*.

Recently introduced and cultivated as a leaf and root vegetable. Guangdong, Guizhou, Jiangsu, Nei Mongol, Sichuan, Zhejiang [widely cultivated elsewhere].


Brassica elongata Z. X. An; B. persica Boissier & Hohenacker.

Herbs biennial or perennial, (40–)50–100(–130) cm tall, basally hirsute or rarely glabrous. Stems erect, branched basally and above. Basal and lowermost cauline leaves long petiolate; leaf blade oblanceolate, elliptic, oblanceolate, or oblong-lanceolate, (3–)5–14.–20 × (0.5–)1–3.5(–6) cm base cuneate or attenuate, margin dentate, reilant, or entire. Upper cauline leaves petiolate or subsessile, linear, oblanceolate-linear, lanceolate, or oblong, to 8 cm base attenuate or cuneate, margin entire or dentate. Fruiting pedicels divaricate, (0.6–)0.8–1.8 cm. Sepals oblong, 3–4–(–4.5) × 1–1.5 mm, erect or rarely ascending. Petals yellow, (5–)6–8.5(–10) × 2.5–3.5(–4) mm, obovate, apex rounded; claw 2.5–4 cm. Filaments 3.5–4.5 mm; anthers ovate, 1–1.5 mm. Fruit linear, (1.5–)2–4(–4.8) cm × (1–)1.5–2 mm, terete or slightly flattened, borne on a gynophore (0.8–)1.5–4(–5) mm, divaricate; valvular segment (1.2–)1.6–4(–4.5) cm, (2–)5–11(–13)-seeded per locule; valves with a prominent midvein, torulose; terminal segment linear, stylelike, (0.5–)1–2.5(–3) mm, seedless. Seeds brown or grayish, globose, 1–1.5 mm in diam., minutely reticulate.

Steppe, disturbed areas; 900–2400 m. Xinjiang [Afghanistan, Kazakhstan, Russia (W Siberia), Tajikistan, Turkmenistan, Uzbekistan; SW Asia, Europe; naturalized in Australia and North America].

The protologue of Brassica brevirostrata (Fl. Xinjiang. 2(2): 374. 1999) represents the first record of B. elongata from China. It is not known whether the species has recently been introduced to China or its native range in China has long been overlooked.


白芥属 bai jie shu

Herbs annual or rarely perennial. Trichomes absent or simple. Stems erect or ascending, often branched apically, leafy. Basal leaves petiolate, not rosulate, simple, lyrate, pinnatifid, pinnatisect, bibinatissect or/and dentate. Cauline leaves petiolate or sessile, not auriculate, entire, dentate, or shallowly lobed. Racemes ebracteate, elongated considerably in fruit. Fruiting pedicels slender or thickened, erect, ascending, divaricate, or reflexed. Sepals oblong or linear, spreading or reflexed, not saccate. Petals yellow, spreading; blade obovate, apex obtuse or emarginate; claw subequalling sepals. Stamens 6, tetradynamous; anthers oblong, obtuse at apex. Nectar glands 4, distinct; median pair ovoid; lateral pair prismatic, flat, or rarely lobed. Ovules 4–20 per ovary. Fruit dehiscent siliques, linear, lanceolate, or oblong, terete, somewhat 4-angled, or latiseptate, sessile, segmented; valvular segment dehiscent, few to many seceded, longer or shorter than terminal segment, torulose; valves with 3–7, prominent, longitudinal veins, thin or thick and obscurely veined; terminal segment indehiscent, seedless or 1- or 2-seeded, flattened and ensiform, or terete and conical or subulate, sometimes coryc; replum rounded; septum complete, membranous; style distinct; stigma capitate, 2-lobed. Seeds uniseriate, wingless, globose, plum or rarely slightly flattened; seed coat reticulate, mucilaginous or not when wetted; cotyledons conduplicate.

Seven species: Mediterranean region, especially N Africa; two species in China.

1a. Fruit lanceolate, terminal segment strongly compressed, ensiform; fruiting pedicels divaricate; fruit valves hispid with subsetose trichomes mixed with much shorter, more slender ones ........................................ 1. S. alba

1b. Fruit linear, terminal segment terete, conical or subulate; fruiting pedicels ascending or suberect; fruit valves glabrous or rarely sparsely pubescent with 1 kind of trichome ........................................... 2. S. arvensis


白芥 bai jie

Brassica alba (Linnaeus) Rabenhorst; B. hirta Moench.

Herbs (15–)25–100(–220) cm, retrorsely hispid, rarely glabrescent. Stems erect, often branched above. Petiole of basal and lower cauline leaves 1–3(–6) cm base; leaf blade oblong, ovate, or lanceolate in outline, lyrate, pinnatifid, pinnatisect, (3.5–)5–14(–16) × 2–6(–8) cm; terminal lobe broadly ovate, (1–)3–6 cm, usually 3-lobed, margin dentate; lateral lobes 1–3 on each side of midvein, ovate, or lanceolate, 1.5–2.5 cm, margin dentate, repand, or rarely pinnatifid. Upper cauline leaves shortly petiolate; leaf blade ovate or oblong-ovate, 2–4.5 cm, margin coarsely dentate, rarely subentire. Fruiting pedicels divaricate, stout, (3–)6–12(–17) mm. Sepals yellow or green, narrowly oblong, (3.8–)4–7(–8) × 1–1.8 mm, spreading or reflexed. Petals pale yellow, obovate, (0.7–)0.8–1.2(–1.4) cm × (3–)4–6(–7) mm. Filaments (3–)4–7(–8) mm; anthers oblong, 1.2–1.5 mm. Fruit lanceolate, (1.5–)2–4.2(–5) cm × (2–)3–5.5(–6.5) mm; valvular segment (0.5–)0.7–1.7(–2) cm, 2–5-seeded in each locule. 3–5(–7)-veined, torulose, terete or slightly compressed, hispid with subsetose trichomes mixed with much shorter and more slender ones; terminal segment ensiform, strongly compressed, (1–)1.5–2.5(–3) cm, straight or curved upward, seedless or 1 or 2-seeded. Seeds gray, pale brown, or reddish brown, globose, (1.7–)2–3(–3.5) mm in diam., finely reticulate. Fl. and fr. May–Sep. 2n = 24*.
Roadsides, fields, pastures, disturbed sites. Anhui, Gansu, Hebei, Liaoning, Qinghai, Shandong, Shanxi, Sichuan, Xinjiang [India, Kashmir, Russia, Tajikistan, Turkmenistan, Vietnam; N Africa, SW Asia, Europe; naturalized elsewhere].

The seeds are used for the manufacture of table mustard and also for the extraction of oils, which are used for cooking and making soap and mayonnaise. The species is a cosmopolitan, naturalized weed.


新疆白芥 xin jiang bai jie

Brassica arvensis (Linnaeus) Rabenhorst; B. kaber (de Candolle) L. C. Wheeler; B. sinapistrum Boissier; B. xinjiangensis Y. C. Lan & T. Y. Cheo; Sinapis kaber de Candolle.

Herbs (5–)20–100(–210) cm, retrorsely or spreading hairy. Petiole of basal and lower cauline leaves 1–4(–7) cm; leaf blade oblong, ovate, or lanceolate in outline, lyrate, pinnatifid, or undivided and dentate, (3–)4–18(–25) × 1.5–5(–7) cm; terminal lobe broadly ovate, obovate, to elliptic, margin dentate; lateral lobes 1–4 on each side of midvein, oblong, ovate, or lanceolate, smaller than terminal one, margin dentate.

Upper cauline leaves shortly petiolate; leaf blade ovate or lanceolate, often undivided, margin dentate or subentire, apex acute. Fruiting pedicels ascending or suberect, stout, (2–)3–7(–15) mm. Sepals yellow or green, narrowly oblong, (4.5–)5–6(–7) × 1–1.8 mm, spreading or reflexed. Petals bright or pale yellow, ovate, (0.8–)0.9–1.2(–1.7) cm × (3–)4–6(–7.5) mm. Filaments (3–)4–6 mm; anthers oblong, 1.2–1.5 mm. Fruit linear, (1.5–)2–4.5(–5.7) cm × (1.5–)2.5–3.5(–4) mm; valvular segment (0.6–)1.2–3.5(–4.3) cm, (2–)4–8(–12)-seeded in each locule, 3–5(–7)-veined, torulose, terete, glabrous or pubescent with 1 kind of trichome; terminal segment conical or subulate, terete, (0.7–)1–1.6 cm, straight or curved upward, seedless or 1- or 2-seeded. Seeds blackish to dark brown, globose, (1–)1.5–2 mm in diam., finely reticulate. Fl. and fr. May–Sep. 2n = 18*.

Roadsides, waste places, fields, pastures; 400–1800 m. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; N Africa, SW Asia, Europe; naturalized elsewhere].


二行芥属 er hang jie shu

Herbs annual or perennial. Trichomes absent or simple. Stems erect or ascending, rarely procumbent. Basal leaves petiolate, rosulate or not, dentate, lyrate, pinnatifid, or pinnatisect, rarely bipinnatifid. Cauline leaves petiolate or sessile and sometimes auriculate. Racemes ebracteate or rarely lowermost flowers bracteate, elongated in fruit. Fruiting pedicels ascending, divaricate, or recurved. Sepals oblong or linear, erect or spreading, base of lateral pair often not saccate. Petals yellow, white, pink, or purple, longer than sepals; blade obovate or suborbicular, apex obtuse or emarginate; claw absent or as long as or shorter than sepals. Stamens 6, tetradynamous; filaments not often not saccate. Petals yellow, white, pink, or purple, longer than sepals; blade obovate or suborbicular, apex obtuse or emarginate; claw absent or as long as or shorter than sepals. Stamens 6, tetradynamous; filaments not dilated at base; anthers oblong, obtuse at apex. Nectar glands 4; median glands large; lateral glands smaller. Ovules 16–260 per ovary. Fruit dehiscent siliques, linear, latiseptate or terete, glabrous, sessile or long stipitate, unsegmented or segmented; valvular segment well developed, dehiscent, numerous seeded, much longer than terminal segment, torulose, with a distinct midvein; terminal segment indehiscent, seedless or 1- or 2-seeded; replum rounded; septum complete; style obsolete to 4 mm; stigma capitate, entire or 2-lobed. Seeds biseriate, wingless, oblong, ovoid, or ellipsoid, slightly flattened; seed coat smooth or minutely reticulate, slightly mucilaginous or not mucilaginous when wetted; cotyledons conduplicate.

About 30 species; especially in NW Africa, the Iberian Peninsula, and Macaronesia, extending into C Asia; one species (introduced) in China.


二行芥 er hang jie

Sisymbrium muralis Linnaeus, Sp. Pl. 2: 658. 1753; Brassica muralis (Linnaeus) Boissier; Sinapis muralis (Linnaeus) R. Brown.

Herbs annual, sometimes perennial, (5–)20–50(–60) cm tall, scapose or subscapose, glabrous throughout or hirsute basally with simple, retrorse trichomes. Basal leaves rosulate, petiolate; leaf blade elliptic, spatulate, or narrowly ovate, 2–9 × 1–3 cm, dentate, sinuate, lyrate, or pinnatifid with 2–6 oblong or ovate lateral lobes smaller than terminal lobe. Cauline leaves absent or few, sessile, not auriculate, much smaller than basal ones, dentate or entire. Fruiting pedicels slender, divaricate or ascending, straight, glabrous, (0.3–)0.8–1.4(–3) cm. Sepals oblong, 3.5–5.5 mm, glabrous or apically hairy. Petals yellow, ovate, (4.5–)6–8(–10) × 4–5 mm, cuneate to a short clawlike base. Filament 3.5–6 mm; anthers 1.5–2 mm. Ovules 20–36 per ovary. Fruit (1.5–)2.5–4(–4.5) cm × 1.5–2.5(–2.5) mm, erect-patent, compressed, slightly torulose; gynophore 0.2–0.5 mm; style stout, beaklike, (1–)1.5–3(–3.5) mm; stigma entire. Seeds ovoid or ellipsoid, 0.9–1.3 × 0.6–0.9 mm. Fl. and fr. late Apr–Aug. 2n = 42.

Coastal weedy areas. Liaoning [native to Europe; naturalized elsewhere].
5. **ERUCA** Miller, Gard. Dict., ed. 4, 1: [472]. 1754.

Herbs annual or perennial. Trichomes absent or simple. Stems erect or ascending, leafy or leafless. Basal leaves petiolate, rosulate or not, simple, often lyrate-pinnatifid, rarely bipinnatisect or dentate. Cauline leaves petiolar or sessile, not auriculate, entire, dentate, or lyrate-pinnatifid, sometimes absent. Racemes ebracteate, elongated considerably in fruit. Fruiting pedicels erect or ascending and subappressed to rachis, rarely divaricate. Sepals oblong or linear, deciduous or rarely persistent, erect, base of lateral pair saccate. Petals cream or yellow with dark brown or purple veins, or entire blade purple; blade broadly obovate or oblanceolate, rounded or emarginate; claw subequalling or longer than sepals. Stamens 6, strongly tetradynamous; anthers oblong or linear, obtuse at apex. Nectar glands 4 or 2; lateral pair prismatic; median pair ovoid or oblong, or absent. Ovules 10–50 per ovary. Fruit siliques or silicles, linear, oblong, or elliptoid, terete or 4-angled, sessile, segmented; valvular segment dehiscent, many seeded; valves smooth, leathery, with a prominent midvein; terminal segment indehiscent, seedless, flattened and ensiform, or 4-angled, shorter or longer than valves; replum rounded; septum complete, membranous; style obsolete; stigma conical, 2-lobed, lobes connivent, deciduous. Seeds biseriate, wingless, globose or ovoid, plump; seed coat minutely reticulate, mucilaginous when wetted; cotyledons conduplicate.

One species: NW Africa, Asia, Europe, naturalized elsewhere.


- **Eruca sativa** Miller, Gard. Dict., ed. 8, Erula no. 1. 1768; Brassica *eruca* Linnaeus; *E. cappadocica* Reuter var. *eriocarpa* Boissier; *E. lativalvis* Boissier; *E. sativa* var. *eriocarpa* (Boissier) Post.

Herbs annual, (10–)20–80(–100) cm tall, glabrous or retrorsely hirsute or hispid. Stems erect, usually branched above. Basal leaves not rosulate, often withered by fruiting time; petiole (1–)2–5(–7) cm; leaf blade dentate, lyrate, pinnatifid, pinnatisect, or bipinnatisect, (2–)4–15(–20) × (1–)2–4(–6) cm; terminal lobe suborbicular or broadly ovate, margin dentate or entire; lateral lobes (2 or)2–9 on each side of midvein, oblong or oblong-ovate, margin pinnatifid, pinnatisect, dentate, or entire. Upper cauline leaves subsessile; leaf blade lobed or not. Fruiting pedicels 2–7(–10) mm, slightly thickened, erect or ascending, appressed or subappressed to rachis. Sepals often purplish, oblong, (6–)7–10–12(–15) mm, glabrous or hairy, deciduous, weakly cucullate or not. Petals yellow turning white, with dark brown or purplish veins, broadly obovate or spatulate, (1–)1.5–2–2.6 cm × (4–)5–7–9 mm, apex rounded; claw as long as sepal or slightly longer. Lateral filaments (5–)7–11 mm; median filaments (8–)10–13(–15) mm; anthers narrowly oblong, 2–3 mm. Fruit linear, oblong, or elliptoid, (1.1–)1.5–3.5(–4) cm × (2.5–)3–5 mm, glabrous or retrorsely hispid or hirsute; valves (0.7–)1–2.5(–3.2) mm, with a prominent midvein; terminal segment ensiform, (4–)5–10(–11) mm, 5-veined, as long as or slightly shorter than valves. Seeds brown, globose or ovoid, 1.5–2.5 mm in diam. Fl. May–Jul, fr. Jun–Aug. 2n = 22*.

Waste areas, fields, roadsides, slopes; near sea level to 3800 m. Gansu, Guangdong, Hebei, Heilongjiang, Jiangsu, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang [Afghanistan, India, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; NW Africa, SW Asia, Europe; naturalized elsewhere].

**Eruca vesicaria** subsp. *vesicaria* is endemic to Spain and NW Africa and is distinguished by having persistent, strongly cucullate sepals. Forms with retrorsely hispare fruit were recognized in FRPS and some other provincial floras as *Eruca sativa* var. *eriocarpa*, but these always occur with glabrous forms in the same population and throughout the naturalized or native ranges of the species. Therefore, no infraspecific taxon merit recognition.

Widely cultivated in Asia for seed oil which is used as an illuminant, lubricant, and for pickling. The seed oil is one of the richest sources of erucic acid, which is important in industry. The young plants are medicinal and used as a stimulant, antiscorbutic, stomachic and diuretic. The species is a naturalized weed worldwide, but it is extensively cultivated in Europe and North America as a salad plant.


Herbs annual or biennial, scabrous or hirsut, rarely glabrous. Trichomes simple. Stems erect or prostrate, simple or branched. Basal leaves petiolate, rosulate or not, simple, dentate, lyrate, pinnatifid, or pinnatisect. Cauline leaves similar to basal, petiolar or uppermost subsessile. Racemes several flowered, ebracteate, elongated in fruit. Fruiting pedicels divaricate or reflexed. Sepals oblong or linear, erect, base of lateral pair saccate. Petals yellow, white, pink, or purple, usually with darker veins; blade obovate or suborbicular, apex rounded or emarginate; claw subequaling...
or longer than sepal. Stamens 6, strongly tetradynamous; filaments not dilated at base; anthers oblong or oblong-linear, obtuse at apex. Nectar glands 4; median pair oblong; lateral pair prismatic. Ovules 2–22 per ovary. Fruit indehiscent siliques or silicles, often lomentaceous, breaking into 1-seeded units, linear, oblong, ovoid, ellipsoid, or lanceolate, terete or polygonal, sessile, segmented; valvular segment rudimentary, seedless, as thick as or slightly thicker than pedicel, or absent; terminal segment few to many seeded, wingless, corky, smooth or strongly torulose or moniliform, ribbed longitudinally or not ribbed, antorsely or retorsely scabrous, or glabrous; replum absent; septum absent; style prominent or obsolete; stigma capitulate, entire or slightly 2-lobed. Seeds uniseriate, wingless, oblong, ovoid, or globose, plump; seed coat minutely reticulate, not mucilaginous when wetted; cotyledons conduplicate.

Three species: Mediterranean region; two species (anciently introduced) in China.

1a. Petals pink or purple, sometimes white; roots often fleshy; fruit smooth or slightly constricted between seeds ................................................................. 1. R. sativus

1b. Petals yellow or creamy white, rarely pink; roots not fleshy; fruit strongly ribbed and torulose or moniliform

................................................................. 2. R. raphanistrum


野萝卜 ye luo bo

Raphanus acanthiformis J. M. Morel; R. chinensis Miller (1768), not (Linnaeus) Crantz (1769); R. macropodus H. Léveillé; R. niger Miller; R. raphanistroides (Makino) Nakai; R. raphanistrum Linnaeus var. sativus (Linnaeus) Domin; R. sativus var. macropodus (H. Léveillé) Makino; R. sativus f. raphanistroides Makino; R. sativus var. raphanistroides (Makino) Makino; R. taquetii H. Léveillé.

Herbs annual or biennial, 10–130 cm tall, glabrous, scabrous, or hispid. Roots fleshy, white, pink, red, or black, linear, fusiform, oblong, or globose, 1–100 × 0.5–45 cm, sometimes slender and not fleshy. Stems simple or branched. Basal leaves with petioles 1–30 cm; leaf blade oblong, obovate, oblanceolate, or spatulate in outline, 2–60 × 1–20 cm, lyrate or pinnatisect, sometimes undivided, margin dentate, apex obtuse or acute; lateral lobes 1–12 on each side of midvein, sometimes absent, oblong or ovate, to 10 × 5 cm. Uppermost cauline leaves subsessile, often undivided, dentate. Fruiting pedicels divaricate or ascending, straight, 0.5–4 cm. Sepals narrowly oblong, 5.5–10 × 1–2 mm, glabrous or sparsely pubescent. Petals purple, pink, or sometimes white, often with darker veins, broadly obovate, 1.2–2.2 cm × 3–8 mm, apex obtuse or emarginate; claw to 1.4 cm. Filaments slender, 5–12 mm; anthers 1.5–2 mm, sagittate at base. Fruit fusiform or lanceolate, sometimes ovoid or cylindric; seedless valvular segment 1–3.5 mm; seed-bearing distal segment (1–)3–15–(25) × (0.5–)0.7–1.3(–1.5) cm, corky, rounded at base, conical at apex, smooth or rarely slightly constricted between seeds, not ribbed; style 1–4 cm; stigma entire. Seeds globose or ovoid, 2.5–4 mm in diam. Fl. and fr. depending on cultivation time. 2n = 18*. Fields, roadides, waste areas. Throughout China [native to the Mediterranean region; cultivated worldwide].

Long cultivated in E Asia primarily as a vegetable and medicinal plant. A very variable species with regard to fleshy root color, shape, and size, plant height, degree of division and size of leaves, flower color, and fruit shape and size. Numerous infraspecific taxa have been recognized, and their taxonomy is controversial and highly confused. The interested reader should consult Pistrick (Kulturpflanze 35: 225–321. 1987). Perhaps the most interesting cultivar, which is grown primarily in China and Japan, is var. longipinnatus L. H. Bailey, with roots to 50 kg in weight and to 1 m in length and enormous rosettes to 2 m in diam.


野萝卜 ye luo bo

Herbs annual, (20–)25–60(–75) cm tall, often hispid. Roots not fleshy. Stems erect or prostrate, usually retrorsely hispid. Basal leaves with petioles 1–6 cm; leaf blade oblong, obovate, or oblanceolate in outline, 3–15(–22) × 1–5 cm, lyrate or pinnatifid, sometimes undivided, margin dentate, apex obtuse or acute; lateral lobes 1–4 on each side of midvein, oblong or ovate, to 4 × 2 cm, smaller than terminal lobe. Uppermost cauline leaves subsessile, often undivided, dentate. Fruiting pedicels divaricate or ascending, straight, 0.7–2.5 cm. Sepals narrowly oblong, 7–11 × 1–2 mm, sparsely pubescent. Petals yellow or creamy white, with dark brown or purple veins, broadly obovate, 1.5–2.5 cm × 4–7 mm, apex obtuse or emarginate; claw to 1.5 cm. Filaments slender, 7–12 mm; anthers 2–2.5 mm, sagittate at base. Fruit cylindric or narrowly lanceolate; valvular segment seedless, 1–1.5 mm; seed-bearing distal segment (1.5–)2–11(–14) cm × (2.5–)3–8(–11) mm, woody or corky, rounded at base, conical at apex, strongly constricted between seeds, strongly ribbed; style 1–5 cm; stigma entire. Seeds oblong or ovoid, 2.5–3.5 × 1.8–2.5 mm. Fl. May–Sep. fr. Jun–Oct. 2n = 18.* Roadsides, fields, waste areas. Qinghai, Sichuan, Taiwan [native to SW Asia, Europe, and the Mediterranean region; naturalized elsewhere].

两节荠属 liang jie qi shu

Herbs annual or perennial, rarely subshrubs. Trichomes absent or simple. Stems erect, often simple basally, much branched apically. Basal leaves petiolate, rosulate or not, simple, dentate, lyrate, or pinnately lobed, often very large. Cauline leaves petiolate, similar to basal leaves. Racemes many flowered, usually lax, ebracteate, often in panicles, elongated considerably in fruit. Fruiting pedicels slender, erect or divaricate. Sepals ovate or oblong, ascending or spreading, not saccate. Petals white or rarely yellow, spreading or ascending, longer than sepals; blade obovate or oblong, apex obtuse; claw much shorter than sepals. Stamens 6, strongly tetradynamous; filaments not dilated at base; lateral pair filiform, wingless, unappendaged; median pairs winged and/or toothed, rarely filiform and toothless; anthers ovate or oblong, obtuse at apex. Nectar glands 4; median pair large, globose or oblong; lateral pair minute, intrastaminal, semiannular. Ovules 2 per ovary. Fruit indehiscent, nutletlike silicles, segmented; basal segment seedless, much shorter than terminal segment; distal segment 1-seeded, globose or ovoid, corky, terete or 4-angled, smooth, rugose, or reticulate; gynophore absent; replum and septum obsolete; style absent, obsolete, or rarely to 1 mm; stigma capitate, entire. Seeds wingless, oblong, pendulous on a basal funicle, plump; seed coat smooth, not mucilaginous when wetted; cotyledons conduplicate.

About 35 species: Africa, Asia, Europe; one species in China.


两节荠 liang jie qi
Crambe cordifolia Steven subsp. kotschyana (Boissier) Jafri; C. cordifolia var. kotschyana (Boissier) O. E. Schulz.

Herbs perennial, 0.5 –1.8(–2.5) m tall, with somewhat fleshy roots. Stems simple at base, hirsute. Basal leaves with petioles 10–35 cm; leaf blade cordate-reniform, cordate, or ovate-orbicular, (10–)15–35 × 2–50 cm, densely hirsute abaxially especially along veins, thick, base cordate, margin coarsely toothed, apex acute. Cauline leaves similar to basal, much reduced in size upward. Infructescences large panicles. Fruiting pedicels slender, (1.5–)2–3.5(–4) cm. Sepals oblong, 2.5–4 × 1–1.5 mm, sparsely hirsute. Petals white, broadly obovate, 5–9(–11) × 3–4(–6) mm, apex rounded; claw 0.5–1 mm. Median filament pairs flattened, 3–4 mm, with a tooth 0.5–1 mm; lateral pair slender, toothless, 2–2.5 mm; anthers oblong, 0.7–1 mm. Basal fruit segment oblong, seedless, 2–2.5 mm; terminal segment globose, subcorky, 4.5–6.5 mm in diam., smooth, reticulate veined, glabrous; style absent. Seed pale brown, subglobose, 3–4 mm in diam. Fl. Mar–May, fr. May–Jun. 2n = 30.

Mountain slopes, stony hillsides, grassy foothills; 700–4000 m. Xinjiang, Xizang [Afghanistan, India, Kazakstan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

The leaves and roots are eaten as vegetables.


诸葛菜属 zhu ge cai shu

Herbs annual, biennial, or rhizomatous perennial. Trichomes absent or simple. Stems erect or ascending. Basal leaves petiolate, not rosulate, simple or pinnatifid with 1–6 leafletlike lateral lobes on each side. Cauline leaves petiolate or sessile, not auriculate, auriculate, or amplexicaul at base, entire, dentate, serrate, or sometimes with 1–4 lateral lobes. Racemes ebracteate, elongated in fruit. Fruiting pedicels slender or stout, divaricate or recurved. Sepals oblong or linear, erect or ascending, base of lateral pair slightly to strongly saccate, margin membranous. Petals purple, lavender, or white; blade obovate or narrowly obcordate, apex rounded or emarginate; claw obscurely to strongly differentiated from blade, shorter than to as long as sepals. Stamens 6, tetradynamous; filaments dilated at base; anthers oblong or linear, apiculate at apex. Nectar glands 2, lateral, semiannular or annular. Ovules 20–70 per ovary. Fruit dehiscent siliques, linear, terete or somewhat 4-angled, sessile or shortly stipitate, unsegmented; valves leathery, with an obscure or prominent midvein, glabrous or rarely hairy, torulose; replum rounded; septum complete, membranous, opaque, veinless; style distinct; stigma capitate, 2-lobed, lobes free, decurrent. Seeds uniseriate, wingless, oblong, plump; seed coat alveolate-reticulate, not mucilaginous when wetted; cotyledons conduplicate.

Two species: China, Korea; two species (one endemic) in China.

1a. Cauline leaves auriculate; sepals linear, erect, (6–)8–13(–16) mm, base of lateral pair strongly saccate; petals deep purple, lavender, or rarely white, (12–)16–25(–32) mm, apex rounded, claw well differentiated
and as
long as sepals; anthers linear, (3–)4–6(–8) mm; style (0.3–)0.7–3(–5.5) cm ......................... 1. O. violaceus
1b. Cauline leaves not auriculate; sepals oblong, ascending, 2–3.5 mm, base of lateral pair slightly saccate;
petals
white, (6–)7–9 mm, apex shallowly emarginate, claw obscurely differentiated and shorter than sepals;
anthers
oblong, 1–1.5 mm; style 0.1–0.3 cm ........................................................................... 2. O. limprichtianus


Arabis chanetii H. Léveillé; Cardamine potentillifolia H. Léveillé; Moricandia sonchifolia (Bunge) J. D. Hooker; M. sonchifolia var. homaeophylla Hance; Orychophragmus diffusus Z. M. Tan & J. M. Xu; O. hupehensis (Pampanini) Z. M. Tan & X. L. Zhang; O. sonchifolius Bunge; O. sonchifolius var. hupehensis Pampanini; O. sonchifolius var. intermedius Pampanini; O. sonchifolius var. subintegerrimus Pampanini; O. taibaiensis Z. M. Tan & B. Z. Zhao; O. violaceus var. homaeophyllus (Hance) O. E. Schulz; O. violaceus var. hupehensis (Pampanini) O. E. Schulz; O. violaceus var. intermedius (Pampanini) O. E. Schulz; O. violaceus var. lasiocarpus Migo; O. violaceus var. subintegerrimus (Pampanini) O. E. Schulz; Raphanus chanetii H. Léveillé; R. courtoisii H. Léveillé; R. violaceus (Linnaeus) Crantz.

Herbs annual or biennial, (6–)15–60(–90) cm tall. Stems erect, simple or branched at base, often branched above, straight, glabrous or sparsely to densely pilose. Basal leaves not rosetulate; petiole (1–)2–8(–11) cm; blade or terminal leaf lobe cordate, reniform, broadly ovate, or suborbicular, (0.4–)1.5–10(–14) × (0.3–)1–4(–7) cm, glabrous or pilose, base cordate or rarely obtuse, margin coarsely crenate with teeth ending in apiculae, apex acute or obtuse; lateral lobes 1–6 on each side, sessile or petiolulate, to 3 × 2 cm, sometimes absent. Uppermost cauline leaves auriculate or amplicaul, sessile or petiolate, (0.5–)2–9(–15) × (0.2–)1–6(–9) cm, margin coarsely and irregularly dentate, rarely entire, apex acute or acuminate; auricles to 3 × 4 cm; lateral lobes absent or 1–4 on each side, sessile or petiolulate. Fruiting pedicels divaricate, glabrous or pilose, narrower than fruit, (0.6–)0.8–2(–3) cm. Sepals linear, erect, connivent, (0.6–)0.8–1.3(–1.6) cm × 1.5–2.5 mm, base of lateral pair strongly saccate. Petals deep purple, lavender, or white, broadly obovate, (1.2–)1.6–2.5(–3.2) cm × (4–)5–9(–11) mm, apex rounded; claw as long as sepal. Filaments 0.8–1.8 cm; anthers linear, (3–)4–6(–8) mm, distinctly apiculate. Ovules (20–)40–70 per ovary. Fruit narrowly linear, stout, terete or somewhat 4-angled, (3–)4.5–11(–13) cm × 1.5–3 mm; valves glabrous or densely hirsute, torulose, usually with a prominent midvein; style (0.3–)0.7–3(–5.5) cm; stigma slightly to distinctly 2-lobed, lobes recurved. Seeds

Roadsides, gardens, forests, thickets, valleys, hillsides, sunny slopes; near sea level to 1500 m. Anhui, Gansu, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Nei Mongol, Shandong, Shanxi, Sichuan, Zhejiang [Korea; naturalized in Japan].

An examination of the holotype of *Arabis chanetii* readily reveals that the name is a synonym of *Orychophragmus violaceus*. The former was recognized as a distinct species of *Arabis* in FRPS and in Fl. Hebei. (1: 538. 1986).


Herbs annual or perennial, (12–)25–45(–80) cm tall. Stems erect, simple at base, often branched above, somewhat flexuous, glabrous or sparsely to densely pilose with trichomes to 1.5 mm. Basal leaves not rosetulate, simple or with 1–3 lateral lobes on each side; petiole (3–)5–15(–18) cm, flattened at base; blade or terminal leaf lobe cordate to broadly so, (2–)4–8(–10) × (1.5–)2.5–6(–8) cm, glabrous or sparsely to densely subappressed pilose abaxially, glabrous or sparsely pilose adaxially, sometimes ciliate, base cordate or rarely cordate-truncate, margin coarsely crenate with teeth ending in apiculae, apex acute or acuminate; lateral lobes sessile or petiolulate, 0.1–3 × 0.03–2 cm, sometimes absent. Uppermost cauline leaves petiolate, much smaller to much larger than basal ones and up to 18 × 11 cm, base not auriculate, margin coarsely and irregularly dentate, rarely crenate, apex ciliate or acuminate. Fruiting pedicels divaricate or recurved, glabrous or pilose, narrower than fruit, (0.5–)1–3(–3.5) cm. Sepals oblong, ascending, 2–3.5 × 1–1.5 mm, base slightly saccate. Petals white, broadly obovate or narrowly obcordate, (6–)7–9 × 3–6 mm, apex shallowly emarginate; claw obscurely differentiated, shorter than sepal. Filaments 2.5–3.5 mm; anthers oblong, 1–1.5 mm, minutely apiculate. Ovules 20–35 per ovary. Fruit narrowly linear, stout, terete, (2–)3–6 cm × 1.5–2 mm; valves glabrous or sparsely pilose, strongly torulose, inconspicuously veined; style terete, 1–3 mm; stigma 2-lobed, slightly recurved. Seeds oblong, 2–3 × 0.8–1.2 mm. Fl. Mar–May, fr. Apr–Jun.

- Grassy areas along streams, moist slopes, roadsides, rocky slopes; 300–1200 m. Anhui, Zhejiang.

*Cardamine limprichtiana* and *Alliaria grandifolia* were both recognized in FRPS and in Fl. Zhejiang (3: 51, 55. 1993) as distinct
species in two different tribes (Arabidaceae and Sisymbrieae, respectively). However, examination of the type collections of both species and ample additional material reveal that they are conspecific and belong to *Orychophragmus* in the tribe Brassiceae.

6. CONRINGIA Heister ex Fabricius, Enum. 160. 1759.

线果芥属 xian guo jie shu

Herbs annual or rarely biennial, mostly glabrous throughout, usually glaucous. Trichomes absent or rarely as minute papillae on pedicels. Stems erect, simple. Basal leaves submersile, subfleshy, not rostrate, simple, entire. Cauline leaves sessile, cordate-amplexical or rarely auriculate at base, entire. Racemes ebracteate, elongated in fruit. Fruiting pedicels slender or thick and as wide as fruit, erect or divaricate. Sepals oblong or linear, erect or ascending, base of lateral pair not saccate or strongly saccate. Petals yellow or white, rarely with purple veins, longer than sepal; blade obovate, oblong, or oblanceolate, apex obtuse; claw somewhat differentiated from blade. Stamens 6, tetradynamous; filaments not dilated at base; anthers narrowly oblong, obtuse at apex. Nectar glands 2, lateral, semiannular, rarely 1 and confluent; median glands absent or rarely present. Ovules 10–50 per ovary. Fruit dehiscent silicles, linear, terete, 4- or 8-angled, or latiseptate; valves veinless or prominently veined, smooth or torulose; replum rounded; septum complete; style 0.5–1.5 mm; stigma capitulate, entire or decurrently 2-lobed. Seeds uniseriate, wingless, oblong or elliptic, plump; seed coat reticulate, mucilaginous or not when wetted; cotyledons incumbent or rarely subcordulate. Six species: primarily in C and SW Asia, the Caucasus, and Europe; one species in China.


Erysimum planisiliquum (Fischer & C. A. Meyer) Steudel; Sisymbrium planisiliquum (Fischer & C. A. Meyer) J. D. Hooker & Thomson.

Herbs (10–)15–50(–75) cm tall, mostly glabrous and glaucous. Stems erect, simple. Basal leaves withered by flowering. Middle cauline leaves broadly ovate or narrowly oblong, (1.2–)2–7(–10) × (0.5–)1–2.5(–3) cm, base deeply cordate-amplexical, margin entire, apex shortly mucronate; basal auricles ovate or lanceolate, to 1.5 cm. Fruiting pedicels slender, (4–)7–12(–15) mm, erect-ascending, subappressed to rachis, minutely papillate adaxially or rarely glabrous. Sepals linear, ascending, 3–4.5 × 0.5–1 mm, subequal, not saccate at base. Petals white or creamy white, with purplish veins extending to apex, oblong, 5–7 × 1.5–2 mm, apex obtuse; claw broad, 3–4 mm. Filaments slender, median pairs 3–4.5 mm, lateral pair 2–2.5 mm; anthers 1–1.2 mm. Ovules 24–44 per ovary. Fruit linear, latiseptate, (3–)3.5–8.5(–10) cm × 1.3–2 mm, erect or ascending, straight or rarely slightly curved, torulose, sub sessile; valves obscurely veined; style 0.5–1.2(–2) mm; stigma entire. Seeds brown, oblong, 1.5–2 × 0.7–1 mm; cotyledons nearly incumbent. Fl. May–Jun, fr. Jun–Aug. 2n = 14.

Mountain slopes, sandy deserts, steppe; 300–3600 m. Xinjiang, Xizang [Afghanistan, India, Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].


独行菜属 du xing cai shu

Herbs annual, biennial, or perennial, sometimes subshrubs, rarely shrubs or climbers. Trichomes absent or simple. Stems erect or ascending, sometimes creeping, simple or branched basally and/or apically. Basal leaves rostrate or not, simple, entire or pinnately dissected. Cauline leaves petiolate or sessile, base cuneate, attenuate, auriculate, sagittate, or amplexical, margin entire, dentate, or dissected. Racemes ebracteate, corymbose, elongated or not in fruit. Fruiting pedicels terete, flattened, or winged, erect or divaricate. Sepals ovate or oblong, rarely orbicular, base of lateral pair not saccate. Petals white, yellow, or pink, erect or spreading, sometimes rudimentary or absent; blade obovate, spatulate, oblong, oblanceolate, orbicular, linear, or filiform, apex obtuse, rounded, or emarginate; claw absent or distinct. Stamens 2 and obtuse, sometimes 6 and tetradynamous or subequal in length, rarely 4 and all median or 2 median and 2 lateral; anthers ovate or oblong. Nectar glands 4 or 6, distinct; median glands always present. Ovules 2 per ovary; placentation apical. Fruit dehiscent silicles, oblong, ovate, obovate, cordate, orbiculate, elliptic, or orbicular, strongly angustiseptate; valves veinless or prominently veined, keeled or not, apically winged or wingless; replum rounded; septum complete or perforated, membranous; style absent, obsolete, or distinct, included or exserted from apical notch of fruit; stigma capitulate, entire or rarely 2-lobed. Seeds 1 per locule, winged, margined, or wingless, oblong or ovate, plump or flattened; seed coat smooth, minutely reticulate, or papillate, usually copiously mucilaginous when wetted; cotyledons incumbent, rarely acuminate or diplecolobal. About 180 species; all continents except Antarctica; 16 species (two endemic, two introduced) in China.
1a. Cauline leaves sessile, amplexicaul, sagittate, or auriculate at base.
2a. Flowers yellow; upper leaves amplexicaul-perfoliate, basal leaves 2- or 3-pinnatisect; seeds winged all around .......................................................... 10. L. perfoliatum
2b. Flowers white; upper leaves auriculate or sagittate, basal leaves entire, dentate, or pinnatifid; seeds wingless.
3a. Annuals or biennials, usually densely long pubescent; fruit wings united with lower part of style; leaves herbaceous .................................................. 1. L. campestre
3b. Perennials, glabrous, papillate, or crisped hairy; fruit wings free from style; leaves leathery.
4a. Basal and lowermost cauline leaves pinnatifid, upper ones subentire; plants glabrous . 3. L. cordatum
4b. All leaves entire; plants with curved papillate trichomes ................................ 4. L. cartilagineum
1b. Cauline leaves petiolate or subsessile, cuneate or obtuse at base, if subauriculate then plants with capitate or clavate papillae.
5a. Stamens 6; stems glabrous or pubescent with long trichomes (puberulent in L. alashanicum).
6a. Petals absent; plants puberulent with subclavate papillate trichomes; all leaves linear, entire, margin involute .......................................................... 9. L. alashanicum
6b. Petals well developed; plants glabrous or pilose with slender trichomes; leaves variously-shaped, at least some pinnatifid, pinnatisect, dentate, or serrate, margin flat.
7a. Annuals; fruit (4–)5–6 mm, winged all around, broadly so apically; all or at least lower leaves 1- or 2-pinnatisect or -pinnatifid; cotyledons 3-lobed .................................................. 2. L. sativum
7b. Perennials; fruit 1.5–3 mm, wingless or only apically winged; leaves entire, serrate, or dentate; cotyledons entire.
8a. Sepals persistent in fruit; fruit cordate at base .......................................................... 7. L. obtusum
8b. Sepals deciduous shortly after anthesis; fruit cuneate, obtuse, or rounded at base.
9a. Basal and lowermost cauline leaves pinnatifid or lyrate, with oblong or linear lateral lobes much smaller than terminal one; style (0.2–)0.3–0.4(–0.5) mm, distinctly exserted from apical notch .......................................................... 8. L. lacerum
9b. Basal and lowermost leaves dentate, serrate, or subentire; style absent, obsolete, or rarely to 0.1 mm.
10a. Uppermost cauline leaves sessile or subsessile, leathery; fruit not carinate; seeds (0.8–)1–1.3 mm .......................................................... 6. L. latifolium
10b. Uppermost cauline leaves shortly petiolate, papery; fruit carinate; seeds 1.5–2.2 mm .......................................................... 5. L. ferganense
5b. Stamens 4 or 2; stems puberulent with clavate or capitate papillae, sometimes with minute trichomes.
11a. Stamens 4; style longer than and exserted from apical notch of fruit ................................ 11. L. cuneiforme
11b. Stamens 2; style shorter than and included within apical notch of fruit.
12a. Fruit orbicular; upper stems and rachis puberulent with curved minute trichomes; cotyledons accumbent .......................................................... 13. L. virginicum
12b. Fruit elliptic, ovate, or obovate; upper stems and rachis puberulent with straight or clavate papillae; cotyledon incumbent.
13a. Middle and upper cauline leaves usually pinnatifid; infructescences capitate; petals 0.5–1 mm .......................................................................................... 12. L. capitatum
13b. Middle and upper cauline leaves dentate, serrate, or entire; infructescences elongated racemes; petals absent or rudimentary.
14a. Basal leaves 2- or 3-pinnatisect; pedicels puberulent all around with slender trichomes; herbs fetid ........................................................................ 14. L. ruderale
14b. Basal leaves 1-pinnatifid or serrate; pedicel papillate only adaxially; herbs not fetid.
15a. Fruit broadly obovate, widest above middle; raceme papillae terete or subclavate .......................................................... 15. L. densiflorum
15b. Fruit elliptic, widest at middle; raceme papillae clavate or capitate .. 16. L. apetalum

Thlaspi campestre Linnaeus, Sp. Pl. 2: 646. 1753.
绿独行菜 lu du xing cai
Herbs annual or biennial, (8–)12–50(–60) cm tall, densely hirsute with spreading trichomes. Stems erect,

simple or branched above. Basal leaves rosulate; petiole (0.5–)1.5–6 cm; leaf blade oblanceolate or oblong, (1–)2–6(–8) × 0.5–1.5 cm, base attenuate, margin entire, pinnatifid, or lyrate, apex obtuse or subacute. Cauleine leaves sessile; leaf blade oblong, lanceolate, or narrowly deltoid-lanceolate, (0.7–)1–4(–6.5) cm × (2–)5–10(–15) mm, base sagittate or auriculate, margin dentate or subentire, apex acute to subobtuse. Fruiting pedicels slender, horizontal, (3–)4–8(–10) mm, pubescent. Sepals oblong, (1–)1.3–1.8 mm, erect to ascending, pubescent or glabrous. Petals white, spatulate, (1.5–)1.8–2.5(–3) × (0.2–)0.5–0.7 mm, base clawed, apex rounded. Stamens 6; filaments (1.2–)1.5–1.8(–2) mm; anthers oblong, 0.3–0.5 mm. Fruit ovate or broadly oblong, curved adaxially above middle, (4–)5–6(–6.5) × (3–)4–5 mm, winged distally, apex emarginate; wings 1–1.5 mm, glabrous. Sepals oblong, 1–1.8 × 0.5–0.8 mm, glabrous or with subappressed trichomes; caudex with fibrous petiolar remains of previous years. Stems erect, branched basally and above. Basal leaf blade ovate, pinnatifid, withered at flowering. Cauleine leaves sessile; leaf blade oblong or lanceolate, 0.3–1.8(–3) cm × 2–7(–13) mm, subleathery, base sagittate or auriculate, margin serrulate or entire, apex acute or obtuse. Fruiting pedicels slender, straight, 2–4 mm, pilose in flower, glabrous in fruit. Sepals caducous, broadly ovate or suborbicular, 0.8–1.2 × 0.8–1 mm, sparsely pilose with crisped trichomes, broadly white at margin and apex. Petals white, obovate, 1.5–1.8 × 0.8–1 mm, base clawed, apex rounded. Stamens 6; filaments 0.7–1.5 mm, often conspicuously dilated at base; anthers oblong, 0.2–0.4 mm. Fruit suborbicular or broadly ovate-cordate, 2–2.5(–2.8) × 1.8–2.3 mm, wingless, base sometimes subcordate; apical notch absent or rarely ca. 0.05 mm; style 0.1–0.3 mm; stigma discoid, distinctly broader than style. Seeds reddish brown, oblong, 0.9–1.1 × 0.5–0.6 mm, pilose; cotyledons incumbent. Fl. May–Jun, fr. Jun–Aug. 2n = 16.

Fields, roadsides, pastures, waste grounds, disturbed sites, mountain slopes. Heilongjiang, Liaoning, Shandong [Russia; SW Asia, Europe; introduced elsewhere].


家独行莱 jia du xing cai

Herbs annual, (10–)20–80(–100) cm tall. Stems erect, simple or branched, sparingly pilose above. Basal leaves not rosulate; petiole 1–4 cm; leaf blade variable in shape, 1- or 2-pinnatifid or -pinnatisect, 2–8(–10) × 1–3(–5) cm; ultimate lobes ovate or oblong, margin dentate, apex acute. Cauleine leaves petiolate; leaf blade similar to basal ones but less divided, with 1–4 lateral lobes on each side of midvein; uppermost leaves subsessile, linear, margin entire. Fruiting pedicels suberect, appressed to rachis, or ascending, straight, 1.5–4(–6) mm, terete or slightly flattened, glabrous. Sepals oblong, 1.8–1.8 × 0.5–0.8 mm, glabrous or pubescent abaxially. Petals white or lavender, spatulate or obovate, 2.5–3.5(–4) × 0.7–1.4 mm, base attenuate. Stamens 6; filaments 1.5–2 mm; anthers oblong, 0.4–0.5 mm. Fruit oblong-ovate or elliptic, (4–)5–6(–7) × 3–4.5 (–5.5) mm, base rounded, margin and apex broadly winged, apex emarginate; wings 1–1.5 mm at apex; apical notch 0.2–0.5 mm; style 0.2–0.5(–0.8) mm, free from wings, included in or rarely exserted from apical notch. Seeds reddish brown, oblong, 2.2–2.6 × 1–1.3 mm, wingless; cotyledons incumbent, 3-lobed. Fl. Jun–Jul, fr. Aug–Sep. 2n = 24, 32*.

Cultivated or naturalized; near sea level to 1700 m. Heilongjiang, Jiangsu, Jilin, Shandong, Xinjiang, Xizang [Afghanistan, India, Japan, Kashmir, Kazakhstan, Kyrgyzstan, Nepal, Pakistan, Russia, Sikkim, Tajikistan, Turkmenistan, Uzbekistan, Vietnam; N Africa, SW Asia, Europe; naturalized in North and South America].


心叶独行莱 xin ye du xing cai

Herbs perennial, 15–40 cm tall, glabrous except for pilose sepals and pedicels, glaucous. Stems erect, branched basally and above. Basal leaf blade obovate, pinnatifid, withered at flowering. Cauleine leaves sessile; leaf blade oblong or lanceolate, 0.3–1.8(–3) cm × 2–7(–13) mm, subleathery, base sagittate or auriculate, margin serrulate or entire, apex acute or obtuse. Fruiting pedicels slender, straight, 2–4 mm, pilose in flower, glabrous in fruit. Sepals caducous, broadly ovate or suborbicular, 0.8–1.2 × 0.8–1 mm, sparsely pilose with crisped trichomes, broadly white at margin and apex. Petals white, obovate, 1.5–1.8 × 0.8–1 mm, base clawed, apex rounded. Stamens 6; filaments 0.7–1.5 mm, often conspicuously dilated at base; anthers oblong, 0.2–0.4 mm. Fruit suborbicular or broadly ovate-cordate, 2–2.5(–2.8) × 1.8–2.3 mm, wingless, base sometimes subcordate; apical notch absent or rarely ca. 0.05 mm; style 0.1–0.3 mm; stigma discoid, distinctly broader than style. Seeds reddish brown, oblong, 0.9–1.1 × 0.5–0.6 mm, pilose; cotyledons incumbent. Fl. May–Jun, fr. Jun–Jul.

Saline meadows or lowlands; 1000–3900 m. Gansu, Nei Mongol, Ningxia, Qinghai, Xinjiang, Xizang [Kazakhstan, Mongolia, Russia, Tajikistan].

The above first record from Xizang is based on Ladygin 312 (LE).


碱独行莱 jian du xing cai


Herbs perennial, (10–)15–35(–40) cm tall, puberulent with pilate or curved trichomes; caudex with fibrous petiolar remains of previous years. Stems erect, branched. Basal leaves rosulate, fleshy, persistent; petiole 1.5–5(–7) cm; leaf blade oblong, elliptic, (0.7–)1.7–4(–5) × (0.5–)0.8–1.5(–2.2) cm, usually glabrous, base cuneate or attenuate, margin entire, apex acute or obtuse. Cauleine leaves sessile; leaf blade elliptic, oblong, or lanceolate, 0.2–4.7 cm × 1–9 mm, glabrous or with subpressed trichomes, base usually amplexicaul, margin entire, apex acute. Fruiting pedicels divaricate, straight or slightly curved, 3–6 mm, puberulent adaxially. Sepals oblong, 1–1.2 × ca. 0.5 mm, pilose with crisped trichomes, white at margin and apex, apex acute. Petals white, obovate or oblanceolate, 1–1.6 × 0.3–0.8 mm, apex rounded; claw obscurely differentiated. Stamens 6; filaments 0.8–1.1 mm; anthers oblong, 0.2–0.3 mm. Fruit ovate, 2.3–3.3 × 2.1–2.7 mm; valves glabrous, prominently reticulate veined;
wing 0.1–0.2 mm; apical notch 0.05–0.2 mm; style 0.2–0.4 mm, exserted from apical notch. Seeds brown to reddish brown, obovate, 1.3–1.7 × 0.7–1 mm, papillate; cotyledons incumbent. Fl. Aug. 2n = 16.

Saline lowlands or steppe; 400–1000 m. Nei Mongol, Xinjiang [Afghanistan, Kazakstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan, Turkmnenistan, Uzbekistan; SW Asia, C and S Europe].


Herbs perennial, (25–)35–100(–110) cm tall. Stems simple few from base, many branched above, glabrous. Basal and lower cauleine leaves long petiole; papery; leaf blade linear-lanceolate or linear-oblong, (2–3)–12(–14) × (0.3–)1–2.5(–4) cm, base cuneate or attenuate, margin serrate, apex often acute. Upper cauleine leaves shortly petiole; leaf blade linear, (1–)2–8(–10) cm × (1–)2–7(–10) mm, base attenuate or cuneate, margin entire, apex acute. Fruiting pedicles (3–)4–5(–6) mm, slender, divericate. Sepals deciduous, ovate, 1–1.5 × 0.8–0.9 mm, glabrous, white at margin and apex. Petals white, broadly obovate, (2–)2.5–3 × 1–1.4 mm, apex rounded; claw 0.7–1 mm. Stamens 6; filaments 0.9–1.3 mm; anthers ovate, 0.2–0.3 mm. Fruit ovate-oblong or subobicular, 2.5–3.5 × 2–2.5 mm, glabrous, wingless, carinate at replum, base attenuate or cuneate; apical notch absent or obsolete; style obsolete or rarely to 0.1 mm; stigma wider than style. Seeds reddish brown, oblong, 1.5–2.2 × 0.7–1.2 mm, often 3-angled, wingless, finely papillate; cotyledons incumbent. Fl. May–Sep. fr. Jun–Oct. 2n = 24.

Fields, roadsides, slopes, saline meadows; 100–4300 m. Gansu, Hebei, Heilongjiang, Henan, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Xizang [Afghanistan, India, Kashmir, Kazakstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan, Turkmnenistan, Uzbekistan; N Africa, SW Asia, S Europe].

The above first record from Sichuan is based on *Martin s.n.*, 30 May 1890 (LE). Forms with sessile leaves and pubescent fruit are recognized as *Lepidium latifolium* subsp. or var. *laticolium*, whereas those with sessile leaves and glabrous fruit have variously been recognized as *L. affine*, *L. laticolium* var. *affine*, and *L. laticolium* subsp. *sibiricum*. However, such distinction is artificial, as plants with glabrous and pubescent fruit are often found in the same population.

The seeds are used in Gansu and N Shaanxi for medicine.


Drum独行菜 dun ye du xing cai


Herbs perennial, (30–)45–85(–110) cm tall. Stems erect, branched, glabrous. Basal and lowermost cauleine leaves petiole, withered early. Upper cauleine leaves sessile or subsessile; leaf blade oblong-ovate, oblone, or lanceolate, 0.3–9(–15) × 0.1–2.5(–4) mm, leathery, glabrous or rarely sparsely pubescent, base cuneate or obtuse, margin entire or rarely serrulate, apex obtuse or acute. Infructescence paniculate, ultimate branches capitulate. Fruiting pedicles 1–3(–4) mm, slender, pubescent. Sepals persistent, ovate or suborbicular, 0.9–1.5 × 0.8–1.5 mm, sparsely crisped pilose abaxially, broadly white at margin and apex. Petals white, oblong, 1.3–1.8(–2.2) × 0.8–0.9(–1) mm, base shortly clawed, apex rounded. Stamens 6; filaments 1–1.4 mm, slightly dilated or not dilated at base; anthers oblong, 0.3–0.4 mm. Fruit broadly ovate, 1.6–2.3 × 1.8–2.2 mm, glabrous or rarely sparsely puberulent, wingless, carinate at replum, base cordate; apical notch absent or obsolete; style obsolete or rarely to 0.1 mm; stigma discoid, much broader than style. Seeds brown, oblong, 0.8–1.1 × 0.5–0.6 mm, wingless; cotyledons incumbent. Fl. and fr. Jul–Aug. 2n = 16.

Pastures, field margins, waste places, deserts; 400–2800 m. Gansu, Nei Mongol, Ningxia, Qinghai, Xinjiang, Xizang [India, Kazakstan, Mongolia, Russia, Tajikistan, Uzbekistan].

干叶独行菜 kuan yuan du xing cai

*Lepidium affine* Ledebour; *L. latifolium* subsp. *affine* (Ledebour) Kitagawa; *L. latifolium* var. *affine* (Ledebour) C. A. Meyer; *L. latifolium* subsp. *sibiricum* Thellung; *L. sibiricum* Schweigger (1812), not Pallas (1776).

Herbs perennial, (20–)35–120(–150) cm tall. Stems erect, many branched above, slightly woody at base, glabrous or pubescent, often glaucous. Leaves leathery; petiole of basal and lower cauleine leaves 1–7(–11) cm; leaf blade elliptic-ovate or oblone, (2–)3.5–15(–25) × (0.5–)1.5–5(–8) cm, glabrous or pubescent with usually 3-angled trichomes, base attenuate, margin usually serrate, apex obtuse to subacute. Upper cauleine leaves subsessile or sessile; leaf blade elliptic-ovate, oblone, or lanceolate, 1–9 × 0.3–4.5 cm, base cuneate, not auriculate, margin serrate or entire, apex acute. Infructescence paniculate, ultimate branches capitulate. Fruiting pedicles slender, 2–5(–6) mm, glabrous or rarely pubescent. Sepals deciduous, oblone or suborbicular, 1–1.4 × 0.8–0.9 mm, glabrous or pubescent, white at margin and apex. Petals white, obovate, 1.8–2.5 × (0.8–)1–1.3 mm, apex rounded; claw 0.7–1 mm. Stamens 6; filaments 0.9–1.4 mm; anthers ovate, 0.4–0.5 mm. Fruit oblong-elliptic, ovate-elliptic, or suborbicular, (1.6–)1.8–2.4(–2.7) × 1.3–1.8 mm, pubescent or glabrous, not carinate, wingless, base rounded; apical notch absent or obsolete; style obsolete. Seeds light brown, oblong-ovate, (0.8–)1–1.3 × 0.7–0.9 mm, compressed, wingless, finely papillate; cotyledons incumbent. Fl. May–Sep, fr. Jun–Oct. 2n = 24.

Fields, roadside, slopes, saline meadows; 100–4300 m. Gansu, Hebei, Heilongjiang, Henan, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Xizang [Afghanistan, India, Kashmir, Kazakstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan, Turkmnenistan, Uzbekistan; N Africa, SW Asia, S Europe].

The seeds are used in Gansu and N Shaanxi for medicine.


**Lepidium perfoliatum** Linnaeus, Sp. Pl. 2: 643. 1753.

Herbs annual or biennial, (7–)15–40(–65) cm tall, glabrous throughout or sparsely pubescent below, often slightly glaucous. Stems erect, simple at base, branched or simple or branched. Basal and lowermost cauline leaves with petioles 0.5–1(–2) cm; leaf blade 2- or 3-pinnatified or -pinnatisect, (1–)3–8(–15) cm; ultimate lobes linear or narrowly oblanceolate. Upper cauline leaves sessile; leaf blade broadly ovate, cordate, or suborbicular, 0.5–1(–2.5) cm, base deeply cordate-amplexicaul, margin entire, apex acute. Fruiting pedicels divaricate, 3–5(–7) mm, slender, straight, glabrous, terete. Sepals yellowish green, oblong, 0.8–1(–1.3) × 0.5–0.8 mm. Petals yellow, narrowly spatulate, 1–1.5(–1.9) × 0.2–0.5 mm, base attenuate to a claw ca. 0.5 mm. Stamens 6; filaments 0.6–0.9 mm; anthers 0.1–0.2 mm. Fruit rhombic or orbicular, 3.4–5.5(–4.8) × 3–4 mm narrowly winged distally; wings apical, 0.2–0.4 mm; apical notch to 0.3 mm; style 0.1–0.3 mm, as long as or shorter than apical notch. Seeds brown, ovate, 1.6–2(–2.3) × 1.2–1.4 mm, narrowly winged all around; cotyledons incumbent. Fl. Mar–Jun, fr. May–Jul. 2n = 16.

Waste places, dry sandy slopes; near sea level to 1000 m. Gansu, Jiangsu, Liaoning, Shanxi, Xinjiang [Afghanistan, India, Japan, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan]; Africa, Europe; introduced elsewhere.

Sometimes eaten as a vegetable or used medicinally as an antiscorbutic.


**Lepidium perfoliatum** Linnaeus, Sp. Pl. 2: 643. 1753.
broadly elliptic, rarely ovate or suborbicular, 2.9–3.4 × 2.4–2.8 mm, glabrous; wing apical, 0.1–0.2 mm; apical notch 0.05–0.1 mm; style 0.1–0.3 mm, usually exerted from apical notch. Seeds brown, oblong-ovate, 1.4–1.5 × ca. 0.8 mm, pitted; cotyledons incumbent. Fl. and fr. Mar–Aug.

- Mountain slopes, roadsides, river beaches; 600–2700 m. Gansu, Guizhou, Jiangxi, Qinghai, Shaanxi, Sichuan, Yunnan.


头花独行菜 tou hua du xing cai


Herbs annual or biennial, (5–)10–35(–50) cm tall, densely covered with capitate or clavate papillate trichomes. Stems prostrate or rarely suberect, branched basally and above. Basal and lower cauline leaves with petioles 0.5–4 cm; leaf blade oblong, spatulate, or lanceolate, (0.5–)1–4(–7) × 0.2–2 cm, usually glabrous, pinnatifid, base attenuate; lobes oblong, lanceolate, or linear, 2–8(–15) × 0.5–3(–5) mm, 1- or 2-pinnatifid or partite, serrate, or entire. Upper cauline leaves slightly petiolate or subsessile, similar to lowermost leaves, progressively smaller upward. Racemes capitate, elongated slightly or not elongated in fruit. Fruiting pedicels slender, divaricate, slightly recurved, with papillate trichomes and capitulate trichomes. Stems prostrate or rarely suberect, branched above. Basal leaves with petioles 0.5–4 cm; leaf blade oblong, spatulate, or lanceolate, (0.5–)1–4(–7) × 0.2–2 cm, usually glabrous; wing apical, 0.1–0.2 mm; style 0.1–0.2 mm, included in apical notch. Seeds brown, oblong-ovate, 1–1.5(–2) × 0.6–0.8 mm, base attenuate, rarely subulate, rarely rudimentary. Stamens 2; filaments 0.6–0.8 mm; anthers 0.1–0.2 mm. Fruit orbicular, 2.5–3.5(–4) mm in diam., narrowly winged apically, apex emarginate; apical notch 0.2–0.5 mm; style 0.1–0.2 mm, included in apical notch. Seeds reddish brown, ovate-oblong, usually narrowly winged at least distally, 1.3–1.7(–1.9) × 0.7–1 mm; cotyledons incumbent. Fl. Apr–Jun, fr. May–Sep. 2n = 32*.

Fields, roadsides, waste places, grassy areas; near sea level to 1000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hunan, Jiangsu, Jiangxi, Liaoning, Shandong, Sichuan, Taiwan, Yunnan, Zhejiang [Bhutan, India, Japan, Pakistan, Russia; native to North America; introduced elsewhere].

The seeds are used medicinally.


柱毛独行菜 zhu mao du xing cai

Herbs annual or biennial, (5–)10–35(–55) cm tall, fetid, puberulent with terete papillate trichomes. Stems erect or ascending, branched above. Basal leaves with petioles 1–2(–3) cm; leaf blade (1 or 2)- or 3-pinnatisect, (1.5–)3–5(–6) × (0.5–)0.7–2(–2.5) cm, glabrous except for ciliate margin; ultimate lobes oblong, entire or rarely toothed, acute. Upper cauline leaves sessile; leaf blade linear, (0.4–)1–2(–3) cm × (0.3–)0.5–2.5(–3.5) mm, sparsely pubescent, base cuneate, not auriculate, margin usually entire, ciliate, apex obtuse to subacute. Fruiting pedicels slender, divaricate, straight or slightly curved, (1.5–)2–4(–5) mm, puberulent all around. Sepals oblong, 0.5–0.9(–1) × 0.2–0.4 mm, puberulent with papillate trichomes, margin and apex white. Petals absent, sometimes rudimentary and to 0.4 mm. Stamens 2; filaments 0.7–0.8 mm; anthers ovate, 0.1–0.2 mm. Fruit broadly elliptic, (1.5–)1.8–2.5(–3) × 1.5–2(–2.3) mm, narrowly winged apically; apical notch 0.1–0.2 mm; style to 0.1 mm, included in apical notch. Seeds brown, oblong or ovate-oblong, 1–1.5 × 0.6–0.7 mm, wingless, finely papillate; cotyledons incumbent. Fl. and fr. May–Jul. 2n = 16, 32*.

Sandy soil, pastures; 300–1100 m. Xinjiang [India, Kazakhstan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia, Europe; introduced in North America].

Lepidium ruderale was recorded in FRPS from Gansu, Henan, Hebei, Jilin, Liaoning, Ningxia, Qinghai, Shaanxi, and Shandong. The present authors have seen no material from these provinces, and it is likely that these records are based on misidentified plants of L. apetalum. The former is a fetid plant, puberulent with curved, usually subapressed trichomes. Stems prostrate, branched above. Basal leaves with petioles 0.5–3.5 cm; leaf blade oblong-obovate, spatulate, or oblanceolate, (1–)2.5–10(–15) × 0.5–3(–5) cm, margin pinnatifid or lyrate; lobes oblong, serrate or dentate, apex acute. Cauline leaves slightly petiolate; leaf blade oblanceolate or linear, 1–6 cm × (2–)5–10 mm, base attenuate to subcuneate, margin serrate or entire, apex acute. Infructescence lax or rarely dense; puberulent with curved, subapressed trichomes. Fruiting pedicels slender, straight, spreading, 2.5–4(–6) mm, usually glabrous abaxially. Sepals oblong, (0.5–)0.7–1(–1.1) × 0.5–0.7 mm, margin and apex white, pi-

lose outside. Petals white, spatulate, 1–1.5(–2) × 0.2–0.6 mm, base attenuate, apex rounded, rarely rudimentary. Stamens 2; filaments 0.6–0.8 mm; anthers 0.1–0.2 mm. Fruit orbicular, 2.5–3.5(–4) mm in diam., narrowly winged apically, apex emarginate; apical notch 0.2–0.5 mm; style 0.1–0.2 mm, included in apical notch. Seeds reddish brown, ovate-oblong, usually narrowly winged at least distally, 1.3–1.7(–1.9) × 0.7–1 mm; cotyledons incumbent. Fl. Apr–Jun, fr. May–Sep. 2n = 32*.


密花独行菜 mi hua du xing cai

Lepidium neglectum Thellung.
Herbs annual or biennial, (10–)25–50(–65) cm tall, puberulent with minute straight papillae, rarely glabrous. Stems erect, branched above. Basal leaves rosulate, withered early; petiole 0.5–1.5(–2) cm; leaf blade often oblanceolate, rarely spatulate or oblong, (1.5–)2.5–8(–11) cm × 5–10(–20) mm, base attenuate, margin coarsely serrate or pinnatifid, apex acute. Cauline leaves shortly petiolate; leaf blade narrowly oblanceolate or linear, irregularly serrulate or dentate, rarely subentire, reduced in size upward. Infructescences dense; rachis papillae straight, slender or subclavate. Fruiting pedicels slender, divaricate, slightly recurved, somewhat flattened, (1.5–)2–3.5(–4) mm, puberulent or pubescent, adaxially. Sepals oblong, 0.5–0.8(–1) × 0.3–0.5 mm, glabrous or sparsely pilose near apex, margin white. Petals usually absent, rarely filiform and 0.3–0.9 mm. Stamens 1; filaments filiform, 0.6–1 mm; anthers ovate, 0.1–0.2 mm. Fruit obovate to obovate-suborbicular, (2–)2.5–3(–3.5) × 1.5–2.5(–3) mm, widest above middle, apex obtuse or emarginate; apical wings ca. 0.5 mm; apical notch 0.2–0.4 mm; style 0.1–0.2 mm, included in apical notch. Seeds brown, ovate, wingless or obscurely winged, 1.1–1.3(–1.5) × 0.8–0.9 mm; cotyledons incipient. Fl. May–Jun, fr. Jun–Jul. 2n = 32.
Seashores, sandy places, roadsides; near sea level to 3800 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shanxi, Shandong, Yunnan [Korea, Mongolia, Russia, Tajikistan; native to North America; introduced elsewhere].

16. Lepidium apetalum Thellung.
Herbs annual, biennial, or perennial with woody caudex. Trichomes absent or simple. Stems prostrate or ascending, rarely erect. Basal leaves sometimes rosulate, 1–3-pinnatisect, rarely serrate. Cauline leaves petiolate or subsessile, entire, serrate, or pinnatisect. Racemes many flowered, ebracteate. Fruiting pedicels erect or divaricate. Sepals oblong, elliptic, ascending or spreading, base of lateral pair not saccate. Petals white or violet, longer or shorter than sepals, sometimes vestigial or absent; blade obovate, oblong, oblanceolate-linear, or subulate, obtuse; claw usually absent. Stamens 6 and tetracycamous, (2–)2.5–8(–11) cm × 5–10(–20) mm, base attenuate, margin coarsely serrate or pinnatifid, apex acute. Cauline leaves shortly petiolate; leaf blade narrowly oblanceolate or linear, irregularly serrulate or dentate, rarely subentire, reduced in size upward. Infructescences dense; rachis papillae straight, slender or subclavate. Fruiting pedicels slender, often recurved, 2–4(–5) mm, puberulent only adaxially with clave or capitulate trichomes, slightly flattened or narrowly winged. Sepals caducous, oblong, 0.7–0.8 × 0.3–0.4 mm, glabrous or puberulent, white at margin and apex. Petals absent, or rudimentary, linear, ca. 0.3 mm. Stamens 2; filaments 0.7–0.8 mm; anthers broadly obovate, 0.1–0.2 mm. Fruit broadly elliptic, 2.2–3.1 × 1.7–2.3 mm, widest at middle, apex narrowly winged; apical notch 0.1–0.3 mm; style 0.05–0.15 mm, included in apical notch. Seeds reddish brown, obovate-oblong, 1.1–1.3 × 0.6–0.8 mm, wingless, finely papillate; cotyledons incipient. Fl. Apr–Aug, fr. May–Sep. Roadsides, slopes, waste places, ravines, plains, fields; 400–4800 m. Anhui, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Shandong, Shandong, Shape, Sichuan, Xinjiang, Xizang, Yunnan, Zhejiang [India, Japan, Kazakhstan, Korea, Mongolia, Nepal, Pakistan].
The above first record from Mongolia is based on Chaney 498 (US).


Senebiera de Candolle.
Herbs annual, biennial, or perennial with woody caudex. Trichomes absent or simple. Stems prostrate or ascending, rarely erect. Basal leaves sometimes rosulate, 1–3-pinnatisect, rarely serrate. Cauline leaves petiolate or subsessile, entire, serrate, or pinnatisect. Racemes many flowered, ebracteate. Fruiting pedicels erect or divaricate. Sepals oblong, elliptic, ascending or spreading, base of lateral pair not saccate. Petals white or violet, longer or shorter than sepals, sometimes vestigial or absent; blade obovate, oblong, oblanceolate-linear, or subulate, obtuse; claw usually absent. Stamens 6 and tetracycamous, (2–)2.5–8(–11) cm × 5–10(–20) mm, base attenuate, margin coarsely serrate or pinnatifid, apex acute. Cauline leaves shortly petiolate; leaf blade narrowly oblanceolate or linear, irregularly serrulate or dentate, rarely subentire, reduced in size upward. Infructescences dense; rachis papillae straight, slender or subclavate. Fruiting pedicels slender, often recurved, 2–4(–5) mm, puberulent only adaxially with clave or capitulate trichomes, slightly flattened or narrowly winged. Sepals caducous, oblong, 0.7–0.8 × 0.3–0.4 mm, glabrous or puberulent, white at margin and apex. Petals absent, or rudimentary, linear, ca. 0.3 mm. Stamens 2; filaments 0.7–0.8 mm; anthers broadly obovate, 0.1–0.2 mm. Fruit broadly elliptic, 2.2–3.1 × 1.7–2.3 mm, widest at middle, apex narrowly winged; apical notch 0.1–0.3 mm; style 0.05–0.15 mm, included in apical notch. Seeds reddish brown, obovate-oblong, 1.1–1.3 × 0.6–0.8 mm, wingless, finely papillate; cotyledons incipient. Fl. Apr–Aug, fr. May–Sep. Roadsides, slopes, waste places, ravines, plains, fields; 400–4800 m. Anhui, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan, Zhejiang [India, Japan, Kazakhstan, Korea, Mongolia, Nepal, Pakistan].
The above first record from Mongolia is based on Chaney 498 (US).


1a. Cauline leaves entire, 1–5 mm wide; stems puberulent with minute trichomes to 0.15 mm ....... 1. C. integrifolius
1b. Cauline leaves pinnatisect or pinnatifid, broader; stems pilose with trichomes to 1 mm ............... 2. C. didymus
Basal leaves not rosulate, soon deciduous; petiole 5–10 mm; blade lanceolate or spatulate, 2–4 cm, margin entire, dentate, or pinnatifid, apex acute. Middle cauline leaves narrowly lanceolate, oblanceolate, or linear (0.5–)1–5 (–7.5) cm × 1–5 mm, base attenuate and petioloike, margin entire or rarely serrate or incised, apex acute or acuminate. Racemes terminal or lateral, leaf-opposed. Fruiting pedicels slender, erect or ascending, straight, 1–3(–4.5) mm, glabrous or pubescent. Sepals greenish white or purplish, elliptic, 0.7–1 mm, ascending or spreading. Petals white, linear, 0.6–1 mm. Stamens 2, median; filaments white, dilated at base, 0.4–0.7 mm; anthers ovoid, ca. 0.1 mm. Fruit 0.9–1.5(–2) × 1.7–2.5(–3.5) mm, didymous, not compressed, emarginate at apex and base; valves subglobose, prominently reticulate or rugose, rarely smooth, rounded on back; style obsolete to 0.1 mm, included in apical notch. Seeds oblong, finely reticulate, 0.8–1.2 × 0.6–0.8 mm.

Roadsides, waste places. Guangdong, Taiwan [native to Africa].


臭荠 xiu qi


群心菜属 qun xin cai shu

Hymenophysa C. A. Meyer; Physolepidion Schrenk.

Herbs perennial, rhizomatous. Trichomes simple. Stems erect or rarely decumbent, branched above. Basal leaves petiolate, rosulate or not, lyrate, sinuate, dentate, or entire. Cauline leaves sessile, auriculate, sagittate, or amplexicaul at base, margin entire or dentate. Racemes ebracteate, corymbose, grouped in panicles, elongated slightly in fruit. Fruiting pedicels slender, divaricate. Sepals ovate or oblong, deciduous, erect or spreading, base of lateral pair not saccate, margin membranous. Petals white; blade obovate or spatulate, apex obtuse; claw subequaling sepals. Stamens 6, tetradynamous; anthers ovoid, ca. 0.1 mm. Fruit 1.3–1.7 × 2.5 mm, didymous, compressed, emarginate at apex and base; valves subreniform, semicircular, or suboblong, prominently reticulate or rugose, rounded on back; style absent, sometimes obsolete, included in apical notch. Seeds oblong, curved, finely reticulate, 1–1.2 × 0.7–0.8 mm. Fl. Mar–Jun. 2n = 32.

Roadsides, waste areas, fields; near sea level to 1000 m. Anhui, Fujian, Guangdong, Hubei, Jiangsu, Jiangxi, Shandong, Sichuan, Taiwan, Xinjiang, Yunnan, Zhejiang [native to South America; naturalized elsewhere].

Herbs annual or rarely biennial, fetid, 10–45(–70) cm tall, glabrous or pilose with straight trichomes to 1 mm. Stems procumbent or erect, usually several from base, branched above. Basal leaves not rosulate, pinnatisect or bipinnatisect, 4–10 cm; lateral lobes 2–7(–10) on each side of rachis, variable in size, entire, dentate, or incised, acute. Middle cauline leaves similar to basal ones, 1.5–3.5(–4.5) × 0.5–1.2 cm, progressively smaller and less divided upward, shortly petiolate to subsessile; lobes lanceolate to oblong or elliptic, entire to serrate or incised. Racemes terminal or lateral and leaf opposed. Fruiting pedicels slender, ascending to divaricate or slightly reflexed, straight or recurved, 1.5–2.5(–4) mm, glabrous or pubescent. Sepals ovate, 0.5–0.7(–0.9) mm, ascending to spreading, glabrous or pubescent. Petals white, elliptic to linear, 0.4–0.5 mm. Stamens 2 or rarely 4; filaments white, dilated at base, 0.3–0.6 mm; anthers ovoid, 0.1–0.2 mm. Fruit 1.3–1.7 × 2.5 mm, didymous, compressed, emarginate at apex and base; valves subreniform, semicircular, or suboblong, prominently reticulate or rugose, rounded on back; style absent, sometimes obsolete, included in apical notch. Seeds oblong, curved, finely reticulate, 1–1.2 × 0.7–0.8 mm. Fl. Mar–Jun. 2n = 32.

Roadsides, waste areas, fields; near sea level to 1000 m. Anhui, Fujian, Guangdong, Hubei, Jiangsu, Jiangxi, Shandong, Sichuan, Taiwan, Xinjiang, Yunnan, Zhejiang [native to South America; naturalized elsewhere].

The genus Cardaria differs from Lepidium in having indehiscent fruit and conflu ent instead of separate nectar glands. However, it is highly questionable if these differences justify the recognition of two independent genera. In fact, recent molecular studies clearly show that the nearest relatives of Cardaria are the L. campestris group. Critical taxonomic studies of the boundaries of these two genera are needed.

1a. Fruit cordate, ovoid, or subglobose; valves flattened, sometimes slightly inflated, carinate, glabrous or sparingly pubescent when young .......................................................... 1. C. draba

1b. Fruit globose; valves semiglobose, inflated, not or only obscurely carinate, often densely puberulent, rarely subglobose ................................................................. 2. C. pubescens


群心菜 qun xin cai

Herbs annual or rarely biennial, fetid, 10–45(–70) cm tall, glabrous or pilose with straight trichomes to 1 mm. Stems procumbent or erect, usually several from base, branched above. Basal leaves not rosulate, pinnatisect or bipinnatisect, 4–10 cm; lateral lobes 2–7(–10) on each side of rachis, variable in size, entire, dentate, or incised, acute. Middle cauline leaves similar to basal ones, 1.5–3.5(–4.5) × 0.5–1.2 cm, progressively smaller and less divided upward, shortly petiolate to subsessile; lobes lanceolate to oblong or elliptic, entire to serrate or incised. Racemes terminal or lateral and leaf opposed. Fruiting pedicels slender, ascending to divaricate or slightly reflexed, straight or recurved, 1.5–2.5(–4) mm, glabrous or pubescent. Sepals ovate, 0.5–0.7(–0.9) mm, ascending to spreading, glabrous or pubescent. Petals white, elliptic to linear, 0.4–0.5 mm. Stamens 2 or rarely 4; filaments white, dilated at base, 0.3–0.6 mm; anthers ovoid, 0.1–0.2 mm. Fruit 1.3–1.7 × 2.5 mm, didymous, compressed, emarginate at apex and base; valves subreniform, semicircular, or suboblong, prominently reticulate or rugose, rounded on back; style absent, sometimes obsolete, included in apical notch. Seeds oblong, curved, finely reticulate, 1–1.2 × 0.7–0.8 mm. Fl. Mar–Jun. 2n = 32.

Roadsides, waste areas, fields; near sea level to 1000 m. Anhui, Fujian, Guangdong, Hubei, Jiangsu, Jiangxi, Shandong, Sichuan, Taiwan, Xinjiang, Yunnan, Zhejiang [native to South America; naturalized elsewhere].

The genus Cardaria differs from Lepidium in having indehiscent fruit and conflu ent instead of separate nectar glands. However, it is highly questionable if these differences justify the recognition of two independent genera. In fact, recent molecular studies clearly show that the nearest relatives of Cardaria are the L. campestris group. Critical taxonomic studies of the boundaries of these two genera are needed.

1a. Fruit cordate, ovoid, or subglobose; valves flattened, sometimes slightly inflated, carinate, glabrous or sparingly pubescent when young .......................................................... 1. C. draba

1b. Fruit globose; valves semiglobose, inflated, not or only obscurely carinate, often densely puberulent, rarely subglobose ................................................................. 2. C. pubescens


群心菜 qun xin cai

Herbs annual or rarely biennial, fetid, 10–45(–70) cm tall, glabrous or pilose with straight trichomes to 1 mm. Stems procumbent or erect, usually several from base, branched above. Basal leaves not rosulate, pinnatisect or bipinnatisect, 4–10 cm; lateral lobes 2–7(–10) on each side of rachis, variable in size, entire, dentate, or incised, acute. Middle cauline leaves similar to basal ones, 1.5–3.5(–4.5) × 0.5–1.2 cm, progressively smaller and less divided upward, shortly petiolate to subsessile; lobes lanceolate to oblong or elliptic, entire to serrate or incised. Racemes terminal or lateral and leaf opposed. Fruiting pedicels slender, ascending to divaricate or slightly reflexed, straight or recurved, 1.5–2.5(–4) mm, glabrous or pubescent. Sepals ovate, 0.5–0.7(–0.9) mm, ascending to spreading, glabrous or pubescent. Petals white, elliptic to linear, 0.4–0.5 mm. Stamens 2 or rarely 4; filaments white, dilated at base, 0.3–0.6 mm; anthers ovoid, 0.1–0.2 mm. Fruit 1.3–1.7 × 2.5 mm, didymous, compressed, emarginate at apex and base; valves subreniform, semicircular, or suboblong, prominently reticulate or rugose, rounded on back; style absent, sometimes obsolete, included in apical notch. Seeds oblong, curved, finely reticulate, 1–1.2 × 0.7–0.8 mm. Fl. Mar–Jun. 2n = 32.
decumbent basally, many branched above. Basal leaves withered by anthesis, petiolate; leaf blade obovate, spatulate, or ovate, (1.5–)3–10(–15) × 1–4 cm, margin sinuate-dentate, apex obtuse. Cauline leaves sessile; leaf blade ovate, elliptic, oblong, or lanceolate, oblan-CEO, or obovate, (1–)3–9(–15) × (0.5–)1–2(–5) cm, pubescent or glabrous, base sagittate-amplexicaul or auriculate, margin dentate or entire, apex acute or acuminate. Fruiting pedicels 5–10(–15) mm, divaricate or ascending, slender. Sepals oblong, 1.5–2.5 mm, glabrous, margin white. Petals white, obovate, (2.5–)3–4(–4.5) × (1–)1.3–2(–2.2) mm, shortly clawed, apex rounded. Filaments 2–3 mm; anthers ovate, 0.4–0.5 mm. Fruit cordate, ovoid, or subglobose, (2.5–)3.5–6(–7) mm, base cordate, rounded, obtuse, or truncate, apex obtuse or acute; valves flattened or somewhat inflated, carinate, reticulate or not, glabrous or sparsely minutely pubescent when young; style (0.7–)1–1.8(–2) mm. Seeds dark brown, ovoid, 1.5–2 × 1–1.2 mm. Fl. May–Jun, fr. Jul–Aug.

Mountain slopes, roadsides, fields, agricultural lands, river banks, pastures, waste areas; near sea level to 4200 m. Gansu, Shandong, Xinjiang, Xizang [Afghanistan, Kashmir, Kazakstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia, Europe and North and South America].

1a. Fruit base cordate, valves prominently reticulate, glabrous ..................... 1a. subsp. draba
1b. Fruit base rounded, obtuse, or truncate, valves not or obscurely reticulate, glabrous or sparsely puberulent when young ..................................................... 1b. subsp. chalepensis

1a. Cardaria draba subsp. draba


球果群心菜 qiu guo qun xin cai


菘蓝属 song lan shu

Herbs annual, biennial, or perennial, often glaucous. Trichomes absent or simple. Stems erect, simple at base, panicately branched above. Basal leaves petiolate or rarely sessile, rosulate or not, simple, entire, dentate, or pinnately lobed. Cauline leaves sessile and auriculate, sagittate, or amplexicaul at base, rarely petiolate and attenuate, entire or dentate. Racemes many flowered, ebracteate, forming panicles, elongated considerably in fruit. Fruiting pedicels filiform, often thickened and clavate at apex, reflexed. Sepals ovate or oblong, erect or ascending, base of lateral pair not saccate. Petals yellow, as long as or longer than sepals; blade obovate, spatulate, oblong, or oblongate, apex obtuse or subapiculate; claw absent. Stamens 6, slightly tetracycious; anthers ovate or oblong, apiculate or obtuse at apex. Nectar glands confluent, or 4 and median and lateral pairs distinct. Ovules 1(0–2) per ovary, subapical. Fruit indehiscent, samaroid silicles or silicules, oblong, ovate, obovate, cordate, elliptic, oblongate, spatulate, or orbicular, strongly angustiseptate, sessile, prominently winged all around or distally, 1(0–2)-seeded, glabrous or hairy, smooth; seed-bearing locule papery or corky, prominently or obscurely 1- or 3-veined, sometimes keeled or shortly winged; valves and replum united; gynophore, style, and septum absent; stigma capitate, entire. Seeds wingless, narrowly oblong, plump; seed coat smooth, not mucilaginous when wetted; cotyledons incumbent or accumbent.

About 50 species: primarily in C and SW Asia; four species in China.

1. fruit winged only above the middle, constricted and often curved at middle, spatulate, often with crisped trichomes; petals 1–2 mm .......................................................... 1b. Fruit winged all around, not curved and rarely slightly constricted at middle, variously-shaped but not spatulate, trichomes straight; petals (2.2–)2.5–4 mm.

1b. Fruit winged all around, not curved and rarely slightly constricted at middle, variously-shaped but not spatulate, trichomes straight; petals (2.2–)2.5–4 mm.

2a. Fruiting pedicels slender throughout; fruit oblong-pandurate, densely puberulent with subclavate trichomes, apex emarginate or rarely truncate .......................................................... 1. I. violascens

2b. Fruiting pedicels clavate at apex; fruit oblong, elliptic, oblong-oblongate, or elliptic-obovate, glabrous or pubescent with slender trichomes, apex acute, obtuse, rounded, or rarely subapiculate.

3a. Fruit only with a prominent midvein and inconspicuous lateral veins, widest above middle, black or blackish brown .......................................................................................... 2. I. tinctoria

3b. Fruit with prominent midvein and two lateral veins, widest at middle, light brown ........ 3. I. costata


宽翅菘蓝 kuan chi song lan

Herbs annual, 20–60 cm tall, glabrous and glaucous throughout except for fruit, sometimes sparsely pilose. Stems branched above. Basal leaves petiolate or subsessile, withered at flowering; leaf blade oblongate, obovate, or ovate, 3.5–7 × 1–2 cm, glabrous, margin entire or obscurely toothed, apex obtuse or rounded. Cauline leaves sessile; leaf blade ovate, lanceolate, oblong-lanceolate, or narrowly oblong, (1–)2.5–6(–8) × (0.2–)0.6–2.5(–4) cm, base cordate-amplexicaul or auriculate, margin entire, apex acute or acuminate. Fruiting pedicels slender, not thickened at apex, (5–)7–10(–15) mm. Sepals purplish, white at apex, oblong, 1.3–1.8 × 0.5–0.8 mm, glabrous or pilose. Petals white, oblong-spatulate, 2.2–2.8(–3) × 0.5–0.8 mm, base cuneate, apex rounded. Filaments 1.2–2 mm; anthers ovate, 0.2–0.3 mm. Fruit oblong-pandurate, (7–)8–10(–12) × (3.5–)4–5 mm, densely puberulent with minute, simple, subclavate trichomes, subequally winged at base and margin, base rounded, apex emarginate or rarely truncate; locule 5–6(–7) mm; wings 1–2 mm wide at base and margin, 2–3 mm wide at apex. Seeds yellowish brown, oblong, 2.5–3(–3.5) × 1–1.4 mm. Fl. and fr. Apr–Jun.
some times slightly constricted, apex subacute, rounded, or rarely subemarginate; locule 3–6(–10) mm, with a distinct midvein and inconspicuous lateral veins; apical wing 3.5–5(–7) mm wide. Seeds light brown, narrowly oblong, 2.3–3.5(–4.5) × 0.8–1 mm. Fl. Apr–Jun, fr. May–Jul. 2n = 14, 28*.

Fields, pastures, roadsides, waste places; 600–2800 m. Fujian, Gansu, Guizhou, Hebei, Henan, Hubei, Jiangxi, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan, Zhejiang [Japan, Kazakhstan, Korea, Mongolia, Pakistan, Russia, Tajikistan, Uzbekistan; SW Asia, Europe; naturalized elsewhere].

The above first record of *Isatis tinctoria* from Xizang is based on *Falco ner s.n. (K). Isatis tinctoria* is a European and probably Asian species very polymorphic in fruit shape, shape and size of auricles of cauline leaves, and the amount of indumentum. It has been cultivated since ancient times as a source of a dark blue dye (woad) obtained by fermenting the leaves and lower portions of the plant. Glabrous forms with oblong fruit and poorly developed or obtuse leaf auricles have been recognized as *I. indigotica*. By contrast, glabrous or hairy forms with cuneiform or oblong-triangular fruit and well-developed, often acute leaf auricles are called *I. tinctoria*. However, every conceivable morphological intermediate between the two forms occurs in China, as well as elsewhere in Asia, Europe, and North America, where they are introduced and naturalized.

The roots and leaves are used for medicinal purposes and a source of dye, and the seed oil is used in industry.


三肋菘蓝 san lei song lan

*Isatis costata var. lasiocarpa* (Ledebour) N. Busch; *I. costata var. lasiocarpa* Ledebour; *I. lasiocarpa* Ledebour.

Herbs annual or biennial, 40–120 cm tall. Stems erect, much branched above, glabrous, slightly glaucous. Leaves glabrous or sparsely pilose. Basal leaves soon withered; petiole (0.5–)1–5 cm; leaf blade obovate-oblong, obo lanceolate, or spatulate, (2–)8–9(–14) × (0.5–)1–3 cm, margin entire or dentate. Middle cauline leaves sessile; leaf blade narrowly oblong, lanceolate, or lanceolate-ovate, (1–)3–8(–11) × (0.3–)0.5–2(–3) cm, base auriculate or amplexicaul, margin entire, apex obtuse or subacute. Fruiting pedicels slender, thickened and subclavate at apex, 4–8 mm, glabrous. Sepals oblong, 1.5–1.8 × 0.5–0.8 mm, glabrous. Petals yellow, obovate-ob lanceolate, 2.5–3 × 0.5–0.8(–1) mm, apex obtuse. Filaments 1–1.8 mm; anthers ovate, 0.4–0.5 mm. Fruit oblong or elliptic, rarely obovate-obovate, (0.7–)0.9–1.2(–1.5) cm × 3–5(–6) mm, broader at middle, glabrous or sparsely to densely pubescent, base and apex rounded to subacute, winged all around; locule (3–)4–6(–9) mm, usually conspicuously 3-ribbed or with a prominent midvein and 2 lateral ones, rarely 2-seeded; apical wings (1.5–)2–3.5 mm wide. Seeds yellowish brown, narrowly oblong, 2.5–3.5 × 0.9–1.3 mm. Fl. and fr. Jun–Aug. 2n = 28*.

Mountain slopes, steppe, hillsides, roadsides; 700–2500 m. Gansu, Liaoning, Nei Mongol, Xinjiang [Kashmir, Kazakhstan, Mongolia, Pakistan, Russia, Tajikistan].

The record in FRPS and provincial Chinese floras of *Isatis oblongata* de Candolle is based on misidentified plants of *I. costata* or *I. tinctoria*. *Isatis oblongata* perhaps deserves only infraspecific rank under *I. costata*. Forms with glabrous or densely pubescent fruit often occur in the same population and, therefore, var. *lasiocarpa* does not merit recognition.


小菘蓝 xiao guo song lan

Herbs annual, (6–)12–40(–60) cm tall, glabrous or distally pilose on sepals, pedicels, and fruit. Stems erect, branched, glabrous. Basal leaves subsessile or attenuate to a petiolelike base; leaf blade oblong or spatulate, (1.5–)3–6(–12) × (0.3–)0.5–1.5 cm, base attenuate, margin subulate-dentate or subentire, apex obtuse. Middle cauline leaves sessile; leaf blade oblong or linear-lanceolate, (0.5–)1–4(–6) cm × 2–10(–20) mm, glabrous or sparsely crisped hairy, base auriculate-amplexicaul, margin entire, apex acute. Fruiting pedicels filiform, deflexed, 2–5 mm, conspicuously thickened and subclavate at apex, white crisped hairy. Sepals oblong, 0.8–1.5 × 0.4–0.7 mm, crisped hairy. Petals yellow, obovate-ob lanceolate, (1–)1.5–2 × 0.4–0.8 mm, base attenuate, apex obtuse. Filaments 1–1.5 mm; anthers ovate, 0.1–0.2 mm. Fruit spatulate or oblanceolate, usually curved at locule, 0.8–1.4(–1.5) cm, 2–4 mm wide at apex, glabrous or pubescent with crisped trichomes, base and middle not winged, somewhat corky, apex distinctly winged, emarginate; locule 4–6 mm; wings 3–5 mm wide. Seeds light brown, narrowly oblong, 2.5–3 × 0.6–0.8 mm. Fl. and fr. May–Jun. 2n = 42*, 34.

Deserts, steppe, roadsides; 300–700 m. Gansu, Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].


Herbs annual, glabrous throughout or pilose, sometimes fruit papillate. Trichomes simple, papillate. Stems erect or ascending, branched. Basal leaves petiolate, not rosulate, simple, entire. Cauline leaves sessile, auriculate, sagittate, or amplexicaul, entire. Racemes several flowered, ebracteate, elongated in fruit, grouped in panicles. Fruiting pedicels filiform, reflexed or rarely divaricate. Sepals ovate or oblong, ascending, base of lateral pair not saccate, margin not membranous. Petals yellow, slightly longer than sepals; blade obovate or oblanceolate, apex obtuse; claw
absent. Stamens 6, slightly tetradynamous; filaments, not dilated at base; anthers subglobose or broadly ovate, obtuse at apex. Nectar glands confluent and subtending bases of all stamens; median glands present; lateral glands annular. Ovules 1 per ovary; placentation subapical. Fruit indehiscent, achenelike silicles, oblong, ovate, elliptic, or oblong-linear, angustiseptate, sessile, sometimes constricted above seed-bearing portion; valves papery, corky and thick winged all around, veinless, glabrous or papillate; replum rudimentary; septum absent; style absent; stigma capitate, entire. Seeds wingless, oblong, plump; seed coat smooth, not mucilaginous when wetted; cotyledons incumbent.

Three species: C and SW Asia; two species in China.

1a. Fruit elliptic, elliptic-oblong, or ovate, not constricted above middle, 2–4 mm, apex obtuse .......... 1. *P. multicaule*
1b. Fruit subpyriform, constricted above middle, 4–5 mm, apex truncate or subemarginate .................. 2. *P. brevipes*


短梗厚壁荠  duan geng hou bi qi

*Pachypterygium multicaule* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 159. 1842; *Isatis multicaulis* (Karelin & Kirilov) Jafri; *Pachypterygium densiflora* (Bunge) Parsa; *P. lamprocarpa* (Bunge) Parsa; *Pachypterygium densiflorum* Bunge; *P. echinatum* Jarmolenko; *P. lamprocarpum* Bunge; *P. microcarpum* Gillii; *P. praemontanum* Jarmolenko; *P. ramosum* Jarmolenko ex Pavlov.

Herbs 8–25 cm tall, glabrous throughout except sometimes for fruit. Stems erect or ascending, several to many branched below and above. Basal leaves subsessile, soon withered; lowest cauline leaves sessile, oblong-ovate, (1–)2–3.5 cm × 5–13(–20) mm, subfleshy, base auriculate or subapplanic, margin entire or repand, apex obtuse. Uppermost cauline leaves ovate-cordate, 0.5–3 cm × (1–)2–7(–10) mm, subfleshy, base subapplanic, margin entire, apex obtuse. Fruiting pedicels filiform, divaricate or reflexed, to 4 mm. Sepals yellowish, oblong, (0.6–)0.7–1 × ca. 0.4 mm. Petals yellow, oblong-ovate or obovate, 1–2 × 0.3–0.7 mm, apex obtuse; claw absent. Filaments yellowish, 0.7–1.1 mm; anthers subglobose, 0.1–0.2 mm. Fruit subpyriform, 4–5 × 1.5–2 mm, base obtuse, apex truncate or subemarginate; valves glabrous or pubescent, papillate in the middle. Seeds narrowly oblong, yellowish, ca. 2 × 1 mm. Fl. and fr. Apr.–Jun.

Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

Herbs 8–20(–25) cm tall, glabrous and glaucous throughout except sometimes for fruit. Stems erect or ascending, several to many branched below and above. Basal leaves subsessile, soon withered; lowest cauline leaves sessile, oblong-ovate, (1–)2–3.5 cm × 5–13(–20) mm, subfleshy, base auriculate or subapplanic, margin entire or repand, apex obtuse. Uppermost cauline leaves ovate-cordate, 0.5–3 cm × (1–)2–7(–10) mm, subfleshy, base subapplanic, margin entire, apex obtuse. Fruiting pedicels filiform, divaricate or reflexed, to 4 mm. Sepals yellowish, oblong, (0.6–)0.7–1 × ca. 0.4 mm. Petals yellow, oblong-ovate or obovate, 1–2 × 0.3–0.7 mm, apex obtuse; claw absent. Filaments yellowish, 0.7–1.1 mm; anthers subglobose, 0.1–0.2 mm. Fruit subpyriform, 4–5 × 1.5–2 mm, base obtuse, apex truncate or subemarginate; valves glabrous or pubescent, papillate in the middle. Seeds narrowly oblong, yellowish, ca. 2 × 1 mm. Fl. and fr. Apr.–Jun.

Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

The above first record from China is based on Regel s.n., 5 May 1877 (LE), collected from Xinjiang.


沙芥属  sha jie shu

Herbs annual. Trichomes absent. Stems erect, simple at base, paniculately branched above. Basal leaves petiolar, not rosulate, 1–3-pinnatisect. Cauline leaves attenuate or auriculate at base, subentire, dentate, pinnatifid, or pinnatisect. Racemes numerous flowered, ebracteate, elongated considerably in fruit; rachis flexuous. Fruiting pedicels stout, divaricate. Sepals narrowly oblong, united, rupturing basally at anthesis, unequal, base of lateral pair strongly saccate, margin membranous. Petals white or pink; blade linear or linear-lanceolate, apex subacute; claw subequalling sepals. Stamens 6, tetradynamous; filaments not dilated at base, filiform; anthers oblong, obtuse at apex. Nectar glands 2, lateral, ringlike; median glands absent. Ovules 2 per ovary, subapical. Fruit indehiscent, samaroid silicles, transversely oblong or ovoid, 1-seeded, thin walled, with woody and coarsely reticulate venation,
angustiseptate, sessile, transversely 2-winged, 2–16-spined; wings prominent, longer or shorter than main part of fruit, with 3–20 subparallel veins extending full length; spines often unequal in length, at least some subparallel to pedicel, those on the seed-bearing fruit half longer; replum and valves margin united into a longitudinal vein; septum complete; style absent, obsolete, or conical and to 5 mm; stigma capitate, entire, long papillate. Seeds 1, wingless, oblong, plump; seed coat smooth, not mucilaginous when wetted; cotyledons incumbent or obliquely so.

Three species: China, Mongolia, adjacent Russia; two species (one endemic) in China.

1a. Fruit wings ensiform, longitudinally 3-veined, acuminate, ascending or divaricate-ascending; ultimate lobes of basal and lower cauline leaves lanceolate or oblong, rarely lanceolate-linear .................................. 1. *P. cornutum*

1b. Fruit wing lanceolate, obovate, or oblong, longitudinally 5–10(–12)-veined, acute, obtuse, to truncate, horizontal; ultimate segments of basal and lower cauline leaves filiform or linear ...................... 2. *P. dolabratum*


*Buinas cornuta* Linnaeus, Sp. Pl. 2: 669. 1753;

*Myagrum cornutum* (Lamarck) Linnaeus.

Herbs annual, 50–100(–150) cm tall. Stems erect, many branched above. Basal leaves slightly fleshy; petiole 2–6 cm; leaf blade pinnatisect, 8–25 × 1.5–4.5 cm; lateral lobes 4–7 on each side of midvein, ultimate segments oblong, lanceolate, or rarely lanceolate-linear, 1–5 cm × 1–6 mm, entire or larger ones coarsely dentate or 3-fid, apex acute. Middle cauline leaves pinnatisect, auriculate; uppermost cauline leaves oblanceolate or linear, 3–6 cm × 2–4 mm, base attenuate, not auriculate, margin entire. Fruiting pedicels slightly stout, straight or curved upward, (1–)1.7–3 cm. Sepals 5–7 × 1.2–1.5 mm; sac of lateral pair 0.5–0.8(–1) mm. Petals whitish, linear to linear-lanceolate, 1.2–1.5 cm × 1.5–2.5 mm; claw 5–7 mm. Median filament pairs 5–8 mm, lateral pair 3–5 mm; anthers oblong, 1.2–1.5 mm. Fruit transversely oblong, excluding wings 0.7–1.2 × 1.2–2 cm; wings ensiform, straight, (2–)3–5(–6.5) cm, 3–5(–6) mm wide at base, longitudinally 3-veined, margin entire, apex acuminate; spines 8–10, to 2 cm × 2 mm, basal 4 pointing downward, subparallel to pedicel, much longer than the others, remaining 4 or 6 horizontal or erect; style absent. Seeds brown, oblong, 8–10 × 3–4 mm. Fl. Jun–Aug, fr. Jul–Sep.


*Fu chi sha jie* Pugionium calcaratum Komarov; *P. cristatum* Komarov; *P. dolabratum var. platypterum* H. L. Yang.

Herbs annual, (50–)60–100 cm tall. Stems erect, many branched above. Basal leaves slightly fleshy; leaf blade 2-pinnatisect, to 25 × 6.5 cm; ultimate lateral lobes filiform or linear, to 5.5 cm × 0.5–1.5 mm, apex subacute. Middle and upper cauline leaves similar to basal. Fruiting pedicels slightly stout, straight, (0.6–)0.8–2(–2.5) cm. Sepals 5–8 × 1.2–1.5 mm; sac of lateral pair 0.6–1.2 mm. Petals pink, linear or linear-lanceolate, 1.2–2 cm × 1.5–2.5 mm; claw 5–8 mm. Median filament pairs 5–8 mm, lateral pair 3–5 mm; anthers oblong, 1.2–1.5 mm. Fruit transversely oblong, excluding wings 0.7–1.2 × 1–2 cm; wings lanceolate, ovate, oblong, or obovate, 0.7–2.5(–3) cm, 4–8(–10) mm wide at base, margin entire, apex obliquely truncate, acute, or obtuse, toothless or toothed, 5–10(–12)-veined; spines absent, sometimes up to 16 and to 2 cm × 3 mm; style obsolete or to 1 mm. Seeds brown, oblong, 5–8 × 1.5–3 mm. Fl. Aug–Sep.

Sandy deserts, dunes; 1000–1400 m. Gansu, Nei Mongol, Ningxia, Shaanxi [Mongolia].


*Gao he cai shu* ga o he cai shu

Herbs perennial with a caudex terminated by petiolar remains of previous years. Trichomes simple. Stems erect, simple basally, branched apically. Basal leaves petiolar, rosulate, simple, pinnately lobed or 1–3-pinnatisect, rarely palmately lobed. Cauline leaves petiolar or sessile, often auriculate or amplexicaul at base, sinuate, pinnately lobed, or pinnatisect. Racemes ebracteate, in panicles, elongated in fruit. Fruiting pedicels slender or stout, ascending, divaricate, or reflexed. Sepals oblong, deciduous, base of lateral pair not saccate, margin membranous. Petals yellow, creamy white, pink, or deep purple, rarely absent; blade obovate, oblong, oblanceolate, or oblong-linear, entire or rarely 3(–5)-toothed; claw absent or much shorter than sepals. Stamens 6 or (8–)12–16(–24), slightly tetradynamous or equal in length; filaments dilated at base; anthers oblong or linear, obtuse at apex. Nectar glands confluent around bases of all stamens; median glands present. Ovules 2 per ovary. Fruit indehiscent, schizocarpic, didymous, angustiseptate silicles, sessile or shortly stipitate; valves (mericarps) oblong, obovate, or orbicular, 1-seeded, leathery, smooth, broadly winged, keeled, glabrous; replum rounded; septum complete, thickened, opaque, veinless;
flattened; seed coat smooth, not mucilaginous when wetted; cotyledons accumbent.

Nine species: C Asia, Himalayas; three species in China.

1a. Fruiting pedicels stout, straight, divaricate or ascending; root napiform, fleshy; deserts ......... 2. M. megalocarpa

1b. Fruiting pedicels slender, recurved or reflexed; root cylindric, not fleshy; mountains

2a. Petals pink or deep purple, (5–)7–10(–12) mm, 3(–5)-lobed, rarely entire; stamens 6; fruit halves

(0.8–)1–1.2

(–1.5) × (0.6–)0.7–0.8(–1) cm; wings 1–2 mm wide; locule 7–12 × 5–8 mm; seeds 4.5–6 × 3–4 mm 1. M. delavayi

2b. Petals yellow, 4–6(–7) mm, entire; stamens (8–)12–16(–24); fruit halves 3–4 × 2.5–3 cm; wings 5–10(–18)

mm wide; locule 15–2(–28) × 12–17 mm; seeds 14–17 × 7–11 mm ........................................... 3. M. polyandra

1. Megacarpaea delavayi


高河菜  gao he cai

Megacarpaea delavayi f. angustisecta O. E. Schulz; M. delavayi var. grandiflora O. E. Schulz; M. delavayi f. microphylla O. E. Schulz; M. delavayi var. minor W. W. Smith; M. delavayi f. pallidiflora O. E. Schulz; M. delavayi var. pinnatifida Danguy.

Herbs perennial, 15–86 cm tall. Trichomes retrorse, flattened, not crisped. Root cylindric, to 2 cm in diam. Caulex short, simple or rarely branched. Stems erect, branched above. Petiole of basal and lower cauline leaves (1–)2–5(–8) cm, considerably flattened at base; leaf blade oblong-oblancocele in outline, appearing pinnately compound, (0.5–)5–15(–22) cm, sparsely to densely pubescent; lateral lobes 7–13 on each side of racis, broadly ovate, oblong, or linear, (0.5–)1–2.5–4.6) × (0.1–)1–2(–2) cm, base decurrent, margin entire, irregularly serrate, or lacinate, apex acute or obtuse. Cauline leaves sessile, strongly auriculate or amplexicaul at base; leaf blade similar to that of basal leaves but with fewer lobes. Fruiting pedicels slender, (0.6–)0.8–1.5(–2) cm, usually strongly recurved, pubescent. Sepals purplish, oblong, 3–4(–4.5) × (1–)1.5–2(–2.5) mm, sparsely pubescent or glabrous. Petals lavender or deep purple, narrowly oblancocele, oblong, or broadly obovate, entire or shallowly to deeply 3(–5)-lobed, (5–)7–10(–12) × (1–)3–4(–6) mm, base cuneate, apex rounded or subacute. Stamens 6; filaments (2.5–)3–4–5 mm; anthers narrowly oblong or linear, 1–1.5 mm. Fruit halves broadly obovate, (0.8–)1–1.2(–1.5) cm × (6–)7–8(–10) mm; wings 1–2 mm wide; replum 2.5–4 mm; locule 7–12 × 5–8 mm. Seed dark brown, broadly ovate, 4.5–6 × 3–4 mm. Fl. May–Aug, fr. Jul–Sep.

Swampy meadows, grassy slopes, open thickets; 3300–4800 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan [Myanmar].

All of the synonyms above represent formal recognition of only a small portion of the enormous variation in Megacarpaea delavayi. The species is most variable in leaf morphology, flower size, petal shape and apex, and fruit shape and size. However, the variation in all of these characters is continuous in nature and does not show any correlation with geography. Therefore, it is more practical not to recognize any infraspecific taxa. The species is recorded here for the first time from Xizang and Myanmar; the records are based on Forrest 4342 (E) and Forrest 26890 (E, NY, US), respectively.

This species is used for medicine and as a vegetable.

2. Megacarpaea megalocarpa

(Fischer ex de Candolle) Schischkin ex B. Fedtschenko in Komarov, Fl. URSS 8: 543. 1939.

大果高河菜  da guo gao he cai


Herbs perennial, 20–30(–40) cm tall. Trichomes sparse to dense, flattened, crisped. Roots napiform, to 4 cm wide. Caulex short, covered with fibrous petiolar remains of previous years. Stems erect, stout, divarically branched above, glabrescent. Petiole of basal leaves 2–6 cm; leaf blade oblancocele, (5–)8–16 × (1–)2.5–4 cm, densely pubescent, margin pinnatisect, with 4–7 lateral lobes on each side; lobes irregularly lacinate. Cauline leaves sessile; leaf blade similar to basal but smaller. Inflorescences paniculate, with sessile bracts at branching. Flowers irregularly unisexual. Fruiting pedicels stout, straight, divaricate or ascending, 5–10(–15) mm, pubescent. Sepals and petals present in male flowers, absent in female ones. Sepals narrowly oblong, 5–7 × 2–2.5 mm, margin white, scarious, sparsely pubescent. Petals lavender, linear-oblong, 1–1.5 cm × 3.5–4.5 mm, base attenuate, apex obtuse. Intermediate flowers sometimes present, with whitish petals, and stamens and pistil developed to various degrees. Filaments 3–4 mm; anthers linear, 2–2.5 mm. Fruit halves suborbicular, (1–)1.2–1.8(–2) cm in diam.; wings 3–7 mm wide; locule suborbicular, 6–10 × 5–7 mm; replum 4–7 mm; style 0.5–1 mm. Seeds flattened, suborbicular, 5–7 × 3.5–5 mm. Fl. Apr, fr. May–Jun.

Sandy deserts, alkaline flats. Qinghai, Xinjiang [Kazakstan, Kyrgyzstan, Russia, Uzbekistan].

3. Megacarpaea polyandra


多蕊高河菜  duo rui gao he cai

Herbs perennial, (0.5–)1–2 m tall, tomentose above. Root to 15 cm in diam. Trichomes flattened, crisped. Caulex considerably thickened. Stems erect, branched.
angustiseptate, sessile; valves keeled, winged or wingless; replum rounded; septum complete, membranous,
silicles, linear, oblong, obovate, obcordate, elliptic, lanceolate, or suborbicular, often apically notched, strongly
often 1 on each side of lateral stamen; median glands absent. Ovules 4–24 per ovary. Fruit dehiscent siliques or
tetradynamous; filaments dilated or not at base; anthers ovate or oblong, obtuse at apex. Nectar glands 2 or 4, lateral,
obovoid, oblong, or spatulate, apex obtuse or emarginate; claw differentiated or not from blade. Stamens 6,
erect or ascending, base of lateral pair not saccate, margin membranous. Petals white, rarely purple or yellow; blade
leaves sessile, often auriculate, sagittate, or amplexicaul at base, entire or rarely dentate. Racemes ebracteate,
erect, simple or branched. Basal leaves petiolate or subsessile, rosulate or not, simple, entire or dentate. Cauline
Herbs annual, sometimes perennial from slender, deeply buried rhizomes. Trichomes absent. Stems absent or rarely
developed. Basal leaves long petiolate, rotulate, simple, entire or reexpanded, palmately 3–5-veined. Cauline leaves
absent, rarely present and similar to basal ones. Racemes absent and all flowers on pedicels from basal rosette, if
present then few flowered, bracteate throughout. Fruiting pedicels erect-ascending or divaricate, recurved. Sepals
ovate, base of lateral pair not saccate, margin not membranous. Petals white, slightly longer than sepal; blade
obovate, oblong-oblatae, or spatulate, apex obtuse; claw absent. Stamens 6, subequal; filaments not dilated at base;
anthers orbicular, obtuse at apex. Nectar glands 4, 1 on each side of lateral stamen; median glands absent. Ovules 2
per ovary. Fruit indehiscent, schizocarpic, didymous, angustiseptate silicles, sessile; valves (mericarps) transversely
ovate or sublenticular, 1-seeded, woody, reticulate, keeled all around; replum rounded; septum complete, thickened,
opaque, veinless; style slender, to 0.3 mm; stigma capitate, entire. Seeds wingless, broadly ovate, plump or slightly
flattened; seed coat smooth, not mucilaginous when wetted; cotyledons accumbent.

One species: China. Russia.

1. **Megadenia pygmaea** Maximowicz, Fl. Tangut. 77. 1889.

Herbs annual, biennial, or perennial, often glabrous and glaucous. Trichomes absent or simple. Stems prostrate or
erect, simple or branched. Basal leaves petiolate or subsessile, rotulate or not, simple, entire or dentate. Cauline
leaves sessile, often auriculate, sagittate, or amplexicaul at base, entire or rarely dentate. Racemes ebracteate,
elongated or not in fruit. Fruiting pedicels slender, divaricate or ascending, rarely reflexed. Sepals ovate or oblong,
erect or ascending, base of lateral pair not saccate, margin membranous. Petals white, rarely purple or yellow; blade
obovate, oblong, or spatulate, apex obtuse or emarginate; claw differentiated or not from blade. Stamens 6,
tetradynamous; filaments dilated or not at base; anthers ovate or oblong, obtuse at apex. Nectar glands 2 or 4, lateral,
often 1 on each side of lateral stamen; median glands absent. Ovules 4–24 per ovary. Fruit dehiscent silicles or
silicles, linear, oblong, obovate, obcordate, elliptic, lanceolate, or suborbicular, often apically notched, strongly
angustiseptate, sessile; valves keeled, winged or wingless; replum rounded; septum complete, membranous,
anthers narrowly oblong, 1–1.3 mm. Fruit halves suborbicular to ovate-elliptic, 3–4 × 2.5–3 cm; wings 5–10(–18) mm wide; replum 7–16 mm; locule 1.5–2(–2.8) × 1.2–1.7 cm. Seeds brown, broadly ovate, 1.4–1.7 × 0.7–1.1 cm. Fl. May–Aug, fr. Aug–Oct.

Steep slopes with semiconsolidated scree, open scrub; (1000–)3500–4200 m. Xizang [India, Kashmir, Nepal, Pakistan].

**Megacarpaea bifida** Bentham, a little-collected and poorly known species endemic to Kashmir, is probably conspecific with (or at most infraspecific under) *M. polyandra*. It has entire leaf lobes and slightly elongated fruit halves. *Megacarpaea polyandra* is the only species in the Brassicaceae with flowers having more than six stamens.
The young leaves are cooked as a vegetable.

17. **MEGADENIA** Maximowicz, Fl. Tangut. 76. 1889.

**双果荠属** shuang guo qi shu

Herbs annual, sometimes perennial from slender, deeply buried rhizomes. Trichomes absent. Stems absent or rarely
developed. Basal leaves long petiolate, rotulate, simple, entire or reexpanded, palmately 3–5-veined. Cauline leaves
absent, rarely present and similar to basal ones. Racemes absent and all flowers on pedicels from basal rosette, if
present then few flowered, bracteate throughout. Fruiting pedicels erect-ascending or divaricate, recurved. Sepals
ovate, base of lateral pair not saccate, margin not membranous. Petals white, slightly longer than sepal; blade
obovate, oblong-oblatae, or spatulate, apex obtuse; claw absent. Stamens 6, subequal; filaments not dilated at base;
anthers orbicular, obtuse at apex. Nectar glands 4, 1 on each side of lateral stamen; median glands absent. Ovules 2
per ovary. Fruit indehiscent, schizocarpic, didymous, angustiseptate silicles, sessile; valves (mericarps) transversely
ovate or sublenticular, 1-seeded, woody, reticulate, keeled all around; replum rounded; septum complete, thickened,
opaque, veinless; style slender, to 0.3 mm; stigma capitate, entire. Seeds wingless, broadly ovate, plump or slightly
flattened; seed coat smooth, not mucilaginous when wetted; cotyledons accumbent.

One species: China. Russia.

1. **Megadenia pygmaea** Maximowicz, Fl. Tangut. 77. 1889.

**双果荠** shuang guo qi

*Megadenia bardunovii* Popov; *M. speluncarum* Vorobiev, Voroschilov & Gorovoi.

Herbs stemless or rarely with flowering stems to 3 cm
tall, glabrous throughout. Basal leaves rotulate; petiole
(0.7–)2–10(–15) cm, slender, often grooved, expanded
at base; leaf blade cordate, orbicular, or broadly ovate,
(0.5–)1–2(–3) × 0.7–1.7 cm. Seeds brown, broadly ovate, 1.3–1.5 × 0.7–1.3 mm. Fl. and fr. Jun–Aug. 2n = 20.

Steep slopes with semiconsolidated scree, alpine meadows, open
scrub; (1000–)3500–4200 m. Gansu, Qinghai, Sichuan, Xizang
[India, Kashmir, Nepal, Pakistan].


**菥属** xi ming shu

Herbs annual, biennial, or perennial, often glabrous and glaucous. Trichomes absent or simple. Stems prostrate or
erect, simple or branched. Basal leaves petiolate or subsessile, rotulate or not, simple, entire or dentate. Cauline
leaves sessile, often auriculate, sagittate, or amplexicaul at base, entire or rarely dentate. Racemes ebracteate,
elongated or not in fruit. Fruiting pedicels slender, divaricate or ascending, rarely reflexed. Sepals ovate or oblong,
erect or ascending, base of lateral pair not saccate, margin membranous. Petals white, rarely purple or yellow; blade
obovate, oblong, or spatulate, apex obtuse or emarginate; claw differentiated or not from blade. Stamens 6,
tetradynamous; filaments dilated or not at base; anthers ovate or oblong, obtuse at apex. Nectar glands 2 or 4, lateral,
often 1 on each side of lateral stamen; median glands absent. Ovules 4–24 per ovary. Fruit dehiscent silicles or
silicles, linear, oblong, obovate, obcordate, elliptic, lanceolate, or suborbicular, often apically notched, strongly
angustiseptate, sessile; valves keeled, winged or wingless; replum rounded; septum complete, membranous,
anthers narrowly oblong, 1–1.3 mm. Fruit halves suborbicular to ovate-elliptic, 3–4 × 2.5–3 cm; wings 5–10(–18) mm wide; replum 7–16 mm; locule 1.5–2(–2.8) × 1.2–1.7 cm. Seeds brown, broadly ovate, 1.4–1.7 × 0.7–1.1 cm. Fl. May–Aug, fr. Aug–Oct.

Slopes, rocky areas, along streams; 3000–4600 m. Xizang [India, Kashmir, Nepal, Pakistan].

*Megacarpaea bifida* Bentham, a little-collected and poorly known species endemic to Kashmir, is probably conspecific with (or at most infraspecific under) *M. polyandra*. It has entire leaf lobes and slightly elongated fruit halves. *Megacarpaea polyandra* is the only species in the Brassicaceae with flowers having more than six stamens.
The young leaves are cooked as a vegetable.
translucent, veinless; style obsolete or prominent, exerted or included in apical notch of fruit; stigma capitate, entire or slightly 2-lobed. Seeds uniseriate, wingless, oblong, ovoid, or ellipsoid, plump; seed coat smooth, reticulate, rugose, or striate, mucilaginous or not when wetted; cotyledons accumbent or rarely incumbent.

About 75 species: temperate Eurasia, especially SW Asia and C and S Europe; six species (two endemic) in China. *Thlaspi* was divided by Meyer (Feddes Repert. 84: 449–470. 1970) into 12 genera largely based on seed anatomy. Molecular data provide some support for the recognition of some of Meyer’s segregates (e.g., *Microthlaspi* F. K. Meyer and *Noccaea* Moench), but such studies are not comprehensive and therefore the traditional broader concept of the genus is tentatively retained in this treatment. The majority of Chinese and Himalayan material is often difficult to determine to species because of the lack of mature fruit and their remarkable variability in habit, foliage, and flower size.

1a. Annuals; fruit obovate or suborbicular.
   2a. Middle and upper cauleine leaves auriculate or sagittate at base; fruit 9–20 × 7–20 mm, broadly winged all around; seeds blackish brown, concentrically striate, 1.6–2 mm ............................... 1. *T. arvense*
   2b. Middle and upper cauleine leaves cordate-amplexicaul; fruit 3–7 × 3–5 mm, broadly winged only apically; seeds yellowish brown, smooth, 1–1.3 mm ............................................................... 2. *T. perfoliatum*

1b. Perennials with slender, branched caudices; fruit oblong or elliptic.
   3a. Fruit elliptic, apex neither winged nor emarginate or retuse; ovules or seeds 4–8(–10) .......... 5. *T. andersonii*
   3b. Fruit narrowly oblong or oblong-obovate, apex winged and/or emarginate or retuse; ovules or seeds more than 12, if less then fruit valves prominently veined.
      4a. Fruit narrowly oblong, 1.5–2.3(–3) mm wide; petals lavender, purplish, or rarely white; cauleine leaves dentate or denticate, rarely repand or entire .................................................................. 3. *T. yunnanense*
      4b. Fruit oblong-obovate, (3.5–)4–5(–6) mm wide; petals white; cauleine leaves entire or repand, rarely denticate.
         5a. Ovules or seeds 14–24; fruit wing not veined .......................................................... 4. *T. flagelliferum*
         5b. Ovules or seeds 4–8(–10); fruit wing distinctly veined ............................................. 6. *T. cochleariforme*

   全叶菥蓂
Herbs annual, (9–)15–55(–80) cm tall, glabrous throughout, often glaucous, fetid when crushed. Stems erect, simple or branched above. Petiole of basal leaves 0.5–3 cm; leaf blade oblanceolate, spatulate, or obovate, 1–5 × 0.4–2.3 cm, base attenuate or cuneate, margin entire, repand, or coarsely toothed, apex rounded. Middle cauleine leaves sessile, oblong, (0.5–)1.5–4(–8) × (0.2–)0.5–1.5(–2.5) cm, base sagittate or auriculate, margin dentate, repand, or entire, apex rounded, obtuse, or subacute. Fruiting pedicels (0.5–)2–4(–5.5) × (0.2–)0.5–1.5(–2) cm, base cordate-sagittate or auriculate, margin entire or repand, apex rounded. Middle cauleine leaves sessile, ovate-cordate or suborbiculate, (1–)2–4(–5.5) × (0.2–)0.5–1.5(–2) cm, base cordate-amplexicaul, margin entire or repand, apex obtuse. Fruiting pedicels (2.5–)4–6(–8) cm, slender, divericate, straight or slightly curved upward. Sepals ovate or oblong, (1.5–)2–3(–3.3) × 1–1.5 mm, not saccate, margin white. Petals white, spatulate, (2.4–)3–4.5(–5) × (0.8–)1.1–1.6 mm, narrowed to a clawlike base ca. 1 mm, apex obtuse or emarginate. Filaments (1–)1.5–2 mm; anthers ovate, 0.3–0.5 mm. Ovules 6–16 per ovary. Fruit oblong or suborbicular, (0.6–)0.9–2 × (0.5–)0.7–2 cm, base obtuse or rounded, apex deeply emarginate and apical notch ca. 5 mm deep; wings 1–1.5 mm wide at base, 3.5–5 mm wide apic ally; style absent or 0.1–0.3 mm. Seeds blackish brown, ovoid, (1.2–)1.6–2(–2.3) × 1.1–1.3 mm, concentrically striate. Fl. and fr. Mar–Oct. 2n = 14*.

Roadsides, grassy slopes, fields, waste places; 100–5000 m. Throughout China except Guangdong, Hainan, and Taiwan [Afghanistan, Bhutan, India, Japan, Kashmir, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia, Sikkim, Tajikistan, Turkmenistan, Uzbekistan; Africa, SW Asia; introduced in Australia, North and South America].

This species is a cosmopolitan weed used as a medicinal plant and a source of oil. Cattle feeding on the plant develop tainted milk.

   全叶菥蓂
*Microthlaspi perfoliatum* (Linnaeus) F. K. Meyer. Herbs annual, (3–)5–28(–40) cm tall, glabrous throughout, often glaucous. Stems erect, simple or branched basally or above. Petiole of basal leaves 0.5–1.3 cm; leaf blade ovate or broadly elliptic, 0.3–2(–2.7) cm × 2–10 mm, base cuneate or attenuate, margin entire or rarely obtusely few toothed, apex rounded. Middle cauleine leaves sessile, ovate-cordate or suboblong, (1–)2–4(–5.5) × (0.2–)0.5–1.5(–2) cm, base cordate-amplexicaul, margin entire or repand, apex obtuse. Fruiting pedicels (2.5–)4–6(–8) cm, slender, divericate, straight. Sepals ovate or oblong, (0.8–)1–1.5(–1.8) × 0.5–1 mm, not saccate, margin white. Petals white, spatulate or oblong, 1.5–2.5(–3) × 0.7–1.3 mm, apex rounded. Filaments 1–1.5 mm; anthers ovate, 0.1–0.2 mm. Ovules 4–10 per ovary. Fruit obovate or rarely suborbiculate, 3–5.5(–7) × 3–4(–5.5) mm, base obtuse, apex deeply emarginate and apical notch 1–1.5 mm deep; wings 1–2 mm wide apically, much narrower at base; style absent or 0.1–0.3 mm. Seeds yellow-brown, ovoid, 0.9–1.3(–1.5) × 0.7–1(–1.2) mm, smooth. Fl. and fr. Apr–Jul. 2n = 14, 28, 42.
Slopes, road-sides, waste grounds, forest margins; 400–2400 m. Xinjiang [Afghanistan, Kazakhstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; N Africa, SW Asia, Europe].


**云南菥** *yun nan xi ming*

*Thlaspi yunnanense* var. *dentatum* Diels.

Herbs perennial, (4–)8–25–30 cm tall, glabrous throughout. Stems erect or ascending, simple. Basal leaves rosulate; petiole (0.1–)0.5–1.5–(2.5) cm; leaf blade oblanceolate, spatulate, ovate, or suborbicular, 3–10–15 × 2–5–(10) mm, base obtuse, margin entire, repand, or dentate, apex rounded. Middle cauline leaves sessile, oblanceolate, ovate, or suborbicular, 0.5–1.8(–2.5) cm × (2–)4–7(–10) mm, base auriculate, margin dentate or denticulate, rarely repand or entire, apex rounded, obtuse, or subacute. Fruiting pedicels 4–6 mm, slender, divaricate, straight. Sepals oblong, 2–3 × 1–1.5 mm, without apical notch; apical wings 0.6–1.2 mm wide; style 0.5–1.5 mm. Ovules 14–24 per ovary. Fruit oblong-obovate, 0.8–1.3 × 0.5–0.6(–0.9) mm, obscurely reticulate. Fl. late Apr–Aug, fr. May–Sep.

- Alpine grassy slopes, alpine meadows, road-sides; 500–4200 m. Sichuan.

The immature fruit of *Thlaspi* cannot be used to determine the degree of development of the apical notch and/or wings. This misled Schulz to describe the fruit of *T. flagelliferum* as wingless and without an apical notch. However, the holotype, *Weigold s.n.* (W), and fragmentary isotype at B clearly show the early development of wings and notch.


**西藏菥** *xi zang xi ming*


Herbs perennial, (4–)6–15–20 cm tall, glabrous throughout. Stems erect or decumbent, simple. Basal leaves rosulate; petiole (2–)5–10(–15) mm; leaf blade oblanceolate, spatulate, ovate, or suborbicular, (0.3–)0.5–1.5(–1.8) cm × 2–6(–10) mm, base obtuse, margin entire, apex rounded. Middle cauline leaves sessile, oblong, ovate, or suborbicular, 5–10(–15) × 2–5(–7) mm, base auriculate, margin repand or entire, apex rounded, obtuse, or subacute. Fruiting pedicels (2–)4–7 mm, slender, divaricate, straight. Sepals oblong, 2–2.5 × 1.2–1.5 mm, not saccate, margin white. Petals white with lavender tinge, spatulate, (5–)6–7 × 2.5–3.5 mm, apex rounded. Filaments 2.5–3.5 mm; anthers oblong, 0.6–0.8 mm. Ovules 4–8(–10) per ovary. Fruit elliptic, 5–8 × 3–4 mm, base obtuse, apex obtuse to subacute, without apical notch; apical wings absent; style 0.7–1.5 mm. Seeds dark brown, oblong, 1.6–1.9 × 1–1.2 mm, obscurely reticulate. Fl. (Mar–)May–Jul, fr. Jun–Aug.

Grassy crevices, scree, moist grounds, steep hillsides, grassy river banks; 3200–5200 m. Xizang [Bhutan, Kashmir, Nepal, Pakistan, Sikkim].

The record and illustration in FRPS and Fl. Yunnan. (6: 32. 1995) of *Thlaspi andersonii* from Yunnan are most likely based on young plants of *T. yunnanense* with an obsolete apical notch, a feature not uncommon in the species.


**山菥** *shan xi ming*

*Noccaea cochleariformis* (de Candolle) Á.. Löve & D. Löve; *N. exauriculata* (Komarov) Czerepanov; *Thlaspi exauriculatum* Komarov.

Herbs perennial, (5–)8–25–45 cm tall, glabrous throughout, glaucous. Stems erect or ascending, simple. Basal leaves rosulate; petiole 0.5–1.5(–2.5) cm; leaf blade spatulate, oblanceolate, or ovate, 0.6–2.8(–3.5) cm × 3–11(–15) mm, base obtuse, margin entire, apex rounded. Middle cauline leaves sessile, oblong or ovate, 0.6–
2.8(–3.5) cm × 4–12(–16) mm, base auriculate or amplexicaul, margin repand or entire, rarely denticulate, apex obtuse or acute. Fruiting pedicels (2–)4–8 mm, slender, divaricate, straight. Sepals oblong, 2–3 × 1–1.5 mm, not saccate, margin white. Petals white, spatulate, 5–7 × 2–3 mm, apex rounded. Filaments 2.5–3.5 mm; anthers oblong, 0.6–0.8 mm. Ovules 4–8(–10) per ovary. Fruit narrowly obovate or obovate-obcordate, rarely oblong-obovate, (5–)6–10(–13) × 4–6 mm, base subacute, apex emarginate and apical notch 1–2 mm deep; apical wings 1–2.5 mm wide; style (0.2–)0.7–1.5(–2) mm. Seeds brown, ovate-oblong, 1.2–1.8 × 0.9–1.1 mm, obscurely reticulate. Fl. May–Jun, fr. Jun–Aug. 2n = 56, 84.

Grassy slopes, roadsides, meadows; 600–3700 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Xinjiang, Xizang [Kashmir, Kazakhstan, Mongolia, Pakistan, Russia, Tajikistan].

Thlaspi cochleariforme was reduced in FRPS to the synonymy of T. thlaspioides (Pallas) Kitagawa, but the latter is a synonym of T. alpestre Linnaeus, a species restricted to Europe. The records in FRPS and Fl. Xinjiang. (2(2): 83. 1995) of Thlaspi ferganense N. Busch from Xinjiang are based on misidentified plants of T. cochleariforme.


*荠属* qi shu

*Bursa-pastoris* Séguier, nom. rej.

Herbs annual or biennial. Trichomes sessile and stellate, sometimes mixed with simple or forked ones. Stems erect or ascending. Basal leaves rosulate, simple, usually pinnately lobed, lyrate, or runcinate, rarely entire or toothed. Cauline leaves sessile, auriculate or amplexicaul, entire, dentate, or sinuate. Racemes many flowered, ebracteate. Fruiting pedicels slender, ascending or divaricate. Sepals ovate or oblong, erect or ascending, glabrous or pubescent, base of lateral pair not saccate. Petals white, pink, red, or rarely yellowish, much longer or shorter than sepals, sometimes lacking; blade obvate or spatulate, apex obtuse; claw distinct from blade. Stamens 6, erect, tetradyneous; filaments not dilated at base; anthers ovate or oblong, obtuse at apex. Median glands absent; lateral glands 1 on each side of lateral stamen. Ovules (12–)20–40 per ovary. Fruit dehiscent silicles, obdeltoid to obdeltoid-obcordate, strongly flattened and angustiseptate, sessile; valves papery, prominently veined, strongly keeled; replum rounded; septum complete; style less than 1 mm, included or exserted from apical notch; stigma capitate, entire. Seeds uniseriate, wingless, oblong, plump; seed coat reticulate, mucilaginous when wetted; cotyledons incumbent.

One species: SW Asia, Europe, naturalized elsewhere as a cosmopolitan weed.

1. **Capsella bursa-pastoris** (Linnaeus) Medikus, Pfl.-Gatt. 85. 1792.

*荠* qi

*Thlaspi bursa-pastoris* Linnaeus, Sp. Pl. 2: 647. 1753; for more than 250 synonyms, see Index Kewensis. Herbs (2–)10–50(–70) cm tall, sparsely to densely pubescent with sessile, 3–5-rayed stellate trichomes often mixed near base of plant with much longer simple trichomes. Stems erect, simple or branched. Basal leaves rosulate; petiole 0.5–4(–6) cm; leaf blade oblong or oblanceolate, (0.5–)1.5–10(–15) × 0.2–2.5(–5) cm, base cuneate or attenuate, margin pinnatisect, pinnatifid, runcinate, lyrate, dentate, repand, or entire, apex acute or acuminate. Cauline leaves sessile, sagittate, amplexicaul, or rarely auriculate, narrowly oblong, lanceolate, or linear, 1–5.5(–8) cm × 1–15(–20) mm, margin entire or dentate. Fruiting pedicels (3–)0.5–1.5(–2) cm, divaricate, usually straight, slender, glabrous. Sepals green or reddish, oblong, 1.5–2 × 0.7–1 mm, margin membranous. Petals white, rarely pinkish or yellowish, obvate, (1.5–)2–4(–5) × 1–1.5 mm. Filaments white, 1–2 mm; anthers ovate, to 0.5 mm. Fruit (3–)4–9(–10) × (2–)3–7(–9) mm, flat, base cuneate, apex emarginate or truncate; valves with subparallel lateral veins, glabrous; style 0.2–0.7 mm. Seeds brown, oblong, 0.9–1.1 × 0.4–0.6 mm. Fl. and fr. Apr–Jul. 2n = 16, 32*.

Roadsides, gardens, fields, waste areas, mountain slopes. Throughout China [native to SW Asia and Europe; naturalized elsewhere as a cosmopolitan weed].

This species is used as a vegetable and in the treatment of eye diseases and dysentery. It is the second most common weed on Earth.

20. **HEDINIA** Ostenfeld in Hedin, S. Tibet 6(3), Bot.: 76. 1922.

*藏荠属* zang qi shu

*Hediniopsis* Botschantzev & Petrovsky.

Herbs annual, biennial, or short-lived perennial. Trichomes short-stalked, 1–3-forked, mixed with simple ones. Stems procumbent, decumbent, or ascending, rarely erect, few to numerous from base. Basal leaves petiolate, rosulate only early, later deciduous, 1- or 2-pinnatisect. Cauline leaves petiolate or uppermost subsessile, similar to basal ones. Racemes bracteate throughout or only basally, elongated in fruit. Fruiting pedicels suberect or divaricate. Sepals oblong, suberect, base of lateral pair not saccate. Petals white, longer than sepals; blade obovate, apex...
rounded; claw subequaling sepals. Stamens 6, slightly tetradynamous; filaments not dilated at base; anthers ovate, obtuse at apex. Nectar glands 4, lateral, 1 on each side of lateral stamen; median glands absent. Ovules 18–46 per ovary. Fruit dehiscent silicles, broadly oblong, obovate, or orbiculate, strongly angustiseptate, sessile; valves papery, with a prominent midvein, glabrous or pubescent, strongly keeled, slightly torulose, flat or twisted; replum rounded; septum complete or rarely perforated; style distinct, often less than to 1 mm; stigma capitulate, entire. Seeds uniseriate, wingless, oblong, plump; seed coat coarsely reticulate, not mucilaginous when wetted; cotyledons incumbent.

Four species: C Asia, Himalayas, Mongolia, Russia; one species in China.

1. **Hedinia tibetica** (Thomson) Ostenfeld in Hedin, S. Tibet 6(3), Bot.: 76. 1922.

藏荠 zang qi

**Hutchinsia tibetica** Thomson, Icon. Pl. 9: t. 900. 1852; **Capsella thomsonii** J. D. Hooker; **Hedinia elata** C. L. He & Z. X. An; **H. rotundata** Z. X. An; **H. taxkargannica** G. L. Zhou & Z. X. An; **Smelowskia tibetica** (Thomson) Lipsky.

Herbs (1–)5–30(–45) cm tall, densely to sparsely pubescent, canescent or green. Stems procumbent or ascending, densely hirsute basally with primarily simple trichomes to 1.3 mm. Basal leaves sparsely to densely pubescent; petiole (0.2–) 0.5–2(–3.5) cm, often ciliate basally; leaf blade ovate or narrowly oblong in outline, 1- or 2-pinnatisect, (0.3–)1–4(–7) × (0.2–)0.7–2(–2.5) cm; ultimate lobes ovate or oblong-linear, 1–12 × 0.5–3 mm. Cauline leaves similar to basal, reduced in size and divisions toward stem apex. Racemes bracteate throughout or rarely only basally; distal bracts subsessile, sometimes adnate to pedicel. Fruiting pedicel, straight, erect or ascending, 1.5–3.5(–5) mm, pubescent, subappressed to rachis. Sepals oblong, 1.3–2 × 0.7–0.9 mm, sparsely pubescent. Petals obovate, 2–3.2 × (0.6–)0.9–1.4 mm; claw ca. 1.5 mm. Filaments 1.5–2 mm; anthers 0.3–0.4 mm. Ovules 20–46 per ovary. Fruit broadly oblong, rarely oblong-linear or suborbiculate, (4.5–)5–10(–14) × 3–5 mm, flat or slightly twisted, obtuse, slightly retuse, or rarely subacute at both ends, appressed to rachis; valves glabrous or pubescent; style 0.3–0.8 mm, glabrous or rarely pubescent. Seeds light to dark brown, oblong, 0.8–1.1 × 0.4–0.6 mm. Fl. Jun–Aug, fr. Jul–Sep.

Sandstone gravel, alpine meadows, steppe, scree, sandy slopes; 3900–5200 m. Gansu, Qinghai, Sichuan, Xinjiang, Xizang [Bhutan, India, Nepal, Sikkim, Tajikistan].


薄果荠属 bao guo qi shu

**Hutchinsia** R. Brown; **Hutchinsiella** O. E. Schulz; **Hymenolobus** Nuttall ex Torrey & A. Gray; **Pritzelago** Kuntze.

Herbs perennial with a branched caudex, or annual. Trichomes absent or minutely branched and subsessile mixed with simple ones. Stems erect, ascending, decumbent, or procumbent. Basal leaves rosulate or not, pinnatisect, sometimes dentate or entire. Cauline leaves petiolate, base cuneate or attenuate, pinnatisect, pinnatifid, dentate, or entire, or absent. Racemes few to many flowered, ebracteate. Fruiting pedicels divaricate. Sepals ovate or oblong, spreading or reflexed, glabrous or puberulent, base of lateral pair not saccate. Petals white, spreading, longer or shorter than sepals; blade obovate, oblong, or oblong-linear, apiculate or rounded; claw absent. Stamens 6 and subtetradynamous, rarely 4, erect or slightly spreading; filaments often dilated at base; anthers ovate, obtuse at apex. Median glands present or absent; lateral glands 1 on each side of lateral stamen. Ovules 4–20 per ovary. Fruit dehiscent silicles, broadly oblong, ovate, or orbiculate, elliptic, or lanceolate, angustiseptate, sessile; valves with a prominent midvein, glabrous, keeled; replum rounded; septum complete; style obsolete or rarely to 0.5 mm; stigma capitulate, entire. Seeds biseriate or aseriate when few, wingless, oblong, plump; seed coat obscurely reticulate, mucilaginous or not when wetted; cotyledons incumbent or rarely accumbent.

Three species: Europe, one species extending into Asia and North America and naturalized elsewhere.


薄果荠 bao guo qi

**Lepidium procumbens** Linnaeus, Sp. Pl. 2: 643. 1753; **Capsella procumbens** (Linnaeus) Fries; **Hutchinsia procumbens** (Linnaeus) Desvaux; **Hymenolobus procumbens** (Linnaeus) Nuttall ex Torrey & A. Gray.

Herbs annual, (2–)5–22(–30) cm tall, glabrous throughout or puberulent with minutely forked trichomes. Stems erect, ascending, or decumbent, branched at base or rarely simple. Basal leaves rosulate or not; petiole (2–)5–12(–20) mm; leaf blade obovate, oblongate, or oblong, (0.2–)1–2.5(–4) cm × (1–)5–11(–16) mm, base cuneate or attenuate, margin entire, dentate, or pinnatifid, apex acute or obtuse. Cauline
leaves similar to basal ones, progressively smaller and subessible upward. Racemes few to several flowered; rachis straight or slightly flexuous in fruit. Fruiting pedicels slender, divaricate, 3–8(–12) mm. Sepals ovate, 0.6–1.1 × 0.4–0.6 mm. Petals white, spatulate, 0.6–1.2 × 0.3–0.6 mm. Filaments white, 0.5–1 mm; anthers ovate, ca. 0.1 mm. Ovules 10–24 per ovary. Fruit oblong, elliptic, or obovate, (2–)3–4(–4.5) × (1–)1.4–2.2 mm, apex subtruncate to slightly emarginate; valves glabrous, with prominent reticulate veins; style obsolete or to 0.1 mm. Seeds brown, oblong, plump, 0.5–0.6 × 0.3–0.4 mm. Fl. and fr. Apr–Jul. 2n = 12, 24.

22. HEMILOPHIA Franchet, Pl. Delavay. 65. 1889.

半脊荠属 ban ji qi shu

Herbs perennial, rhizomatous. Trichomes simple, malpighiaceous, or sometimes minutely forked. Stems ascending or decumbent, simple or branched. Basal leaves petiolate, rosulate, simple, entire. Cauline leaves petiolate or sessile, attenuate, entire. Racemes several flowered, bracteate throughout. Fruiting pedicels slender, ascending or divaricate, straight or curved. Sepals ovate, oblong, or obovate, ascending, glabrous or pubescent, base of lateral pair subacute. Petals yellowish, white, pink, or purple, caducous or persistent, longer than sepals; blade narrowly to broadly obovate or obcordate, apex shallowly to deeply emarginate. Stigmas 6, slightly tetradynamous; filaments of lateral stamens filiform, those of median pairs strongly dilated or appendaged basally; anthers ovate, apiculate or not at apex. Nectar glands confluent, subtending bases of all stamens. Ovules 2 per ovary. Fruit dehiscent siliques, oblong, terete, sessile or subsessile; valves papyraceous, navicular, veinless, glabrous, with 3 rows of crests; replum rounded; septum absent; style to 1.5 mm, cylindrical or conical, persistent, glabrous or minutely papillate; stigma capitate, entire. Seeds 1 or 2 per fruit, wingless, oblong, plump; seed coat smooth, not mucilaginous when wetted; cotyledons obliquely accumbent.

- Four species.
  1a. Cauline leaves sessile; sepals membranous throughout, readily caducous at anthesis; petals persistent till fruit dehiscence; style glabrous, conical; stem trichomes exclusively simple; raceme not elongated in fruit
  
  1b. Cauline leaves petiolate; sepals membranous only at margin, remaining until young fruit develops; petals caducous; style minutely papillate, cylindrical; stem trichomes crisped simple and forked, or malpighiaceous; raceme elongated considerably in fruit.
  2a. Petals purplish; leaf trichomes setose, appressed; sepals not ciliate; stem with malpighiaceous, noncrisped trichomes
  
  2b. Petals pink, creamy white or yellowish; leaf glabrous or crisped pilose; sepals ciliate; stems puberulent with crisped trichomes.
  3a. Petals 2.5–3.5 × 1.5–2 mm, narrowly obovate, pink; base of median filaments slightly dilated, not appendaged, 0.2–0.3 mm wide; leaves glabrous or rarely sparsely pilose; trichomes on inflorescence rachis obsolescent
  
  3b. Petals 5–7 × 3–5 mm, obcordate, creamy white to yellowish; base of median filaments conspicuously broadened, appendaged, 0.6–1.1 mm wide; leaves pilose or rarely glabrescent; trichomes of inflorescence rachis minutely branched


法氏半脊荠 fa shi ban ji qi

_Hemilophia pulchella_ Franchet var. _pilosa_ O. E. Schulz. Stems originate from rhizomes and sometimes terminate in a basal rosette, producing 3–15 branches (3–)5–10(–15) cm, pubescent throughout with appressed malpighiaceous trichomes to 0.6 mm. Basal leaves with petioles (3–)5–12 mm; blade elliptic, ovate, or oblanceolate, to 7 × 5 mm, margin entire, apex obtuse to rounded. Cauline leaves with petioles 1–4 mm; blade elliptic, elliptic-ovate, or rarely ovate-suborbicular, 3–7 × 2–5 mm, gradually reduced in size upward, sparsely to densely covered with appressed setose trichomes to 1 mm, margin entire, apex obtuse. Racemes elongated considerably in fruit. Fruiting...
Stems from rhizomes, few to many, 4–15 cm, puberulent throughout with minute, crisped, simple and forked trichomes. Sepals oblong, pink or purplish, tardily caducous, not saccate, 1.5–2 × 0.7–1 mm, with appressed subsetose or nonsetose simple trichomes to 0.4 mm, margin entire, not ciliate, with a membranous part 0.1–0.2 mm wide. Petals pink or purple, caducous, obovate, 3–4(–5) × 2–2.5 mm, base cuneate to a claw ca. 1 mm, apex emarginate. Filaments pink, lateral pair 1.2–1.5 mm; median pairs 1.3–1.6 mm, inflated basal part 0.5–0.8 mm wide; anthers yellow or pink, 0.3–0.4 mm. Fruit valves papery, 2–3 × 1.5–2 mm, with a crest of tubercles surrounding margin and extending along midvein; gynophore obsolete or to 0.2 mm; style stout, cylindric, minutely papillate throughout, 0.5–0.9 mm. Seeds 2–2.3 × 1–1.1 mm. Fl. Apr–Aug, fr. Jul–Aug.


Stems originate from rhizomes and sometimes terminate in a basal rosette, producing few or a cluster of many branches 4–10(–25) cm, puberulent throughout with crisped, simple and forked trichomes rarely to 0.2 mm. Basal leaves lanceolate to elliptic-lanceolate, 2–5 × 0.5–1.5 mm, densely covered with straight trichomes to 1 mm. Cauline leaves with petioles 1–2 (–3) mm; blade oblancoate, narrowly elliptic, or rarely ovate, (2–)4–8(–10) × (1–)2–3.5(–5) mm, sparsely covered with crisped simple trichomes to 0.5 mm, rarely glabrous, margin entire, apex subacute to obtuse. Racemes elongated considerably in fruit. Fruiting pedicles straight to slightly curved, divaricate, (3–)4–8(–10) mm, pubescent with crisped trichomes. Sepals oblong or ovate, greenish, tardily caducous, not saccate, 1.5–2 × 1–1.5 mm, with crisped simple trichomes to 0.4 mm, margin ciliate with trichomes to 0.1 mm, membranous part 0.1–0.2 mm wide. Petals yellowish to creamy white, caducous, obcordate, 5–7 × 3–5 mm, base cuneate to a claw ca. 1 mm, apex deeply emarginate or nearly 2-lobed. Filaments white, lateral pair 1.4–1.5(–1.8) mm; median pairs 1.6–1.8(–2.1) mm, inflated basal appendage 0.6–1.1 mm; anthers yellow, 0.3–0.4 mm. Fruit valves papery, 3–4 × 1.5–2.5 mm, with a crest of tubercles surrounding margin and extending along midvein; gynophore obsolete or to 0.2 mm; style stout, cylindric, minutely papillate throughout, 0.8–1.2 mm. Seeds 2–3 × 1–2 mm. Fl. Jun–Jul, fr. Jul–Aug.

Loose limestone gravel, scree; 3900–4900 m. SW Sichuan, E Yunnan.


Stems 1 to several from basal rosette or solitary from rhizomes, 3–9 cm tall, simple or few branched, with spreading or appressed simple trichomes to 0.3 mm. Basal leaves oblancoate, 6–10 × 1.5–2.5 mm, densely covered with straight, simple trichomes 0.8–1.3 mm. Cauline leaves oblong to oblong-oblancoate, 2.5–5(–8) × 1–2(–2.5) mm, sessile, glabrous or minutely pubescent, margin entire, apex obtuse. Racemes not elongated in fruit. Fruiting pedicles slender, straight, divaricate, 5–6 mm, pilose. Sepals obovate, membranous, early caducous and leaving 4 receptacular teeth, 1.8–2.7 × 1.2–1.5 mm, entire, rounded at apex. Petals creamy white with dark green veins, pale to light brown at base of blade, persistent to fruit maturity, broadly obovate, 6–7 × 4–5.5 mm, 2-lobed, abruptly narrowed to claw, apical notch to 2 mm deep; claws 1.5–2.5 mm. Filaments white, lateral pair 1.8–2.2 mm; median pairs 1.9–2.5 mm, strongly inflated on basal half into an oblong appendage 1.1–1.3 mm; anthers green. Fruit valves thin papery, 3–4 × 1.5–2 mm, with 3 rows of crests; gynophore obsolete or to 0.1 mm; style conical, glabrous, 1–1.5 mm. Seeds 2.5–3 × 1.1–1.3 mm. Fl. & fr. Aug.

Limestone gravel; 4300–4600 m. Yunnan.


蛇头荠属 she tou qi shu

Herbs perennial, rhizomatous. Trichomes a mixture of simple and short-stalked, submalpighiaceous. Stems decumbent or ascending. Basal leaves rosulate, simple, entire or distally 3–5-lobed. Cauline leaves sessile and attenuate at base, entire, apically dentate. Racemes several flowered, bracteate. Fruit pedicels arising at base, strongly recurved and often forming a loop. Sepals oblong, spreading, glabrous or pubescent, base of lateral pair not saccate. Petals white, sometimes with pink veins, much longer than sepals; blade broadly obcordate to orbicular, apex emarginate or rarely subrounded; claw short, well differentiated from blade. Stamens 6, erect, subequal; filaments not dilated at base; anthers ovate to suboblong, obtuse at apex. Median glands absent; lateral glands 1 on each side of lateral stamen. Ovules 4 per ovary. Fruit dehiscent silicles, oblong or ovoid, terete or slightly angustiseptate, sessile; valves membranous, sparsely to densely hisrute with subsetose trichomes, rarely glabrous, rounded, smooth, wingless or with small appendages; replum strongly flattened and to 1 mm wide; septum complete; style conical; stigma capitate, entire. Seeds wingless, oblong, flattened; seed coat minutely reticulate, not mucilaginous when wetted; cotyledons accumbent.

One species.


蛇头荠 she tou qi

Dipoma iberideum var. dasycarpum O. E. Schulz; Dipoma iberideum f. pilosius O. E. Schulz.

Stems slender, (3–)5–15(–22) cm, simple, pubescent with stalked or subsessile forked trichomes to 1 mm. Basal leaves with petioles (1–)2–7 mm; blade obovate to oblanceolate, 3–8 × 2–5 mm, 3–5-lobed or -toothed near apex, rarely entire. Cauline leaves sessile or attenuate to a petioloike base to 4 mm; blade oblong, obovate, spatulate, or oblanceolate, 0.5–1.5(–3) cm × 2–5(–7) mm, margin entire, sometimes ciliate with subsetose trichomes, apex 3–5-toothed or -lobed; terminal tooth or lobe to 6 × 4 mm. Fruit pedicels strongly curved, often forming a complete loop, 4–8(–12) mm, pubescent with simple and forked trichomes. Sepals pink or green, oblong, 1.5–2.5 × 0.7–1 mm, membranous margin 0.1–0.2 mm. Petals white, broadly obcordate or orbicular, (3.5–)5–6(–7) × 2.5–4(–5) mm; claw 0.5–1 mm. Filaments white, 2–3.5 mm; anthers purple, ca. 0.5 mm. Fruit with 1 side aborting; valves thin papery, 3–4 × 1.7–2.5 mm, glabrous or with simple, flattened trichomes to 0.4 mm, rounded or rarely with a dorsal appendage to 1 mm; replum flattened, to 1.5 mm wide; gynophore obsolete or to 0.1 mm; style (1–)2–3.5 mm. Seeds 2.5–3(–3.5) × 1.5–2(–2.5) mm, reddish brown. Fl. Apr–Jul, fr. Jul–Sep.

Alpine gravel, mountain slopes, limestone drift, open stony meadows, scree, pastures, alpine meadows; 3000–4600 m. Sichuan, Yunnan.


双脊荠属 shuang ji qi shu

Herbs perennial. Trichomes absent or simple. Roots fleshy, conical. Stems erect, simple underground, branched aboveground. Basal leaves sessile, fleshy, rosetulate, simple, entire or sinuate or dentate. Cauline leaves sessile, attenuate and not auriculate, entire. Corymbs several to many flowered, bracteate or ebracteate, simple or compound, not elongated in fruit. Fruit pedicels ascending or divaricate. Sepals broadly ovate, persistent, ascending, glabrous or puberulent, base of lateral pair not saccate. Petals white or pink, longer than sepals; blade obovate or spatulate, apex obtuse or emarginate; claw obscurely to distinctly differentiated from blade. Stamens 6, slightly spreading, slightly tetradynamous; filaments not dilated at base; anthers ovate, apiculate at apex. Nectar glands confluent and subtending bases of all filaments. Ovules 4–12 per ovary. Fruit dehiscent silicles, obcordate, angustiseptate, sessile; valves membranous or thin papery, obscurely veined, glabrous or puberulent, rounded, smooth, apically gibbous and cristate; replum strongly flattened, base much broader; septum complete or perforated; style to 0.5 mm, included in apical notch of fruit; stigma capitate, entire. Seeds wingless, broadly oblong or ovoid, slightly flattened; seed coat minutely reticulate, not mucilaginous when wetted; cotyledons incumbent or oblique.

Two species: Bhutan, China, India, Kashmir, Kyrgyzstan, Nepal, Sikkim, Tajikistan; two species (one endemic) in China.

1a. Petals broadly obovate, 4.5–6 × 2–3 mm; anther apicula ovate, 0.2–0.5 mm, apex rounded; seeds 2–4 per fruit, 1.8–2.2 × 0.9–1.2 mm ................................ ................................ .................................................... 1. D. ebracteata

1b. Petals spatulate or spatulate-linear, 1.8–2.5(–3.2) × 0.5–1(–1.5) mm; anther apicula triangular, 0.05–0.1 mm, apex acute; seeds (2–)4–8(–12) per fruit, 0.7–1.1(–1.5) × 0.5–6 mm ................................ ................................ ........................................... 2. D. salsa

宽框荠属 kuan kuang qi shu

*Dilophia hopkinsontii* O. E. Schulz.

Herbs glabrous throughout, rarely sepals puberulent. Stems erect, somewhat fleshy, simple from taproot, 1.5–10 cm tall. Leaves oblong-spatulate, linear-spatulate, or linear, (3–)5–10 (– 15) × (1–)1.5–3 mm, fleshy, base attenuate, margin entire, apex obtuse or rounded. Corymb few to many flowered, only lowermost few flowers bracteate. Fruiting pedicels 3–10 mm. Sepals erect, broadly ovate, 2.5–3 × 1.5–2 mm, glabrous or subapically puberulent, margin broadly membranous, apex obtuse or minutely denticulate. Petals white, often with pink tinge outside, broadly obovate, 4.5–6 × 2–3 mm, apex rounded or submarginal; claw to 3 mm. Filaments white, 2–3 mm; anthers ovate, 0.6–1 mm, the apicula ovate, 0.2–0.5 mm, apex rounded. Ovules 2–4 per ovary. Fruit valves oblong, glabrous, 2.5–2.5 mm, notch to 2 mm wide, apical cristae 4–12; replum 2–2.5 mm wide at base; style 0.2–0.3 mm. Seeds brown to blackish, broadly membranous, apex obtusely triangular, 0.05–0.1 mm, apex acute. Ovules (2–)4–8 (–12) per ovary. Fruit valves oblong or ovate, glabrous or densely pubescent, 1–2.5 mm, notch 1–2 mm wide, apical cristae 3–14; replum 1.2–2.5 mm wide at base; style 0.2–0.5 mm. Seeds brown to blackish, broadly oblong, 0.7–1.1 (–1.5) × 0.5–0.6 mm. Fl. late Jun–Sep, fr. Aug–Oct.

- Consolidated turf within scree slopes in alpine meadows and on rocky slopes, *Kobresia* mats; 4500–5000 m. Qinghai, Xizang.

The records in FRPS and Fl. Xinjiang. (2(2): 91. 1995) of *Dilophia ebracteata* from Xinjiang are based on misidentified plants of *D. salsa* var. *hirticalyx* Pampanini. The differences previously used to distinguish *D. ebracteata* (leaves entire, flowers ebracteate, ovary cristae longitudinal) from *D. salsa* (leaves dentate or pinnately lobed, flowers bracteate, ovary cristae transverse) do not hold, though the leaves in the latter species are more often sinuate, dentate, or repand, rather than entire.


宽叶双脊荠 yan ze shuang ji qi

*Dilophia dutreuilii* Franchet; *D. kashgarica* Ruprecht; *D. salsa* var. *hirticalyx* Pampanini.

Herbs glabrous throughout, or fruit valves and/or sepals sparsely to densely pubescent with simple, flattened trichomes to 0.5 mm. Stems erect, somewhat fleshy, usually simple from taproot, 1.5–10 cm tall, often forming a flat mat 1–12 cm in diam. Leaves spatulate, linear-spatulate, oblong, or linear, (0.3–)0.6–2(–3) cm × (1–)2–3(–5) mm, fleshy, base attenuate, margin sinuate, dentate, or repand, sometimes entire, apex obtuse. Corymb few to many flowered, lowermost or most flowers bracteate, sometimes flowers solitary from center of rosette. Fruiting pedicels 3–10 mm. Sepals erect or ascending, broadly ovate, (1–)1.5–2.5 × 1–1.5 mm, glabrous or densely pubescent, margin broadly membranous, apex denticulate or entire. Petals white or pink, drying purplish, spatulate to spatulate-linear, 1.8–2.5 (–3.2) × 0.5–1(–1.5) mm, apex obtuse or submarginal; claw to 2 mm. Filaments white, 1.1–1.6 mm; anthers ovate, (0.2–)0.3–0.5 mm, the apicula triangular, 0.05–0.1 mm, apex acute. Ovules (2–)4–8 (–12) per ovary. Fruit valves oblong or ovate, glabrous or densely pubescent, 1–2.5 mm, notch 1–2 mm wide, apical cristae 3–14; replum 1.2–2.5 mm wide at base; style 0.2–0.5 mm. Seeds brown to blackish, broadly oblong, 0.7–1.1 (–1.5) × 0.5–0.6 mm. Fl. Jun–Aug, fr. Jul–Sep.

Sandy river bottoms or marshes, damp mud by streamsides, debris covered glacial moraine, scree, grasslands, steep slopes with semiconsolidated scree, turf cushions, sand plains permafrost, salty pastures, dunes, alpine steppe; (2200–)3400–5500. Gansu, Qinghai, Xinjiang, Xizang [Bhutan, India, Kashmir, Kyrgyzstan, Nepal, Sikkim, Tajikistan].


宽框荠属 kuan kuang qi shu

Herbs biennial or perennial. Trichomes simple. Roots fusiform, fleshy. Stems erect, short, and simple at base, with several, long, decumbent or ascending branches. Basal leaves unknown. Cauline leaves petiolate, repand-dentate or sinuate, dentate, or repand, apex obtuse or minutely denticulate. Petals white, drying purplish, spatulate to spatulate-linear, 1.8–2.5 (–3.2) × 0.5–1(–1.5) mm, apex obtuse or submarginal; claw to 2 mm. Filaments white, 1.1–1.6 mm; anthers ovate, (0.2–)0.3–0.5 mm, the apicula triangular, 0.05–0.1 mm, apex acute. Ovules (2–)4–8 (–12) per ovary. Fruit valves oblong or ovate, glabrous or densely pubescent, 1–2.5 mm, notch 1–2 mm wide, apical cristae 3–14; replum 1.2–2.5 mm wide at base; style 0.2–0.5 mm. Seeds brown to blackish, broadly oblong, 0.7–1.1 (–1.5) × 0.5–0.6 mm. Fl. Jun–Aug, fr. Jul–Sep.

Sandy river bottoms or marshes, damp mud by streamsides, debris covered glacial moraine, scree, grasslands, steep slopes with semiconsolidated scree, turf cushions, sand plains permafrost, salty pastures, dunes, alpine steppe; (2200–)3400–5500. Gansu, Qinghai, Xinjiang, Xizang [Bhutan, India, Kashmir, Kyrgyzstan, Nepal, Sikkim, Tajikistan].


宽框荠 kuan kuang qi
Herbs (6-)10–20(--60) cm tall, glabrous or sparsely pubescent with trichomes to 0.8 mm. Root fusiform, to 5 mm in diam. Stems several branched from a short base. Cauline leaves petiolate, glabrous or pubescent; petiole (0.1–)0.5–2(--3) cm; leaf blade suborbicular, cordate, or broadly ovate, (4–)7–15 × (1–)5–12(–15) mm, reduced upward, base cordate, margin repand-dentate, repand, or palmately 5-lobed, not mucronate, apex obtuse. Fruiting pedicels slender, ascending or divaricate, straight or recurved, (3–)5–12(--20) mm. Sepals 1.5–2 × 0.8–1.5 mm, glabrous, membranous margin to 0.2 mm wide; median pair oblong, narrower than lateral, not saccate at base; lateral pair broadly ovate, saccate at base. Petals white, narrowly obovate or subelliptic, 4–6 × 2–3 mm, base cuneate, apex rounded. Filaments white, 1.1–2 mm; lateral pair slender; median pair strongly flattened basally, 0.4–0.6 mm wide, with an ovate or oblong lateral tooth 0.2–0.4 × 0.1–0.2 mm; anthers oblong, 0.4–0.6 mm, apex obtuse. Ovules 6–9 per ovary. Fruit narrowly oblong, 4-angled, longitudinally 4-winged, curved, not torulose, (6–)18–15 × 2.5–3 mm, base cuneate; valves glabrous, with a well-developed midvein wing to 0.5 mm wide; replum with a longitudinal wing to 0.5 mm wide; style thick, 0.5–1.5 mm; gynophore to 0.5 mm. Seeds ovate or broadly oblong, flattened, (2.8–)3–3.5 × 1.5–2 mm. Fl. Jun–Aug, fr. Jul–Aug.


阳山荠属 Yinshania shanqi


Herbs annual or perennial with tubers or rhizomes. Trichomes absent or simple or 1- or 2-forked. Stems erect, ascending, or decumbent. Basal leaves not rosulate, simple, undivided or pinnately or palmately lobed, trilobolate, or pinnately compound. Cauline leaves petiolate, not auriculate, similar to basal leaves or simple upward. Racemes few to many flowered, ebracteate or rarely bracteate throughout. Fruiting pedicels erect, ascending, divaricate, or reflexed. Sepals oblong or ovate, spreading, not saccate. Petals white or rarely pinkish, spreading, longer than sepals; blade obovate, oblong, or ovate, apex obtuse or rounded; claw absent or short. Stamens 6, spreading, subequal; filaments not dilated at base; anthers ovate or oblong, apex obtuse. Median nectaries absent; lateral glands 1 on each side of lateral stamen. Ovules 1–24 per ovary. Fruit dehiscent silicules, oblong, ovoid, ellipsoid, or globose, terete, rarely slightly latisectate or angustiseptate, sessile; valves veinless or obscurely veined, glabrous, papillate, or with simple trichomes, smooth; replum rounded; septum complete, perforated, or absent; style obsolete or to 3 mm; stigma discoid, entire. Seeds uniserial or biseriate, wingless, oblong, ovate, reniform, orbicular, ovoid, lenticular, elliptic, ellipsoid, or globose, slightly flattened; seed coat minutely reticulate or papillate, not mucilaginous when wetted; cotyledons incumbent or rarely accumbent.

Thirteen species: China, N Vietnam; 13 species (12 endemic) in China.


1a. Most or all leaves simple, entire, repand, or sinuate, rarely lowermost few trifoliolate ...................... 8. Y. sinuata
1b. Leaves compound or pinnately lobed.

2a. Flowers bracteate along entire length or only on lower half of inflorescence.

3a. Plants annual; ovary ca. 8-ovuled, cylindric, papillate ................................................................. 13. Y. hui
3b. Plants perennial; ovary ca. 4-ovuled, obovate-ellipsoid, glabrous ............................................. 12. Y. hunanensis
2b. Flowers ebracteate.

4a. Trichomes forked.

5a. Leaves and stems canescent, densely villous with trichomes 0.3–0.5(–0.6) mm ... 6. Y. furcatopilosa
5b. Leaves and stems not canescent, puberulent with trichomes 0.05–0.08(–0.1) mm ........ 3. Y. zayuensis

4b. Trichomes simple or absent.

6a. Infructescence rachis conspicuously flexuous.

7a. Leaves canescent, densely villous, margin of lower leaves deeply crenate; seeds 0.7–0.9 mm, (4–)10–20 per fruit .............................................................. 5. Y. henryi
7b. Leaves not canescent, glabrous or sparsely pubescent, margin of lower leaves not deeply crenate; seeds 1.5–2 mm, 2(–4) per fruit ........................................ 2. Y. yixianensis

6b. Infructescence rachis straight.

8a. Leaflets of middle and lower leaves less than 1 cm wide.

9a. Leaves glabrous, lower ones trifoliolate; fruit papillate ................................ ... 4. Y. fumarioides
9b. Leaves usually pilose, rarely glabrous, lower ones pinnate, with 2–5 pairs of lateral leaflets; fruit glabrous or rarely pilose .......................................................... 1. Y. acutangula

8b. Leaflets of middle and lower leaves more than 1 cm wide.

10a. Lower leaves with 5–9 leaflets; fruit conspicuously compressed; plants tuberous perennials ................................................................. 11. Y. rupicola
10b. Lower leaves with 3(or 5) leaflets; fruit plump, not compressed; plants annuals with slender roots.

11a. Leaflet apex acuminate-caudate; fruit appressed to rachis; plants puberulent with trichomes to 0.1 mm .............................................................. 10. Y. lichuanensis
11b. Leaflet apex obtuse or acute, rarely subacuminate; fruit widely spreading or reflexed; plants glabrescent throughout or rarely glabrescent.

12a. Fruit ovate or obovate, 2- or 3-seeded; style 0.5–0.8 mm; pedicel (1.5–)2.5–4 mm ................................................................. 9. Y. paradoxa
12b. Fruit narrowly oblong, 7–10-seeded; style (1–)1.5–2 mm; pedicel 6–10 mm ................................................................. 7. Y. rivulorum


锐棱阴山荠 rui leng yin shan qi

Annuals, (8–)30–60(–100) cm tall. Stems slender, distantly angled or subterete, branched, sparsely to densely covered with simple trichomes (0.1–)0.3–0.4(–0.5) mm, rarely glabrescent or glabrous. Basal leaves and lowermost cauline leaves pinnate, with 2–5 pairs of lateral leaflets, often withered at fruiting, pilose with subappressed, simple, straight trichomes; petiole 0.5–2 cm; leaflets membranous, oblong or ovate-lanceolate, 5–20 × 2–9 mm, sparsely pubescent or rarely glabrous, base cuneate, margin deeply serrate or entire, apex obtuse, with a minute callose mucro; upper cauline leaves similar to lower ones but progressively shorter upward. Racemes terminal and lateral, many flowered, elongated in fruit. Fruiting pedicels 4–7 mm, slender, straight, divaricate or slightly recurved, glabrous or pilose. Sepals ovate, 1–1.5 mm. Petals white, obovate, 2–2.5 × ca. 0.7 mm. Filaments ca. 1 mm. Ovules (2–)4–20 per ovary. Fruit oblong-linear, oblong, narrowly ovoid, or globose, 1.5–4 × 1–1.5 mm, not compressed, sessile; valves membranous, papillate or pilose; style 0.5–0.8 mm. Seeds brown, oblong-ovate, 0.6–1(–1.1) × 0.4–0.5(–0.6) mm, reticulate. Fl. Jul–Aug, fr. Aug–Oct.

Mountain slopes, meadows, rock crevices, valleys, fields, among bushes, roadsides, dry areas; 900–3000 m. Gansu, Hebei, Nei Mongol, Qinghai, Shaanxi, Sichuan.

1a. Fruit oblong to oblong-linear, rarely narrowly ovoid; seeds (10–)14–20(–24) per fruit, 0.6–0.8 mm ......................... 1a. subsp. acutangula
1b. Fruit globose, rarely globose-ovoid; seeds 2–4(–6) per fruit, 0.8–1(–1.1) mm.

2a. Fruit pilose; stems obscurely angled to subterete ......... 1b. subsp. microcarpa
2b. Fruit minutely papillate or glabrous; stems distinctly angled ...... 1c. subsp. wilsonii

1a. Yinshania acutangula subsp. acutangula

锐棱阴山荠(原亚种) rui leng yin shan qi (yuan ya zhong)

Stems distinctly angled. Fruit oblong to oblong-linear, rarely narrowly ovoid, glabrous or minutely papillate. Seeds (10–)14–20 (–24) per fruit, 0.6–0.8 mm. Fl. Jul–Aug, fr. Aug–Oct. 2n = 14*.

- Mountain slopes, meadows, rock crevices, valleys, fields, among bushes, roadsides, dry areas; 900–3000 m. Gansu, Hebei, Nei Mongol, Qinghai, Shaanxi, Sichuan.


- Dry areas by rocks; ca. 1100 m. Gansu, Sichuan.


- Woods; 2600–3000 m. Hubei, Sichuan, Xizang, Yunnan.


- Valley slopes, roadsides; ca. 200 m. Anhui.

- Annuals, (5–)10–20 (–35) cm tall. Stems erect, simple or branched, puberulent with forked and bifurcate trichomes 0.05–0.08 (–0.1) mm, rarely glabrous above. Leaves pinnatisect; petiole 2–7 mm; leaf blade oblong, 0.6–3 × 0.4–1.5 (–2.3) cm, puberulent with minute, simple and forked trichomes, rarely glabrescent; terminal lobe oblong, 3–15 × 1–5 mm, base cuneate, margin serrate or subentire, apex acute; lateral lobes 1–3 pairs, 1.5–13 × 0.5–3 mm. Racemes paniculate; rachis straight or rarely flexuous. Fruiting pedicels divericate or ascending, slender, straight, 5–10 mm, pubescent or glabrous. Sepals oblong, 1.6–1.6 × 0.5–0.7 mm, white at margin and apex. Petals white or rarely pinkish, 1.5–2 × 0.7–1 mm. Filaments 1.1–1.2 mm; anthers oblong, ca. 0.2 mm. Ovules 16–20 per ovary. Fruit oblong, ellipsoid, or ovoid, plump, (2.5–4 × 0.9–1.6 mm; valves with distinct midvein and reticulate veins, glabrous; style 0.1–0.5 mm. Seeds dark brown, ovate, 0.6–0.9 × 0.4–0.6 mm, reticulate. Fl. and fr. Jul–Aug.

- Woods; 2600–3000 m. Hubei, Sichuan, Xizang, Yunnan.


- Annuals or biennials. Stems erect, 40–90 cm tall, striate, glabrous or rarely pilose with simple trichomes. Basal and median cauline leaves compound, with 2 or 3 pairs of lateral leaflets; petiole 0.5–1.5 cm; leaflets thin papery, ovate or elliptic, 1–4 × 0.8–1.7 cm, hirsipulous, base obtuse or cuneate, margin obtusely dentate with the teeth mucronate, apex acute; petiolo 6 to 5 mm; uppermost cauline leaves smaller, with fewer teeth and lateral leaflets. Racemes terminal and lateral, elongated considerably in fruit; rachis conspicuously flexuous, slender. Fruiting pedicels slender, 5–6 mm. Sepals elliptic, ca. 1.5 × 0.5 mm, spreading. Petals white, spreading, ovate, ca. 2.5 × 1.5 mm. Fruit subglobose-obovoid, ca. 3.5 × 2.5 mm; valves papillate. Seeds 2 (–4) per fruit, ovoid, 1.5–2 mm. Fl. Jul. 2n = 42*.

- Roadsides; ca. 200 m. Anhui.

- Annuals, (14–)30–60 cm tall. Stems erect, simple or branched, puberulent with forked and bifurcate trichomes 0.05–0.08 (–0.1) mm, rarely glabrous above. Leaves pinnatisect; petiole 2–7 mm; leaf blade oblong, 0.6–3 × 0.4–1.5 (–2.3) cm, puberulent with minute, simple and forked trichomes, rarely glabrescent; terminal lobe oblong, 3–15 × 1–5 mm, base cuneate, margin serrate or subentire, apex acute; lateral lobes 1–3 pairs, 1.5–13 × 0.5–3 mm. Racemes paniculate; rachis straight or rarely flexuous. Fruiting pedicels divericate or ascending, slender, straight, 5–10 mm, pubescent or glabrous. Sepals oblong, 1.6–1.6 × 0.5–0.7 mm, white at margin and apex. Petals white or rarely pinkish, 1.5–2 × 0.7–1 mm. Filaments 1.1–1.2 mm; anthers oblong, ca. 0.2 mm. Ovules 16–20 per ovary. Fruit oblong, ellipsoid, or ovoid, plump, (2.5–4 × 0.9–1.6 mm; valves with distinct midvein and reticulate veins, glabrous; style 0.1–0.5 mm. Seeds dark brown, ovate, 0.6–0.9 × 0.4–0.6 mm, reticulate. Fl. and fr. Jul–Aug.
0.9–1.3 mm; anthers oblong-ovate, 0.2–0.4 mm. Fruit suborbicular, 1.5–2.5 mm in diam., plump; valves densely papillate, appearing minutely papillate or subglabrous when young; style 0.2–0.5 mm. Seeds 2 per fruit, brown, broadly ovate to ovate-oblong, 1.2–1.5 × 0.8–1.1 mm, minutely papillate. Fl. and fr. May–Aug.

- Wet slopes, rocky cliffs, forests, along streams; 400–1000 m. Anhui, Fujian, Zhejiang.


柔毛阴山荠 rou mao yin shan qi

Nasturtium henryi Oliver, Hooker’s Icon. Pl. 18: t. 1719. 1887; Cochlearia henryi (Oliver) O. E. Schulz; N. kouytchense H. Léveillé.

Annuals, 15–35–(50) cm tall. Stems branched, terete. Leaves 3–5(–9)-foliolate, canescent, usually densely pubescent with straight simple trichomes (0.5–)0.6–1 mm; petiole 1.5–6 cm; terminal leaflet broadly ovate or suborbicular, rarely narrowly ovate, 1.5–2.5 × 0.8–2.8 cm, base slightly cordate or subtruncate, margin 3–lobed, lobes deeply crenate, ending in a small callose mucro, apex rounded; lateral leaflets petiolate or sessile, blade 6–10 mm, base attenuate. Racemes ebracteate, elongated in fruit; rachis slender, slightly to strongly flexuous, at least apically. Fruiting pedicels slender, straight, spreading, 5–10–(15) mm, pubescent or rarely glabrous. Sepals oblong, 1.5–2 × 0.7–1.2 mm, pubescent outside. Petals white, obovate, 2–3.5 × 1–1.5 mm, base shortly clawed, apex rounded. Filaments 1.3–2 mm; anthers ovate, ca. 0.3 mm. Fruit narrowly oblong, oblong-lanceolate, or sublinear, (2.5–)3–5 × 1–1.2 mm, plump; valves navicular, pubescent or sometimes glabrous, thickened at margin; septum complete or perforate; style 0.3–0.7(–1.2) mm. Seeds (2–)15–10 in each locule, brown, reticulate, ovate, 0.7–0.9 × 0.5–0.7 mm. Fl. and fr. Jun–Sep. 2n = 12*.

- Mountain slopes, rocky areas, roadsides; 800–1600 m. Hubei.


叉毛阴山荠 cha mao yin shan qi


Annuals, 10–20–(30) cm tall, canescent, densely covered with forked trichomes. Stems erect, branched, terete. Basal and lower cauline leaves 3–5-foliolate, canescent, densely pubescent with bifurcate trichomes 0.25–0.5(–0.6) mm; petiole 1–3(–4.5) cm; terminal leaflet ovate, rarely oblong or subreniform, 0.6–1.2 × 0.4–1.5 cm, base subtruncate or rounded, margin lobed or crenate, not ending in callose apiculae, apex rounded; lateral leaflets suborbicular or ovate, 3–6 × 2–7 mm, margin crenate or entire. Uppermost leaves simple, pubescent; petiole 1–6 mm; leaf blade oblong, 3.10 × 1.5–4.5 mm, base rounded, margin entire, apex obtuse. Racemes panicle, ebracteate; rachis distinctly flexuous. Fruiting pedicels divaricate, straight, slender, (3–)5–9(–12) mm, glabrous or pubescent at base. Sepals oblong, 1.2–1.6 × 0.8–0.9 mm, glabrous, white at margin and apex. Petals white, obovate, 3–3.3 × 1.6–2 mm, base shortly clawed, apex rounded. Filaments 1–1.6 mm; anthers oblong-ovate, ca. 0.3 mm. Ovules 8–12 per ovary. Fruit ovate or oblong, rarely oblong, 1.7–2.5(–3) × 0.8–1.1 mm; valves not veined, glabrous; septum perforate; style 0.4–0.5 mm. Seeds brown, oblong, 0.7–0.8 × 0.3–0.4 mm, finely papillate, narrowly margined. Fl. and fr. Jun–Jul. 2n = 12*.

- Shady river banks, mountain slopes; 300–800 m. Fujian, Hunan, Taiwan.


河岸阴山荠 he an yin shan qi


Annuals, 8–50 cm tall, glabrous throughout. Basal and lowermost cauline leaves trifoliolate, rarely 1 simple; petiole 4–10 cm, gradually shorter upward, not winged; leaflet blade ovate, oblong, or rarely lanceolate, 1–5 × 0.8–3 cm, papery, base cordate, rounded, or cuneate, margin repand or rarely sinuate-toothed, with conspicuous callose mucros terminating veins, apex obtuse or acute; petiolo 2–12 mm, longer on terminal leaflet. Upper leaves similar to lower ones, becoming simple at the inflorescence. Racemes lax, ebracteate; rachis straight. Fruiting pedicels 6–10 mm, slender, straight, reflexed. Sepals 1–2 mm. Petals white, obovate, 1.5–2.5 mm, minutely clawed. Filaments white, 1–2 mm; anthers ca. 0.2 mm. Fruit oblong, 3–6 × ca. 1.5 mm, papillate when immature; septum absent; style 0.5–0.8 mm. Seeds 7–10, oblong, 0.8–1 × ca. 0.5 mm. Fl. and fr. Apr–Dec.

- Shady river banks, mountain slopes; 300–800 m. Fujian, Hunan, Taiwan.


弯缺阴山荠 wan que yin shan qi

C. rivulorum = 12*.
0.8–1.1 mm, glabrous, narrowly membranous at margin and apex. Petals white, obovate, 2.5–3 × 1.2–1.7 mm, base shortly clawed, apex rounded. Filaments 1.5–2 mm; anthers 0.4–0.6 mm. Fruit oblong, 6–12 × 1.7–2.3 mm, glabrous; style 0.8–1.5 mm. Seeds (5–)7–14(–21), brown, ovate, 0.8–1.3 mm.

- Forests, mountain slopes, rock crevices, shady moist sand; near sea level to 700 m. Anhui, Guangdong, Hunan, Jiangxi.

1a. Lowermost leaves simple; seeds 0.8–0.9 mm ........................................ 8a. subsp. sinuata

1b. At least some lowermost leaves trifoliolate; seeds 1.2–1.3 mm ............. 8b. subsp. qianwuensis

8a. Yinshania sinuata subsp. sinuata

8b. Yinshania sinuata subsp. qianwuensis


Annuals, 30–70 cm tall, glabrous throughout or rarely puberulent with simple trichomes 0.03–0.08(–0.1) mm. Stems erect, sulcate. Basal and lowermost cauline leaves 3–5-foliolate; petiole 2.5–7 cm, usually narrowly winged, grooved and sparsely to densely puberulent adaxially; leaflet blade lanceolate, (3–)6–14 × (0.8–)2–5 cm, terminal ones usually larger, base cuneate, rounded, or oblique, margin serrate or irregularly dentate, mucronate, apex acuminate-caudate, abaxially puberulent, adaxially sparsely puberulent at least on veins; petiolule of lateral leaflets obsolete to 5 mm. Uppermost leaves simple or rarely 3-foliolate, similar in morphology to leaflets of lower leaves. Racemes terminal and lateral, elongated considerably in fruit. Fruiting pedicels straight, slender, 2–5 mm, erect-subascended, subpressed to rachis. Sepals oblong, 2–2.5 mm. Petals white, spatulate, 2.5–3(–3.5) × ca. 1 mm, base clawed. Filaments white, 2–2.5 mm; anthers oblong, 0.5–0.7 mm. Fruit obovoid, oblong, or elliptoid, 3–5 × 1.5–2 mm; valves thick; gynophore obsolete or to 0.5 mm; septicum absent; style 0.5–1.5(–2) mm. Seeds 1–3, brown to blackish brown, oblong, 1.5–2.5 × 1–1.4 mm, reticulate. Fl. May–Jun, fr. Jun–Aug. 2n = 42*.

- Forests; 200–700 m. Jiangxi.


Cardamine paradoxa Hance, J. Bot. 6: 111. 1868; Cochlearia paradoxa (Hance) O. E. Schulz; Hilliella paradoxa (Hance) Y. H. Zhang & H. W. Li.

Annuals, 30–100 cm tall, with a thick tuberous rhizome 2–4 cm wide, glabrous throughout. Stems 1 or few from rhizome, erect, sulcate, branched above. Basal and lowermost cauline leaves compound, 5–9-foliolate; petiole (3–)8–15(–20) cm; leaflets broadly oblong, ovate, or lanceolate, (2–)4–7(–10) × (1–)2–3(–4) cm, base oblique, cuneate, or subtruncate, margin coarsely

1b. At least some lowermost leaves trifoliolate; seeds 0.8–0.9 mm .............. 8b. subsp. qianwuensis

8b. Yinshania sinuata subsp. qianwuensis

Yinshania paradoxa Hance, J. Bot. 6: 111. 1868; Cardamine paradoxa Hance, J. Bot. 6: 111. 1868; Cochlearia paradoxa (Hance) O. E. Schulz; Hilliella paradoxa (Hance) Y. H. Zhang & H. W. Li.

Annuals, 30–70 cm tall, glabrous throughout or rarely puberulent with simple trichomes 0.03–0.08(–0.1) mm. Stems erect, sulcate. Basal and lowermost cauline leaves 3–5-foliolate; petiole 2.5–7 cm, usually narrowly winged, grooved and sparsely to densely puberulent adaxially; leaflet blade lanceolate, (3–)6–14 × (0.8–)2–5 cm, terminal ones usually larger, base cuneate, rounded, or oblique, margin serrate or irregularly dentate, mucronate, apex acuminate-caudate, abaxially puberulent, adaxially sparsely puberulent at least on veins; petiolule of lateral leaflets obsolete to 5 mm. Uppermost leaves simple or rarely 3-foliolate, similar in morphology to leaflets of lower leaves. Racemes terminal and lateral, elongated considerably in fruit. Fruiting pedicels straight, slender, 2–5 mm, erect-subascended, subpressed to rachis. Sepals oblong, 2–2.5 mm. Petals white, spatulate, 2.5–3(–3.5) × ca. 1 mm, base clawed. Filaments white, 2–2.5 mm; anthers oblong, 0.5–0.7 mm. Fruit obovoid, oblong, or elliptoid, 3–5 × 1.5–2 mm; valves thick; gynophore obsolete or to 0.5 mm; septicum absent; style 0.5–1.5(–2) mm. Seeds 1–3, brown to blackish brown, oblong, 1.5–2.5 × 1–1.4 mm, reticulate. Fl. May–Jun, fr. Jun–Aug. 2n = 42*.

- Forests; 200–700 m. Jiangxi.


serrate with a distinct mucro at tooth apex, apex obtusely acuminate with a distinct mucro; petiolule 1–5(–20) mm. Upper cauline leaves 3- or 5-foliolate, becoming gradually smaller and narrower upward. Racemes terminal and lateral, many flowered; lowestmost flowers sometimes bracteate. Fruiting pedicels filiform, recurved to reflexed, 4–10 mm. Upper cauline leaves 3- or 5-foliolate, becoming gradually smaller and narrower upward. Racemes terminal and lateral, many flowered; lowestmost flowers sometimes bracteate. Fruiting pedicels filiform, recurved to reflexed, 4–10 mm.

Sepals oblong, 1.5–2 mm, whitish at margin. Petals white, oblong or obovate, 2–4 × 1–2 mm, apex rounded; claw to 1 mm. Filaments white, 1–1.5 mm; anthers ovate, ca. 0.5 mm. Fruit narrowly elliptic, 5–6 × 2–2.5 mm. Fl. May–Jun, fr. Jun–Aug.

Forest, wet places, valleys, along streams; 1000–1200 m. Anhui.

1a. Fruit narrowly elliptic, 5–6 × 2–2.5 mm
1b. Fruit suborbicular-obovate, 2.5–4 × 2.5–4 mm

11a. Yinshania rupicola subsp. rupicola

11b. Yinshania rupicola subsp. shuangpaiensis


Annuals, glabrous throughout. Rhizomes thick, to 5 mm in diam. Stems slender, branched from base, ascending. Basal and lowermost cauline leaves 5-foliolate; petiole 5–8.5 cm; leaflets thin, broadly ovate or suborbicular, (0.5–)1–2.5(–3.5) × (5–)1–2(–2.5) cm, margin shallowly 5–7-lobed or repand, veins ending in a distinct mucro; terminal leaflet cuneate or subcordate at base, lateral leaflets oblique at base; petiole (2–)5–10(–30) mm. Middle and upper cauline leaves gradually reduced in size, 3-foliolate. Racemes bracteate along lower half; bracts simple or lowermost 3-foliolate, considerably reduced in size upward. Fruiting pedicels slender, often recurved, 0.8–1.5 cm. Sepals 1.5–1.7 mm. Petals white, 2–2.5 × ca. 1.5 mm. Fl. May–Jun, fr. Jun–Aug.

Rocky areas, valleys, streamsides, dense forests; 500–1600 m. Guangxi, Hunan, Jiangxi.


革叶荠属 ge ye qi shu

Herbs perennial, with a woody, unbranched caudex covered with petiolar remains of previous years. Trichomes simple or absent. Stems erect or ascending, simple at base, many branched above. Basal leaves petiolar, rosulate,
simple, entire or rarely toothed, leathery, with a single midvein or several, equally thick palmate veins. Cauline leaves petiolate or sessile, few, attenuate, auriculate, sagittate, or amplexicaul at base, entire. Racemes many flowered, ebracteate, corymbose, 2–3 cm long, digitate, elongated in fruit. Fruiting pedicels slender or slightly thickened, ascending or divaricate. Sepals ovate or suborbicular, deciduous, erect or ascending, base of lateral pair not saccate, margin broadly membranous. Petals white, pink, or rarely pale yellow; blade broadly obovate or orbicular, apex rounded or emarginate; claw shorter than sepals. Stamens 6, tetradynamous; filaments not dilated at base; anthers ovate or oblong, obtuse at apex. Nectar glands 6, ovoid or toothlike; median glands 2; lateral ones 4, 1 on each side of lateral stamen. Ovules 2 per ovary. Fruit dehiscent silicles, obovate or orbicular, deeply ribbed; seeds wingless, obovate or ellipsoid, plump; seed coat nearly smooth, mucilaginous when wetted; cotyledons incertum.

About 20 species: primarily in C Asia and Iran; one species in China. The principal differences used to distinguish Stroganowia from Lepidium are the presence of somewhat 4-angled fruit with thick valves and an unbranched caudex with petiolar remains from previous years. However, these differences can hardly justify the recognition of two genera.

1. Stroganowia brachyota Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 14: 387. 1841. 菠叶荠 ge ye qi Lepidium desertorum Schrenk; Stroganowia desertorum (Schrenk) Botschantzev. Herbs (20–)30–50 cm tall, glabrous throughout. Stems erect, many branched above, rounded angular. Leaves leathery. Petiole of basal leaves to 1.5 cm, broadly winged, persisting in subsequent years into fibrous remains; leaf blade obovate-spatulate or spatulate-orbicular, 3–8 × 1.5–5 cm, thick leathery, with several palmate main veins more prominent abaxially, base attenuate, margin entire, apex obtuse to subacute. Middle and upper cauline leaves few, much smaller than basal, sessile, ovate-lanceolate or oblong, base subamplexical and with rounded auricles, margin entire, apex acute. Fruiting pedicels thickish, 6–11 mm, angled, ascending or subdivaricate. Sepals deciduous, broadly ovate or suborbicular, 1.7–2.5 × 1.2–1.7 mm, glabrous, with broad white margin and apex. Petals white, broadly obovate or suborbicular, 3.5–5.5 × 2–2.5 mm, apex rounded; claw 1–1.5 mm. Filaments white, 2–2.5 mm; anthers oblong, 0.4–0.5 mm. Fruit obovate, 5–7(–8) × 3–4.5(–5) mm, obscurely carinate, with distinct midvein and obscure lateral veins, base and apex obtuse; gynophore 0.2–0.6 mm, stout; style 0.4–0.8(–1) mm. Seeds brown, ovoid, 2.5–3.5 × 1.5–2 mm. Fl. May–Jul, fr. Jun–Aug.

Stony slopes and steppe of desert mountains; 1300–1700 m. N Xinjiang (Toli Xian) [Kazakhstan].

The illustration of this species in Fl. Xinjiang. (2(2): 93. 1995) is inaccurate because it consists of a basal portion, which is correctly based on Stroganowia brachyota, and a distal portion based on a plant of Platycraspedum tibeticum. The latter species does not occur in Xinjiang, and the illustration is modified from that in FRPS (p. 95), in which both species are correctly illustrated and identified.

28. LIGNARIELLA Baehni, Candollea 15: 57. 1955. 弯梗芥属 wan geng jie shu

Herbs biennial or short-lived perennial. Trichomes simple, clavate papillae. Stems ascending or decumbent or prostrate. Basal leaves not seen. Cauline leaves petiolate, palmately 3(–5)-lobed or 3(–5)-partite to base, sometimes 3(–5)-toothed near apex, rarely repand or entire, glabrous, usually palmately veined. Racemes several flowered, ebracteate throughout. Fruiting pedicels divaricate and often recurved or reflexed, rarely straight, papillate adaxially. Sepals obovate, ascending-spreading, glabrous, base subsaccate, rarely nonsaccate. Petals purple or blue, rarely pink, spreading, often much longer than sepals; blade orbicular or obovate, rounded; claw very short. Stamens 6, spreading, equal in length; filaments distinctly dilated at base; anthers narrowly oblong or obovate, apex obtuse. Nectar glands confluent, subtending bases of all filaments. Ovules 2–6(–12) per ovary. Fruit dehiscent silicles or silicles, obovoid, or ellipsoid, plump; seed coat nearly smooth, mucilaginous when wetted; cotyledons incumbent.

Four species: Bhutan, China, Nepal, Sikkim; three species in China.

1a. Petals orbicular or orbicular-ovoid, (5.5–)6–8(–9) mm; anthers 0.6–1.2 mm ....................... 3. L. hobsonii
1b. Petals narrowly to broadly obovate, 1.5–4(–4.5) mm; anthers 0.25–0.4 mm.

2a. Fruit obovate-ovoid to broadly obovate, 2–4-seeded; fruiting pedicels often recurved; petals purple,
(2.7–)3–4(–4.5) × 1.7–2.5 mm .......................................................... 2. L. serpens
2b. Fruit narrowly oblong or linear, 6–12 seeded; fruiting pedicels usually straight; petals white or rarely pink,
1.5–2 × 0.5–1 mm .......................................................... 1. L. ohbana


**線果弯梗芥** xian guo wan geng jie
Plants slender, biennial or short-lived perennial, glabrous throughout except for pedicels. Stems slender, few or rarely 1 from base, decumbent, 2–12(–15) cm. Lowermost cauline leaves simple, becoming 3-lobed in the middle and distal portions of plant; petiole glabrous, (2–)4–8(–12) mm; blade of lowermost leaves ovate, subacute, 3–5 × 2–3 mm; middle lobe of bracts narrowly oblong or broadly ovate, entire, (2–)3–6(–8) × 1.3–4(–7) mm, obtuse; lateral lobes smaller and narrower, entire or rarely obscurely 1-toothed. Fruiting pedicels 5–8(–13) mm, adaxially puberulent with papillae to 0.1 mm. Sepals oblong, 0.7–1.5 × 0.5–0.7 mm, not saccate at base, scarious at margin. Petals white or rarely pink, narrowly obovate, 1.5–2 × 0.5–1 mm, apex rounded, cuneate and not clawed at base. Filaments white or rarely pink, 0.8–1.2 mm; anthers purple, ovate, 0.2–0.3 mm. Ovules 6–12 per ovary. Fruit linear to narrowly oblong, not geocarpic, straight or slightly curved at middle, 5–10 × 0.7–1 mm; gynophore obsolete; valves torulose; style 0.5–0.8 mm, stout. Seeds uniseriate, oblong, 1–1.4 × 0.5–1 mm. Fl. Jul.–Aug, fr. July–Oct.

Among rocks, sandy flats by streamside; 3000–4500 m. Yunnan


**蛇形弯梗芥** she xing wan geng jie
Plants slender, short-lived perennial, glabrous throughout for pedicels and sometimes fruit. Stems slender, few to many from base, decumbent, (1.5–)5–15(–30) cm. Leaves deeply 3(or 5)-lobed throughout, simple leaves absent; petiole glabrous, (2–)5–15(–40) mm; blade of central lobe oblong or ovate, rarely linear, entire or rarely 1-toothed on each side, (1.5–)3–8(–15) × (0.5–)1–3(–7) mm, apex obtuse to subacute; lateral lobes smaller, entire, 1- or 2-toothed or toothed, rarely leaves subulate. Fruiting pedicels (10–)15–30(–40) mm, strongly recurved or sigmoid, often filiform, adaxially puberulent with papillae to 0.1 mm. Sepals oblong, 1.5–5 × 0.7–1 mm, not saccate at base, scarious margin ca. 0.2 mm wide. Petals purple, broadly obovate, (2–)3–4(–4.5) × (1–)1.5–2.5(–3) mm, apex rounded, cuneate into a claw to 0.1 mm. Filaments purplish, 1.5–2.5 mm; anthers purple, ovate, 0.3–0.4 mm. Ovules 3–6 per ovary. Fruit ovoid or oblong, rarely oblong-linear, not geocarpic, often curved at middle, 2.5–8(–12) × 1–2(–2.5) mm; gynophore 0.5–3 mm; valves slightly torulose or not, glabrous or puberulent; style 1–1.5(–2) mm, stout. Seeds uniseriate, oblong, (1–)1.5–2.5 × (0.5–0.8)–1.2(–1.5) mm. Fl. Jun–Aug, fr. Jul–Oct.

Alpine peaty soil, scree, gravelly stream edges, turf among rocks and small shrubs; 2600–4300 m. Xizang [Bhutan, Nepal, Sikkim].


**弯梗芥** wan geng jie
*Cochlearia hobsonii* H. Pearson, Hooker’s Icon. Pl. 27: t. 2643. 1900.
Plants short-lived perennial, puberulent on stem and/or pedicels. Stems coarse, few to many from base, decumbent or rarely ascending, (6–)11–20(–30) cm, glabrous or puberulent along 1 line or throughout. Leaves simple or rarely deeply 3(or 5)-lobed apically; petiole somewhat flattened, 4–10(–18) mm; leaf blade broadly obovate or suborbicular and often wider than long, rarely oblong, (3–)6–10(–15) × (1.5–)4–10(–15) mm, glabrous, obscurely to prominently 3- or 5-toothed, teeth sometimes restricted to subtruncate apex, when lobed central lobe broadly to narrowly oblong, slightly broader than lateral lobes. Flowers often protogynous. Fruiting pedicels slender, strongly recurved or sigmoid, (0.7–)1.5–3(–4) cm, adaxially puberulent with papillae to 0.1 mm. Sepals oblong, glabrous, 2.5–3.5(–4) × 1–1.5 mm, margin membranous and to 0.5 mm wide, spreading, slightly saccate at base. Petals blue or deep purple, orbicular to orbicular-obovate, (5.5–)6–8(–9) × 4–6(–7) mm, apex rounded, base abruptly narrowed into a claw 0.5–1.5 mm. Filaments purple distally, whitish basally, 4–5.5 mm; anthers narrowly oblong, 0.6–1.2 mm, often strongly curved after dehiscence. Ovules 4–6(–11) per ovary. Fruit linear or narrowly oblong, rarely ovoid, not geocarpic, straight or curved, (5–)10–20 × 1.5–2 mm; gynophore ca. 0.5 mm; valves torulose; style 3–4 mm, stout. Seeds uniseriate, oblong, 2.2–2.8 × 1.2–1.4 mm. Fl. May–Jul, fr. Jun–Sep.

Streamside, mossy areas in running water, wet cliffs, scree, damp banks, wet stony slopes; 2800–4100 m. Xizang [Bhutan, Nepal].
Herbs annual, villous throughout. Trichomes stalked, 1–3-forked, mixed with simple ones. Stems erect, simple or branched above. Basal leaves petiolate, subrosulate, simple, entire or sinuate-dentate. Cauline leaves petiolate, similar to basal ones but larger, sometimes pinnatifid. Racemes 3–16-flowered, lax, ebracteate, elongated in fruit. Fruiting pedicles slender, erect-ascending. Sepals oblong or oblong-linear, deciduous, erect, base of lateral pair saccate, margin narrowly membranous. Petals pink; blade linear or narrowly spatulate, apex obtuse; claw strongly differentiated from blade, subequaling sepals. Stamens 6, tetradyneous; filaments not dilated at base, filiform; anthers oblong, apiculate at apex. Nectar glands 2, lateral, semiannular, extrastaminal; median glands absent. Ovules 2 per ovary. Fruit indehiscent, nutletlike silicles, ovoid, terete or slightly 4-angled, sessile; valves thickened, reticulate, densely white silky; replum rounded; septum complete, thickened, opaque; style cylindric, persistent, to 7 mm; stigma capitate, deeply 2-lobed, lobes spreading. Seeds wingless, oblong, plump; seed coat smooth, not mucilaginous when wetted; cotyledons incumbent.

One species: C and SW Asia.


绵果荠 mian guo qi

Herbs annual, (2.5–)10–20(–31) cm tall, villous. Stems erect, simple or branched above. Basal leaves withered early, not rosulate. Cauline leaves sessile, attenuate and not auriculate at base, entire, dentate, sinuate-dentate, rarely pinnatifid. Racemes several flowered, lax, ebracteate, elongated considerably in fruit. Fruiting pedicles slender, divaricate or reflexed, articulate at base. Sepals narrowly oblong, deciduous, suberect, base of lateral pair subsaccate, margin membranous. Petals white or lavender, longer than sepals; blade linear, apex obtuse; claw undifferentiated. Stamens 6, strongly tetradyneous; filaments slightly dilated at base; anthers oblong, obtuse at apex, lateral pair sterile. Nectar glands 2, lateral, semiannular; median glands absent. Fruit indehiscent, 1-seeded, S-shaped siliques, with ellipsoid seed-bearing part and attenuate stipelike base, terete; valves woody, prominently veined, papillate, reticulate, or rugose, wingless; gynophore absent; replum rounded; septum absent; style beaklike, flattened, to 3 cm in fruit, persistent; stigma capitate, entire. Seeds wingless, narrowly oblong, plump; seed coat smooth, not mucilaginous when wetted; cotyledons incumbent.

One species: C and SW Asia.


螺果荠属 luo hui qi shu

Herbs annual, glabrous or puberulent. Trichomes unicellular, eglandular, simple, papillate. Stems erect, many branched above base. Basal leaves withered early, not rosulate. Cauline leaves sessile, attenuate and not auriculate at base, entire, dentate, sinuate, or rarely pinnatifid. Racemes several flowered, lax, ebracteate, elongated considerably in fruit. Fruiting pedicles slender, divaricate or reflexed, articulate and detached at base. Sepals narrowly oblong, deciduous, suberect, base of lateral pair subsaccate, margin membranous. Petals white or lavender, longer than sepals; blade linear, apex obtuse; claw undifferentiated. Stamens 6, strongly tetradyneous; filaments slightly dilated at base; anthers oblong, obtuse at apex, lateral pair sterile. Nectar glands 2, lateral, semiannular; median glands absent. Ovules 1 per ovary. Fruit indehiscent, 1-seeded, S-shaped silicles, with ellipsoid seed-bearing part and attenuate stipelike base, terete; valves woody, prominently veined, papillate, reticulate, or rugose, wingless; gynophore absent; replum rounded; septum absent; style beaklike, flattened, to 3 cm in fruit, persistent; stigma capitate, entire. Seeds wingless, narrowly oblong, plump; seed coat smooth, not mucilaginous when wetted; cotyledons incumbent.

One species: C and SW Asia.


螺果荠 luohuiqi

Annuals, 15–50(–70) cm tall. Stems erect, many branched on lower and middle part, glabrous. Leaves sessile; leaf blade linear, (1–)3–8(–12) cm × (0.5–)1–4(–7) mm, glabrous, base attenuate, margin remotely dentate, sinuate, or pinnately lobed, entire in upper leaves, apex acute. Fruiting pedicles filiform, (0.5–)0.8–1.5(–2) cm, straight or reflexed, articulate at base, sparsely puberulent or papillate with trichomes to 0.3 mm. Sepals oblong-linear, 1.5–2.5 × 0.4–0.6 mm, oblong or oblong-linear, (4–)5–7 × 1–1.5 mm, densely villous. Petals pink, linear, 7–10 × 0.5–1 mm, apex obtuse; claw 4–6 mm. Filaments 4–6 mm, slender; anthers oblong, 0.8–1 mm. Fruit ovoid, 4.5–6.5 × (2–)2.5–4 mm, densely covered with white, undulate, silky trichomes 5–8 mm; style slender, (2.5–)4–7 mm. Seeds brown, ovoid, 2.5–3.5 × 1.2–2 mm. Fl. and fr. May–Jun.

Gypsum ground, sandy or rocky soil; 300–1200 m. Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].


舟果荠属 zhou guo qi shu

Annuals, 15–50(–70) cm tall. Stems erect, many branched on lower and middle part, glabrous. Leaves sessile; leaf blade linear, (1–)3–8(–12) cm × (0.5–)1–4(–7) mm, glabrous, base attenuate, margin remotely dentate, sinuate, or pinnately lobed, entire in upper leaves, apex acute. Fruiting pedicles filiform, (0.5–)0.8–1.5(–2) cm, straight or reflexed, articulate at base, sparsely puberulent or papillate with trichomes to 0.3 mm. Sepals oblong-linear, 1.5–2.5 × 0.4–0.6 mm, glabrous, margin narrowly membranous, apex acute. Petals white or lavender, linear, (3–)4–6(–8) × 0.3–0.5 mm. Filaments white, median pairs 1.5–2 mm, lateral pair ca. 1 mm; anthers oblong, 0.6–0.9 mm. Fruit seed-bearing portion narrowly ellipsoid, 3.5–6 × 2–3(–4) mm; stipelike base attenuate, (3–)4–8(–10) mm, glabrous; style flattened, strongly curved or rarely straight, glabrous, (1.3–)1.7–2.5(–3) cm. Seeds narrowly oblong, 3–5 × (0.8–)1–2 mm. Fl. and fr. Apr–May.

Sandy deserts; 300–1000 m. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].
Herbs annual, often glaucous. Trichomes simple, straight on pedicels, hooked on fruit, absent elsewhere. Stems erect, simple from base, branched apically. Basal leaves petiolate, not rosulate, simple, entire. Cauline leaves sessile, auriculate, sagittate, or amplexicaul at base, entire. Racemes few to several flowered, ebracteate, elongated in fruit. Fruiting pedicles nearly filiform, strongly recurved, articulate and often detached from base. Sepals oblong, base of lateral pair not saccate, margin not membranous. Petals yellow drying whitish, longer than sepals; blade narrowly spatulate or oblong, apex obtuse; claws absent. Stamens 6, slightly tetradynamous; filaments not dilated at base; anthers broadly ovate, apiculate at apex. Median nectar glands present; lateral glands 1 on each side of lateral stamen, annular. Ovules 1 (or 2) per ovary, apical. Fruit indehiscent, samaroid silicles, navicular and semiovoid to semiglobose, rounded abaxially, flat adaxially, strongly angustiseptate, sessile, glabrous or densely pilose with hooked trichomes, beaked; valves papery, veinless, strongly keeled, smooth, strongly 2-winged, wing margin involute and with 1 or 2 rows of tubercles; replum rounded; septum absent; style obsolete; stigma capitate, entire. Seeds 1 per fruit, wingless, oblong, plump; seed coat smooth, not mucilaginous when wetted; cotyledons incumbent.

One species: C and SW Asia, W Himalayas.


舟果荠 zhou guo qi

Tauscheria desertorum Ledebour; T. gymnocarpa Fischer ex de Candolle; T. lasiocarpa var. gymnocarpa (Fischer ex de Candolle) Boissier; T. oblonga Vassilczenko.

Herbs 10–45(–60) cm tall, glabrous and often glaucous except sometimes for fruit and pedicels. Stems simple at base, branched above. Basal leaves shortly petiolate, oblanceolate, withered by anthesis, base cuneate, margin entire, apex obtuse. Middle cauline leaves cordate, ovate, lanceolate, or oblong, 1–6(–9) × 0.2–2.5(–4) cm, somewhat fleshy, sessile, base auriculate, cordate, or amplexicaul, margin entire, apex acute or obtuse, rarely acuminate in uppermost leaves. Fruiting pedicles 3–5.5(–8) mm, glabrous or adaxially sparsely pilose. Sepals oblong, 0.9–1.5 × 0.5–0.8 mm. Petals yellow drying whitish, oblong or narrowly spatulate, 1.5–2.5 × 0.4–0.6 mm. Filaments 0.8–1.5 mm; anthers 0.1–0.3 mm. Fruit navicular, semiovoid to semiglobose, (3–)4–7(–10) × (2.5–)3–4 mm, glabrous or densely pubescent with hooked trichomes, base obtuse; beak flat, (0.5–)1–3 mm, apex acute or acuminate. Seeds yellow or yellowish brown, oblong, 2–2.5 × (0.8–)1.1–1.5 mm. Fl. Apr–Jun, fr. May–Jul. 2n = 14.

Desert steppes, rocky soil, roadsides, river banks; 400–3800 m. Nei Mongol, Xinjiang, W Xizang [Afghanistan, Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].


鸟头荠属 niao tou qi shu

Hierochontis Medikus, nom. rej.; Soria Adanson, nom. rej.

Herbs annual. Trichomes unicellular, eglandular, simple and stalked forked, in different sizes, some subsetose. Stems erect or ascending, simple or branched. Basal leaves petiolate, not rosulate, simple, entire, dentate, or rarely pinnatifid, often withered by flowering. Cauline leaves similar to basal, entire or dentate, reduced in size upward. Racemes ebracteate, elongated in fruit. Fruiting pedicles stout, thickened, erect, appressed to rachis. Sepals oblong, erect, base of lateral pair not saccate. Petals white, slightly longer than sepals; blade narrowly spatulate, apex emarginate; claw slightly differentiated from blade, shorter than sepals. Stamens 6, slightly tetradynamous; filaments not dilated at base; anthers ovate, apiculate at apex. Nectar glands 4, lateral, 1 on each side of lateral stamen; median glands absent. Ovules 2 per ovary, subapical. Fruit indehiscent, nutletlike silicles, ovoid, slightly 4-angled, sessile; valves thickened, woody, veinless, rough pubescent; replum strongly expanded laterally; septum complete, thickened; style to 1.8 mm, stout, subconical, curved, persistent; stigma capitate, 2-lobed, lobes not recurvate. Seeds wingless, oblong, plump; seed coat smooth, not mucilaginous when wetted; cotyledons incumbent or obliquely so.

One species: C and SW Asia, E Europe, naturalized elsewhere.


鸟头荠 niao tou qi


Herbs annual, (4–)10–40(–45) cm tall, scabrous pubescent throughout; trichomes in various sizes, largest subsetose, to 1 mm. Stems often with ascending rigid branches, mostly branched near base and about middle. Lower and middle cauline leaves with petioles (0.2–)0.5–2(–2.5) cm; leaf blade oblong, oblong-lanceolate, or elliptic, (1–)1.5–7(–9) × (0.3–)0.7–2(–3) cm, base cuneate, margin entire, dentate, or repand, apex acute or obtuse; uppermost leaves sessile or subsessile, much smaller. Fruiting pedicles 0.5–1(–1.2) mm, stout and nearly as wide as fruit base, appressed to rachis. Sepals 0.6–0.9 × 0.2–0.4 mm, sparsely pubescent. Petals white, narrowly spatulate, 0.9–1.3 × 0.1–0.2 mm, apex emarginate; claw 0.4–0.6 mm.
Filaments 0.5–0.8 mm; anthers 0.1–0.2 mm. Fruit ovoid, 2–2.5 × 1.5–2 mm, erect, appressed to rachis, 2-seeded, scabrous, slightly 4-angled; replum expanded and to 1.5 mm wide basally, narrowed to apex; style subconical, 1–1.8 mm, curved away from rachis, sparsely pubescent.

Seeds brown, oblong, 1.3–1.7 × 0.8–1.2 mm. Fl. and fr. May–Jun. 2n = 14.

Roadsides, waste places, fields; 300–3500 m. Xinjiang [Afghanistan, India, Kashmir, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia, Europe; naturalized elsewhere].


Herbs annual. Trichomes unicellular, eglandular, simple, mixed with much fewer and smaller, glandular, multicellular ones with multiiseriate stalk. Stems erect, simple or branched above. Basal leaves petiolate, not rosulate, simple, pinnatifid, dentate, or rarely entire, often withered by flowering. Cauline leaves petiolate or subsessile, entire or dentate. Racemes ebracteate, elongated in fruit. Fruiting pedicels slender, ascending, articulate at rachis. Sepals oblong, erect, base of lateral pair not saccate. Petals white or purplish, longer than sepals; blade narrowly spatulate or oblong, apex obtuse; claw subequaling sepals. Stamens 6, slightly tetradynamous; filaments flattened at base; anthers ovate, obtuse at apex. Nectar glands 6; lateral semiannular; median very small. 1 facing each median filament. Ovules 2 per ovary, subapical. Fruit indehiscent, nutletlike silicles, globose, terete, sessile; valves thickened, woody, prominently veined, vesicular papillate; replum strongly expanded laterally; septum complete, thickened, opaque, veinless; style prominent and to 3.5 mm, slender, cylindric, articulated at base, straight, caducous, glabrous; stigma capitate, entire. Seeds wingless, orbicular, strongly flattened; seed coat reticulate, not mucilaginous when wetted; cotyledons accumbent.

One species: C and SW Asia.


Herbs annual, (7–)15–40(–51) cm tall, hirsute with spreading, straight simple trichomes to 1.5 mm. Stems often with ascending slender branches mostly above middle. Basal and lower cauline leaves with petioles (0.2–)0.5–1.5(–2) cm; leaf blade narrowly oblong or linear-oblancoate, (0.6–)1–5(–7) × (0.3–)0.5–1.5 cm, sparsely pubescent with simple trichomes and fewer stalked glands 0.05–0.15 mm, base attenuate, subulate-dentate or pinnatifid; lateral lobes 3 or 4, much larger terminal one, apex acute or obtuse. Middle and upper cauline leaves sessile or shortly petiolate, linear, linear-lanceolate, or linear-oblong, base attenuate, margin entire or rarely denticate. Fruiting pedicels 0.1–0.6(–1) mm, slender, readily detached from their articulation with rachis, ascending. Sepals 1.5–2 × 0.4–0.6 mm, glabrous or subapically sparsely pubescent. Petals white or purplish, narrowly spatulate or oblong, 2–3(–3.5) × 0.3–0.6(–0.9) mm, apex obtuse; claw to 1.5 mm. Filaments 1.5–2.5 mm; anthers 0.2–0.4 mm. Fruit globose, (1.7–)2–2.5(–3) mm in diam., erect, 2-seeded, minutely papillate, terete; replum expanded and to 1.5 mm wide basally, narrowed to apex; style cylindric, (1.5–)2–2.8(–3.5) mm, straight. Seeds yellow, orbicular, (1–)1.2–1.4 mm in diam. Fl. and fr. Apr–Jun. 2n = 14.

Roadsides, pastures, fields; 300–3500 m. Xinjiang [Afghanistan, India, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

34. NESLIA Desvaux, J. Bot. Agric. 3: 162. 1815, nom. cons.

球果荠属 qiu guo qi shu

Vogelina Medikus.

Herbs annual. Trichomes short-stalked, forked or substellate, mixed on stem with simple ones. Stems erect, simple basally, branched above. Basal leaves shortly petiolate, not rosulate, simple, entire or dentate. Cauline leaves sessile, sagittate or auriculate, entire or denticate. Racemes ebracteate, elongated considerably in fruit. Fruiting pedicels slender, divaricate. Sepals oblong, erect, base of lateral pair not saccate. Petals yellow, longer than sepals; blade spatulate, apex obtuse. Stamens 6, slightly tetradynamous; filaments not dilated at base; anthers ovate, obtuse at apex. Nectar glands 2 or 4; median glands absent; lateral glands semiannular or 1 on each side of lateral stamen. Ovules 2–4 per ovary. Fruit indehiscent, nutletlike silicles, compressed globose or sublenticular, 1-seeded, shortly stipitate, readily detached from pedicel at maturity; valves woody, prominently reticulate; replum rounded, obscured by valve margin; septum complete, membranous; style less than 1 mm, cylindric, readily caducous at fruit maturity; stigma capitate, entire. Seeds wingless, ovoid, plump; seed coat minutely reticulate, not mucilaginous when wetted; cotyledons incumbent.

One species: N Africa, Asia, Europe, introduced in North America.

**匙荠属** chi qi shu

Herbs annual, biennial, or perennial with a caudex. Trichomes stalked forked and/or simple; glandular multicellular papillae present or absent. Basal leaves petiolate, often not rosulate, simple, entire, pinnatifid, or lyrate. Cauline leaves sessile or subsessile above, cuneate, attenuate, or auriculate, entire or dentate. Racemes ebracteate, elongated in fruit. Fruiting pedicels divaricate. Sepals oblong, ascending or spreading, base of lateral pair not saccate, margin membranous. Petals yellow or white, ascending, longer than sepals; blade obovate, apex obtuse; claw distinct. Stamens 6, tetradynamous; filaments dilated or not at base; anthers ovate or oblong, obtuse at apex. Nectar glands confluent and subtending bases of all stamens; median glands present. Ovules 2–4 per ovary. Fruit indehiscent, wingless, obovate, or orbicular, plump or flattened; seed coat smooth; cotyledons spiraloval.

Three species: N Africa, E and SW Asia, Europe; two species in China.

1a. Plants with stalked forked trichomes; glandular papillae present; cauline leaves not auriculate; petals yellow, 5–8 × (2–)3–5 mm; seeds plump .............................................................. 1. *B. orientalis*

1b. Plants glabrous or with simple trichomes; glandular papillae absent; cauline leaves auriculate; petals white, 3–4 × 1.5–2 mm; seeds flattened .................................................. 2. *B. cochlearioides*


**匙荠** you guo qi

Herbs biennial or perennial, (25–)40–100(–150) cm tall, sparsely to densely pilose with simple and stalked forked trichomes; multicellular glandular tubercles present throughout except for flowers. Stems branched above or rarely basally. Basal leaves with petioles (1–)2–10(–15) cm; leaf blade lanceolate, to 40 × 14 cm, coarsely dentate or pinnatifid; lateral lobes oblong or lanceolate, smaller than deltoid or lanceolate terminal lobe. Uppermost leaves subsessile, lanceolate or sublinear, dentate or entire. Fruiting pedicels 1–2(–2.3) cm, slender, divaricate, straight. Sepals yellowish, oblong, 2.5–3 × 1–1.5 mm, spreading, glabrous. Petals yellow, obovate, (5–)6–7(–8) × (2–)3–5 mm; claw slender, 1–2 mm. Filaments yellowish, 1.5–3.5 mm, strongly tetradynamous, not dilated at base; anthers oblong, 0.8–1 mm. Fruit ovoid, rarely suboblong and slightly constricted at middle, terete, (5–)6–8 × 3–4(–5) mm, glabrous, woody, gradually tapering to apex, tuberculate, 1- or 2-loculed; valves not distinct; style obsolete or rarely to 0.5 mm; stigma entire. Seeds 2 per fruit, subglobose, plump, 2–2.5 mm in diam. Fl. and fr. May–Jul. 2n = 14.

Fields. Heilongjiang, Liaoning [Kazakstan, Mongolia, Russia; SW Asia, Europe; introduced elsewhere].

### 2. *Bunias cochlearioides* Murray, Comment. Goetting. 8: 42. 1777.

**匙荠** chi qi

**Bunias techeiensis** Debeaux.

Herbs annual or perhaps biennial, 9–40 cm tall, glabrous throughout or rarely sparsely pilose, multicellular glandular tubercles absent. Stems branched near base and above. Basal leaves withered by fruiting; petiole 0.5–2.5 cm, expanded at base; leaf blade pinnatifid, lyrate, or coarsely dentate, 2–10 × 0.5–2.5 cm. Cauline leaves oblong or lanceolate, 0.7–3.5 cm

× 2–15 mm, sessile, auriculate, margin dentate, repand, or subentire, apex obtuse to subacute. Fruiting pedicels 4–8(–10) mm, slender, divaricate or slightly recurved, straight. Sepals pale green, oblong, 1.4–1.7 × 0.7–1 mm, spreading, glabrous. Petals white, obovate, 3–4 × 1.5–2 mm; claw slender, 0.5–1 mm. Filaments white, 1.2–1.6 mm, dilated at base; anthers ovate, 0.3–0.5 mm. Fruit ovoid or subglobose, usually quadrangular, 3–5 × 1.7–3 mm, glabrous, woody, tapering to apex; valves flat, smooth; style obsolete or rarely to 0.3 mm; stigma entire. Seeds 2, oblong or suborbicular, flattened, 1.2–1.5 × 1–1.2 mm. Fl. and fr. May–Jul.

Sandy deserts, grasslands, steppe, meadows. Hebei, Heilongjiang, Liaoning [Kazakhstan, Mongolia, Russia].


庭荠属 庭荠属 ting qi shu

Gamosepalum Haussknecht; Meniocus Desvaux; Menchia Roth (1788), not Ehrhart (1783); Odontarrhena C. A. Meyer; Psilonema C. A. Meyer; Ptilotrichum C. A. Meyer; Takhtajaniella V. E. Avetisian; Triplopetalum E. J. Nyárády.

Herbs annual, biennial, perennial, or rarely subshrubs. Trichomes stellate, stalked or sessile, with 2–6 minute basal branches from which originate up to 30, simple or branched rays, sometimes trichomes lepidote, rarely mixed with simple and forked. Stems erect or decumbent, simple or branched. Basal leaves petiolate or sessile, rosulate or not rosulate, entire. Cauline leaves petiolate or sessile, cuneate or attenuate, not auriculate, entire. Racemes few to many flowered, dense or lax, ebracteate, coriophyllous or in panicles, elongated or not in fruit. Fruiting pedicels ascending, divaricate, or reflexed. Sepals ovate or oblong, base of lateral pair not saccate. Petals yellow, white, or rarely pink; blade suborbicular, obovate, or spatulate, apex obtuse or emarginate, glabrous or pubescent outside. Stamens 6, tetradynamous; filaments wingless or uni- or bilaterally winged, appended or not, toothed or toothless; anthers ovate or oblong, apiculate or not at apex. Nectar glands 4, lateral, 1 on each side of lateral stamen; median glands absent. Ovules 1 or 2 (or 4–8) per ovary; placentation apical or parietal. Fruit dehiscent silicles, oblong, ovate, or subglobose, strongly latiseptate or rarely inflated, sessile; valves veinless, pubescent or glabrous, smooth; septum complete, membranous, translucent, veinless; style distinct; stigma capitulate, entire. Seeds biseriate, winged or wingless, orbicular or ovate, flattened; seed coat smooth or minutely reticulate, mucilaginous or not when wet; cotyledons accumbent or incumbent.

About 170 species: primarily in SW Asia and SE Europe; ten species in China.

In his protologue of Ptilotrichum, Mey (in Ledaebur, Fl. Altaic. 3: 64. 1831) distinguished the genus by having white flowers, edentate filaments, and 1-seeded locules. However, these characters are also found in Alyssum, in many species of which one of the two ovules fails to mature into a seed, while in others the filaments are edentate. As for the flower color, it is definitely unreliable in Alyssum sensu lato, just as is the case in numerous other genera of the family, namely Cardamine, Draba, Lepidium, and Rorippa. In fact, the filament base in most plants of P. canescens, the generic type of Ptilotrichum, produces a small, basal tooth. If one accepts Ptilotrichum as a distinct genus, then at least five of the other segregates of Alyssum (Gamosepalum, Meniocus, Odontarrhena, Psilonema, and Takhtajaniella) should also be recognized, an action that the present authors do not support, especially after examining the genus critically on a worldwide basis.

Although Alyssum fedtschenkoanum N. Busch was suspected in FRPS to occur in W China, the present authors have seen no Chinese material in the numerous herbaria they consulted both inside and outside of China. The species is narrowly endemic to Kazakhstan. It is likely that the plant recorded in FRPS represents a minor variant of the widespread and highly variable A. tortuosum.

The ovule number and placentation are important in the identification of the species and can be easily observed in the fruit.

1a. Plants annual.

2a. Fruit inflated; ovules 4–8 per locule; placentation parietal ................................................................. 1. A. linifolium

2b. Fruit inflated (biconvex) at least in the middle; ovules 2 per locule; placentation subapical.

3a. All filaments slender, without teeth, wings, or appendages; pedicels and sepals with stellate trichomes

mixed with longer, simple and forked ones.

4a. Fruit with stellate trichomes only; fruiting pedicels divaricate or ascending, 2–5(–6) mm, slender, not appressed to rachis .......................................................................................... 2. A. alyssoides

4b. Fruit with stellate trichomes mixed with longer, simple and forked ones; fruiting pedicels erect or ascending, (1–)1.3–1.8(–2) mm, stout, subappressed to rachis ....................................... 3. A. dasycarpum

3b. Filaments of lateral stamens with 2-toothed appendage, median filaments winged and often toothed;

pedicels and sepals with stellate and rarely a few forked trichomes.

5a. Fruit glabrous, 2.5–4(–4.5) mm in diam.; style 0.3–0.7 mm; seeds 1.2–1.5 mm; median filaments toothless ......................................................................................................................... 4. A. desertorum

5b. Fruit densely stellate, (3.5–)4–6.5(–7) mm in diam.; style 0.7–1.6 mm; seeds 1.6–2 mm; median filaments 1- or 2-toothed .......................................................... 5. A. simplex

1b. Plants perennial with a woody base.
6a. Petal blade white; petals and filaments pink, papillate at base.
7a. Plants often pulvinate, (1–)2–9(–12) cm tall; petals 2–3(–3.5) mm; leaf trichomes rhomboid in outline, with (3 or)4 principal minute branches from stalk apex; seeds 1.4–1.8 × 0.8–1.1 mm ....... 9. A. canescens
7b. Plants not pulvinate, (5–)8–25(–30) cm tall; petals (3–)3.5–5 mm; leaf trichomes narrowly lanceolate in outline, with only 2 principal minute branches from stalk apex; seeds (1.8–)2–2.5 × 1–1.5 mm .......................................................... 10. A. tenuifolium

6b. Petals and filaments yellow; claws and filaments glabrous at base.
8a. Petals (4.5–)5–7(–8) mm; fruit deeply emarginate at apex ........................................ 8. A. lenense
8b. Petals 1.5–3.5(–4) mm; fruit obtuse to subacute at apex.
9a. Stems erect or ascending at base, stout; sterile shoots often several; petals 2.5–3.5(–4) mm;
fruit 2.5–3.5 mm wide ........................................................................................................ 6. A. obovatum
9b. Stems tortuous at base, slender; sterile shoots often absent; petals 1.5–3 mm; fruit (1.5–)1.8–
2.5 mm wide ........................................................................................................................ 7. A. tortuosum


条叶庭荠 tiao ye ting qi

Alyssum cupreum Freyn & Sintenis; A. linifolium var. cupreum (Freyn & Sintenis) T. R. Dudley; A. linifolium var. tetraneum Bornmüller; A. serpyllifolium Desfontaines; Meniocus australasicus Turczaninow; M. linifolium (Stephan ex Willdenow) de Candolle.

Herbs annual, (4–)10–30(–40) cm tall, canescent, with appressed, sessile, (7–)10–18-rayed stellate trichomes. Stems erect, ascending, or rarely prostrate, simple or branched near base, always branched above. Cauline leaves shortly petiolate or sessile; leaf blade linear-oblancoaleate or linear, (0.5–)0.7–2 (–3.5) cm × (0.5–)1–2.5(–3.5) mm, base attenuate, apex obtuse or acute. Fruiting pedicels divaricate or ascending, 2–5(–7) mm, slender, straight, covered with stellate trichomes. Sepals oblanceolate or linear, 1.2–2 × 0.4–0.5 mm, caducous, pubescent with stellate trichomes. Petals white or pale yellow, linear-oblancoaleate, 1.2–2.5(–3) × 0.6–1 mm, glabrous, caducous, apex emarginate. Median filaments 1–1.5 mm, 1-toothed; lateral filaments 0.8–1.5, with an appendage 0.3–0.5 mm; anthers ovate, 0.15–0.2 mm. Ovules 4–6(–8) per locule. Fruit obovate, obovate-oblong, or broadly elliptic, (3.5–)4–7 × (2–)2.5–4(–4.5) mm, apex obtuse; valves not veined, flattened throughout, glabrous; style (0.1–)0.3–0.5 mm, slender, glabrous. Seeds 3–6(–8) per locule, oblong or ovate, 1–1.5 × 0.6–0.9 mm, biseriate, compressed, narrowly margined all around, margin to 0.1 mm wide. Fl. and fr. Apr–Jun. 2n = 16.

Roadsides, cultivated areas, plains, hillsides, steppe, rocky places; 100–2700 m. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; N Africa, SW Asia, Europe; naturalized in Australia].


欧洲庭荠 ou zhou ting qi

Clypeola alyssoides Linnaeus, Sp. Pl. 2: 652. 1753; Alyssum calycinum Linnaeus; A. campestre (Linnaeus) Linnaeus; Psilonema alyssoides (Linnaeus) Heideman; P. calycinum (Linnaeus) C. A. Meyer.

Herbs annual, 5–35(–50) cm tall, canescent with appressed, sessile, 6–10-rayed stellate trichomes, these mixed with simple and forked ones on pedicels and sepals. Stems erect, ascending, or decumbent, 1 to several from the base. Cauline leaves subsessile or lowermost shortly petiolate; leaf blade narrowly oblancoaleate or linear, sometimes spatulate or obovate, 3–4(–4.5) cm × (0.5–)1–3.5(–5) mm, base attenuate or cuneate, apex obtuse or acute. Fruiting pedicels divaricate or ascending, 2–5(–6) mm, slender, straight, covered with stellate trichomes mixed with fewer, simple and forked ones. Sepals oblong, (1.5–)2–3 × 0.7–1.1 mm, persistent, subsessile as pedicels. Petals white or pale yellow, linear to linear-oblancoaleate, rarely obovate, 2–3(–4) × 0.3–0.7(–1) mm, glabrous or sparsely stalked outside, often persistent, apex emarginate. Filaments 1–1.5 mm, slender, neither appressed nor toothed; anthers ovate, 0.15–0.2 mm. Ovules 2 per locule. Fruit orbicular, (2–)3–4(–5) mm in diam., apex emarginate or truncate; valves not veined, uniformly inflated at center, strongly flattened at margins, sparsely stalked; style 0.3–0.6(–1) mm, slender, usually glabrous. Seeds 1 or 2 per locule, oblong or ovate, 1.1–2 × 0.7–1.1 mm, compressed, narrowly margined all around, margin ca. 0.1 mm wide. Fl. and fr. May–Jul. 2n = 32.

Roadsides, waste grounds, disturbed sites near sea level to 2800 m. Naturalized in Liaoning [Afghanistan, Kazakhstan, Kyrgyzstan, Russia,
Herbs annual, (2–)5–25(–35) cm tall, canescent, with appressed, sessile, 8–14-rayed stellate trichomes, these mixed with longer, simple and forked ones on pedicels, sepals, and fruit. Stems erect, ascending, or decumbent, often several from the base. Cauline leaves subsessile or lowermost attenuate to petiolelike base to 5 mm; leaf blade spatulate, oblanceolate, or oblong-oblancoate, (0.5–)0.8–2.5(–4) cm × (2–)4–10(–15) mm, gradually smaller upward, base attenuate, apex acute. Fruiting pedicels erect or ascending, (1–)1.3–1.8(–2) mm, subappressed to rachis, stout, straight, covered with stellate trichomes mixed with fewer, simple and forked ones. Sepals lanceolate, 2–3 × 0.8–1.3 mm, persistent till fruit maturity, pubescent as pedicels. Petals pale yellow, spatulate, 2.5–3.5(–3.8) × 0.6–1 mm, glabrous, often persistent, base attenuate, apex deeply emarginate. Filaments 2–2.5 mm, slender, neither appended nor toothed; anthers ovate, 0.3–0.4 mm. Ovules 2 per locule. Fruit orbicular or orbicular-elliptic, 2.4–3.5(–3.8) mm in diam., apex rounded or truncate; valves not veined, uniformly inflated except for a narrow flattened margins, with stellate trichomes mixed with longer, simple and forked ones; style (1–)1.5–2 mm, much broader at base, pilose and stellate at least along proximal half. Seeds usually 2 per locule, ovate, 1.1–1.7–2.3 × 0.8–1.1 mm, slightly compressed, usually not margined. Fl. and fr. Mar–Jun. 2n = 16.

Deserts, rocky areas; near sea level to 2600 m. Xinjiang, Xizang = 32. Tajikistan, Turkmenistan, Uzbekistan; N Africa, SW Asia; naturalized in North and South America.


粗果庭荠 *cu guo ting qi*

*Alyssum dasycarpum* Stephan ex Willdenow; *Alyssum dasycarpum* var. *pterospermum* Bordzilowski; *Psilomena dasycarpum* (Stephan ex Willdenow) C. A. Meyer.

Herbs annual, (3–)5–25(–35) cm tall, canescent, with appressed, sessile, 8–14-rayed stellate trichomes, these mixed with longer, simple and forked ones on pedicels, sepals, and fruit. Stems erect, ascending, or decumbent, often several from the base. Cauline leaves subsessile or lowermost attenuate to petiolelike base to 5 mm; leaf blade linear to oblanceolate-linear, (0.3–)0.5–2.5(–3) cm × (0.5–)1–3(–4) mm, gradually smaller upward, base attenuate, apex acute. Fruiting pedicels ascending or subdivaricate, (1–)1.5–3.5(–4.5) mm, stout, straight, covered with stellate trichomes only. Sepals oblong, 1.4–1.8(–2) × 0.4–0.5 mm, deciduous, stellate. Petals pale yellow, oblanceolate, 2–2.5 × 0.5–0.6 mm, sparsely stellate outside, caducous, base attenuate, apex obtuse or retuse. Filaments 1–1.8(–2) mm; median pairs gradually expanded from apex to narrowly winged base, not toothed; lateral pair with a broadly winged appendage apically notched into 2 teeth; anthers ovate, 0.1–0.2 mm. Ovules 2 per locule. Fruit orbicular, 2.5–4(–4.5) mm in diam., apex shallowly emarginate; valves not veined, uniformly inflated at middle, broadly flattened at margin, glabrous and often glaucous; style 0.3–0.7 mm, slender, glabrous. Seeds often 2 per locule, ovate, 1.2–1.5 × 0.9–1.1 mm, slightly compressed, margined or not. Fl. and fr. Apr–Jun. 2n = 32.

Deserts, rocky areas; near sea level to 2600 m. Xinjiang, Xizang [Afghanistan, India, Kashmir, Kazakstan, Mongolia, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; Europe; naturalized in North America].

Dudley (Notes Roy. Bot. Gard. Edinburgh 24: 157–165. 1962) divided *Alyssum desertorum* into three varieties distinguished largely on the basis of minor differences in fruit trichomes. In the present authors’ opinion, these varieties do not seem to merit recognition. The occurrence in Xizang of this species, which was not recorded in Fl. Xizang. (vol. 2. 1985), is based on the holotype of var. *himalayense*, Hügel 1191 (W).

### 5. Alyssum simplex Rudolphi, J. Bot. (Schrader) 1799(2): 290. 1799.

新疆庭荠 *xin jing ting qi*

*Alyssum micranthum* C. A. Meyer; *A. minus* Rothmaler; *A. minus var. micranthum* (C. A. Meyer) T. R. Dudley; *A. parviflorum* Marschall von Bieberstein.

Herbs annual, (3–)7–25(–35) cm tall, canescent throughout with appressed, coarse, sessile, (3–)5–10-rayed stellate trichomes sometimes with unequal rays. Stems erect, ascending, or decumbent, often several from the base. Cauline leaves subsessile or lowermost attenuate to petiolelike base to 4 mm; leaf blade oblong-oblancoate, obovate-spatulate, or elliptic-lanceolate, (0.5–)0.7–2.3 × (1–)2–6(–8) mm, gradually smaller upward, base attenuate, apex acute. Fruiting pedicels divaricate, (2–)3–5(–6) mm, stout, straight, covered with stellate trichomes only. Sepals oblong, 1.7–2.3 × 0.8–1.1 mm, deciduous, with stellate trichomes. Petals pale yellow, oblanceolate, (1.8–)2–2.8(–3.2) × 0.6–0.8 mm, sparsely stellate outside or glabrous, caducous, base attenuate, apex often emarginate. Filaments 1.4–2 mm; median pairs broadly winged, apically 2-cleft; lateral pair with a broadly winged appendage apically 1- or 2-toothed; lateral pair with a broadly winged appendage apically notched into 2 teeth; anthers ovate, 0.1–0.2 mm. Ovules 2 per locule. Fruit orbicular, (3.5–)4.6–5.7 mm in diam., apex truncate or shallowly emarginate; valves not veined, uniformly inflated at middle, broadly flattened at margin, densely covered with coarse, stellate, equal- or unequal-rayed trichomes; style 0.7–1.6 mm, slender, glabrous or...
basally stellate. Seeds often 2 per locule, ovate, 1.6–2 × 1.2–1.5 mm, slightly compressed, margined or not. Fl. and fr. Apr–Jun. 2n = 16.

Mountain slopes, open places, fields, steppe, meadows; 100–2600 m. Xinjiang [Russia, Turkmenistan; N Africa, SW Asia, Europe; naturalized in North America].


倒卵叶庭荠 dao luan ye ting qi


Herbs perennial, cespitose, 7–15(–20) cm tall, often woody at base, canescent throughout, with sessile, 10–25-rayed stellate trichomes. Stems usually erect or ascending, often several from caudex, sterile shoots often several. Cauline leaves subsessile; leaf blade broadly obovate, obovate-spatulate, or obovate, 0.6–1.4(–1.7) cm × (1–)2–6 mm, gradually smaller upward, base attenuate, apex rounded, obtuse, or subacute. Racemes corymbose, in a panicle terminating each stem. Fruiting pedicels divaricate, (2–)3–7(–9) mm, slender, straight, uniformly stellate. Sepals oblong, 1.5–2 × 0.7–1 mm, deciduous, stalked. Petals yellow, broadly spatulate, 2.5–3.5(–4) × 0.7–1 mm, glabrous or stellate outside, deciduous, base attenuate, apex often obtuse or rounded. Filaments 1–1.5 mm; median pairs unilaterally broadly winged, apically 1- or 2-toothed; lateral pair with a lanceolate basal appendage apically acute; anthers ovate, 0.2–0.3 mm. Ovules 1(or 2) per locule. Fruit elliptic to elliptic-obovate, 2.5–4(–4.5) × (1.5–)2–2.5 mm, apex obtuse to subacute; valves not veined, often asymmetrically inflated on 1 side, flattened on other, densely covered with stellate trichomes; style 0.5–1.5 mm, slender, glabrous or sparsely with stellate trichomes basally. Seeds 1(or 2) per locule, ovate, 1.1–1.4 × 0.8–1.1 mm, compressed, not margined. 2n = 16, 32.

Xinjiang [Kazakstan, Russia, Turkmenistan; SW Asia, Europe].

The above description is based on non-Chinese material. The Xinjiang plants examined by the present authors are tentatively assigned to this species.


北方庭荠 bei fang ting qi


Herbs perennial, cespitose, 6–30(–50) cm tall, often woody at base, canescent throughout, with sessile, 10–18-rayed stellate trichomes. Stems tortuous at base, slender, several from caudex, sterile shoots often absent at flowering. Cauline leaves subsessile; leaf blade narrowly obovate or oblancoaleate, 0.5–2(–2.5) cm × 1–3(–5) mm, gradually smaller upward, base attenuate, apex acute to subacuminate. Racemes corymbose, in a panicle terminating each stem. Fruiting pedicels divaricate or rarely ascending, (2–)3–6(–8) mm, slender, straight or slightly curved upward, uniformly stellate. Sepals oblong, 1.2–1.8 × 0.5–0.6 mm, deciduous, stalked. Petals yellow, spatulate, 1.5–3 × 0.7–1 mm, glabrous or stellate outside, deciduous, base attenuate, apex often obtuse or rounded. Filaments 1–1.5 mm; median pairs unilaterally broadly winged, apically 1- or 2-toothed; lateral pair with a lanceolate basal appendage apically acute; anthers ovate, 0.2–0.3 mm. Ovules 1(or 2) per locule. Fruit elliptic to elliptic-obovate, 2.5–4(–4.5) × (1.5–)1.8–2.5 mm, apex obtuse to subacute; valves not veined, often asymmetrically inflated on 1 side, flattened on other, densely covered with stellate trichomes; style 0.5–1.5 mm, slender, glabrous or sparsely with stellate trichomes basally. Seeds 1(or 2) per locule, ovate, 1.1–1.4 × 0.8–1.1 mm, compressed, not margined. 2n = 16, 32.

Alyssum canescens var. *abbreviatum* de Candolle; *Ptilotrichum canescens* (de Candolle) C. A. Meyer.

Herbs perennial, often pulvinate, (1–)2–9(–12) cm tall, silvery canescent throughout, with short-stalked, stellate trichomes lanceolate in outline and with 2, branched, principal rays from stalk apex. Stems usually erect or ascending, often several from woody base, sterile shoots often several. Cauline leaves fleshy, sessile; leaf blade oblong or linear, 4–12(–15) × 0.5–2(–3) mm, often grooved adaxially, base attenuate, apex obtuse or subacute. Fruitings pedicels ascending or sub erect, 3–12 mm, slender, straight. Sepals oblong, 1.5–2.2 × 1–1.5 mm, deciduous, stellate. Petals white, obovate or suborbicular, (3–)3.5–5 × (2–)2.5–3.5 mm, glabrous outside, caducous, apex rounded; claw often pink, minutely papillate at base. Filaments 1–2.5 mm, dilated and papillate at base, neither winged nor appendaged; anthers ovate or oblong, 0.4–0.6 mm. Ovules 1(2) per locule. Fruit broadly ovate or lanceolate-ovate, 4–6 × 2–4 mm, apex acute or acuminate; valves not veined, slightly flattened, densely stellate; style 1–2.5 mm, slender, glabrous. Seeds 1 per locule, ovate, (1.8–)2–2.5 × 1–1.5 mm, compressed, not margined. Fl. Jun–Aug, fr. Jul–Oct. 2n = 88, 92.

Steppe, rocky places, sandy ravines, dry sandy slopes; 900–2400 m. Nei Mongol [Kazakhstan, Mongolia, Russia (Siberia)].

Except for differences in the trichomes, *Alyssum canescens* and *Alyssum tenuifolium* overlap in plant height, petal length, and seed size, and they are sometimes separated with difficulty. A critical field study in parts of their ranges where they overlap, especially in Nei Mongol, Mongolia, and Siberia, is needed in order to reach a better understanding of their limits. Hybridization between the two species (Botschantzev, *Bot. Zhurn. (Moscow & Leningrad)* 44: 1486. 1959) was suggested, but no experimental work supports that hypothesis. *Alyssum tenuifolium* was not listed in FRPS but was recorded for China (as *Ptilotrichum tenuifolium*) in Fl. Intramongol. (ed. 2, 2: 648. 1990). Several collections from Nei Mongol were examined by the present authors, including *Roerich Expedition 375* (US) and *Petrov s.n.* (LE). Another species, *P. dahuricum* Peschko (Novosti Sist. Vyssh. Rast. 15: 230. 1979), if indeed distinct from *A. tenuifolium*, was said to occur in China (Fl. Siberiae 7: 107. 1994), but the present authors have seen no Chinese material.
Herbs perennial. Caudex often several branched, with persistent petiolar remains of previous years. Trichomes sessile, stellate, 4–8-rayed; rays simple and 1–3-forked. Stems erect, often simple. Basal leaves many, petiolar, rosulate, simple, entire, persistent. Cauline leaves few, sessile, attenuate, not auriculate, entire. Racemes several flowered, ebracteate. Fruiting pedicels divaricate. Sepals ovate or oblong, deciduous, ascending, pubescent, base of lateral pair saccate. Petals yellow or white, longer than sepals; blade obovate, deeply 2-fid. Stamens 6, erect, tetradynamous; filaments only slightly dilated at base; anthers narrowly oblong, obtuse at apex. Nectar glands 4, 1 on each side of lateral stamen; median glands absent. Ovules 6–14 per ovary. Fruit silicles, orbicular, broadly obovate, or broadly elliptic, strongly latiseptate, sessile or rarely on a gynophore to 1 mm; valves subleathery, obscurely or distinctly veined, glabrous or pubescent, flat or slightly inflated; replum slightly flattened, not winged; septum complete, membranous; style to 5 mm, filiform; stigma capitate, entire. Seeds biseriate, broadly winged, orbicular, ovate, or elliptic; seed coat smooth, not mucilaginous when wetted; cotyledons accumbent.

Three species: W China, Kazakhstan, Mongolia; two species in China.

The lack in Galitzkya of simple and forked trichomes and staminal appendages, and the development of thick, branched caudices and saccate, lateral sepals clearly distinguish it from Berteroa. The latter genus has simple and forked trichomes, staminal appendages, and nonsaccate sepals.

1a. Fruit glabrous or very rarely pubescent, somewhat inflated, 3–5(–7) mm; valves rounded at 1 or both ends; petals white ................................................................. 1. G. spathulata

1b. Fruit pubescent, flat, larger; valves acute or subacute at both ends; petals yellow ......................... 2. G. potaninii


匙叶翅籽荠  chi ye chi zi qi

Plants (5–)7–12(–15) cm tall. Basal leaves canescent, densely stellate; petiole (0.3–)0.5–1.8(–2.5) cm, slightly expanded at base; leaf blade broadly spatulate, suborbicular, or obovate, rarely subreniform or oblanceolate, (2–)4–10(–12) × (2–)3–9(–12) mm, base cuneate or rarely subcordate, margin entire, apex rounded or subacute. Cauline leaves linear or narrowly oblanceolate, (3–)4–8(–12) × 0.5–1.5(–2) mm, sessile, apex obtuse or subacute. Fruiting pedicels divaricate, slender, straight, 5–14 mm. Sepals suborbicular, or broadly elliptic, 3–3.5 × 1–1.5 mm. Petals white, obovate, 5–7 mm; lobes ovate or oblong, 1–2 × 0.5–1.5 mm, obtuse. Filaments 2.5–3.5 mm; anthers 0.7–1 mm. Ovules 2–6(–8) per ovary. Fruit orbicular, or rarely elliptic, (3–)4–6(–7) × 3–5 mm, somewhat inflated; valves glabrous or very rarely pubescent, rounded at 1 or both ends, reticulate veined; gynophore 0.1–0.7 mm; style glabrous, (1–)2–3(–4) mm. Seeds suborbicular, 3–4 mm in diam., slightly flattened; wing membranous, to 1 mm wide. Fl. Apr–May, fr. Jun–Jul.

Rocky slopes; 500–1000 m. Xinjiang [Kazakhstan].

The above first record from China is based on Bunge 73 (F).


大果翅籽荠  da guo chi zi qi

Plants (9–)15–25(–30) cm tall. Basal leaves canescent, sparsely stellate; petiole (0.3–)0.7–2(–2.5) cm, slightly expanded at base; leaf blade broadly oblanceolate or oblong-lanceolate, (0.6–)1–5(–6) cm × 3–10 mm, base cuneate, margin entire, apex obtuse. Cauline leaves linear-lanceolate, (0.8–)1–3.5 cm × 2–4(–6) mm, sessile, apex obtuse. Fruiting pedicels divaricate, slender, straight, 5–14 mm. Sepals sparsely pubescent, 3–4 × ca. 1.5 mm. Petals yellow, obovate, 5–7 mm; lobes ovate or oblong, 1–2 × 0.5–1.5 mm, obtuse. Filaments 3–4 mm; anthers 0.8–1.1 mm. Ovules to 14 per ovary. Fruit orbicular, or broadly obovate, 0.8–1.3 cm × 6–8 mm, flattened; valves sparsely stellate, acute to subacute at both ends, reticulate veined; gynophore to 1 mm; style sparsely stellate, 3–5 mm. Seeds suborbicular or broadly ovate, to 4 mm in diam., slightly flattened; wing membranous, to 1 mm wide. Fl. Apr–May, fr. Jun–Jul.

Rocky mountain slopes; 800–1700 m. Gansu, Nei Mongol, Xinjiang [Mongolia].

38. LOBULARIA Desvaux, J. Bot. Agric. 3: 162. 1815, nom. cons.
香雪球属  xiang xue qiu shu

Aduseton Adanson, nom. rej.; Koniga R. Brown.

Herbs annual or perennial, sometimes subshrubs. Trichomes exclusively malpighiaceous, appressed. Stems erect or decumbent, branched basally and above. Leaves all cauline, shortly petiolate or sessile, entire. Racemes several to many flowered, ebracteate, elongated in fruit. Fruiting pedicels slender, ascending or divaricate. Sepals ovate or

oblong, erect or spreading, base of lateral pair not saccate. Petals white or creamy white, rarely purple; blade ovate, spatulate, obovate, or orbicular, apex rounded; claw strongly differentiated from blade, shorter than sepals. Stamens 6, spreading or suberect, slightly tetradynamous or subequal; filaments dilated at base; anthers ovate, obtuse at apex. Nectar glands 8, in pairs, median pairs longer than lateral ones. Ovules 2–14 per ovary. Fruit dehiscent silicles, ovate, obovate, orbicular, or elliptic, latiseptate, sessile or shortly stipitate; valves papery, veinless or with a distinct midvein; replum rounded; septum complete, membranous, translucent; style to 0.6 mm, cylindric; stigma capitately entire. Seeds uniseriate or biseriate, winged or wingless, ovate or orbicular, often lenticular, strongly flattened; seed coat reticulate, mucilaginous when wetted; cotyledons accumbent.

Four species: Macaronesia, Mediterranean region, one ornamental species introduced and naturalized worldwide.

1. **Lobularia maritima** (Linnaeus) Desvaux, J. Bot. Agric. 3: 162. 1815.  
香雪球 xiang xue qiu 

*Clypeola maritima* Linnaeus, Sp. Pl. 2: 652. 1753; *Alyssum halimifolium* Linnaeus; *A. maritimum* (Linnaeus) Lamark; *A. minimum* Linnaeus; *Koniga maritima* (Linnaeus) R. Brown.

Herbs perennial, sometimes suffrutiaceous, (5–)12–24(–40) cm tall, silvery pubescent. Stems erect, ascending, procumbent, or decumbent, basally branched; pubescent. Leaves linear, lanceolate, or oblanceolate, (1–)1.5–2.5(–4) cm × (0.8–)1.5–3 (–6.5) mm, pubescent, base attenuate, margin entire, apex acute to subobtuse. Racemes many flowered, elongated considerably in fruit. Fruiting pedicels divaricate or ascending, straight, slender, (3–)5–7(–10) mm, pubescent. Sepals green or purple, oblong, 1.5–1.8(–2.4) × 0.5–1 mm, pubescent. Petals white or deep purple, obovate or suborbicular, 2–3 × 1.5–2.5(–3) mm, abruptly narrowed to claw; claw to 1 mm. Filaments white or purple, 1.2–2 mm; anthers ovate, 0.3–0.5 mm. Fruit ovate, elliptic, or orbicular, (2–)2.3–3(–4.2) × (1.2–1.5–2(–3)) mm; valves convex, pubescent, with a distinct midvein; style 0.4–0.6 mm. Seeds light to reddish brown, 1 per ovary, lenticular, ovate or suborbicular, (1–)1.2–1.4(–2) × (0.7–)0.9–1.1(–1.5), wingless or with a narrow wing to 0.1 mm wide. Fl. and fr. throughout the year depending on locality. 2n = 24. Stony areas, waste grounds, yards; sea level to 2000 m. Cultivated in most of China, naturalized in Gansu, Hebei, Jiangsu, Shaanxi, Shandong, Shanxi, Taiwan, Xinjiang, Zhongwei [native to W Mediterranean region; naturalized elsewhere].

团扇荠属 tuan shan qi shu  

Herbs annual or perennial. Trichomes stellate, mixed with simple ones. Stems erect or ascending, simple or branched. Basal leaves petiolate, not rosulate, simple, entire, dentate, or sinuate. Cauline leaves sessile, margin entire, apex acute or obtuse. Sepals oblong, deciduous, suberect or spreading, pubescent, base of lateral pair not saccate. Petals white or rarely yellow, much longer than sepals; blade obcordate, apex deeply 2-fid; claw short. Stamens 6, tetradynamous; filaments of median pairs flattened basally, unappendaged or laterally 1-toothed; lateral pair with a basal toothlike appendage; anthers oblong, obtuse at apex. Nectar glands 4; median glands absent; lateral glands 1 on each side of lateral stamen. Ovules 4–16 per ovary. Fruit dehiscent silicles, oblong, elliptic, ovate, obovate, or orbicular, latiseptate, sometimes slightly inflated, sessile; valves veinless or with an obscure midvein, stellate hairy or glabrous; replum rounded; septum complete, membranous; style to 4 mm, glabrous or sparsely pubescent; stigma capitately obscurely 2-lobed. Seeds biseriate, winged, margins, or wingless, suborbicular or lenticular, plum or flattened; seed coat minutely reticulate, not mucilaginous when wetted; cotyledons accumbent.

Five species: Asia, Europe (especially Balkan Peninsula), naturalized in North America; one species in China.

团扇荠 tuan shan qi  

*Alys incanum* Linnaeus, Sp. Pl. 2: 650. 1753;  
*Farsetia incana* (Linnaeus) R. Brown.

Herbs annual or biennial, (20–)30–80(–110) cm tall, densely pubescent with appressed stellate trichomes mixed with some simple ones. Stems erect, simple or few basally, often branched above. Basal leaves petiolate, oblanceolate, (2.5–)3.5–8(–10) cm, withered by flowering time, base cuneate or attenuate, margin entire or repand, apex obtuse. Middle and upper cauline leaves sessile, margin entire, apex acute or obtuse.

Fruiting pedicels slender, erect to erect-ascending, (4–)5–9(–12) mm. Sepals erect-ascending, 2–2.5 mm. Petals white, narrowly obcordate, (4–)5–6.5(–8) mm; lobes oblong, (1–)1.5–3 × 0.5–1.5 mm, apex obtuse. Filaments white; median pairs 2–3.3 mm, flattened base appendaged or unappendaged; lateral pair shorter, with an appendage 0.3–1 mm; anthers oblong, 0.5–1 mm. Fruit oblong or elliptic, slightly inflated, (4–)5–8.5(–10) × (2–)2.5–4 mm; valves stellate, obtuse at both ends; style slender, 1–4 mm, basally sparsely pubescent. Seeds lenticular or ovate-orbicular, 1–2.3 mm in diam., slightly flattened, narrowly margined. Fl. May–Aug, fr. Jun–Sep. 2n = 16.

穴丝荠属 *xue si qi shu*

Herbs stoloniferous perennial. Trichomes simple, mixed with short-stalked and forked or 3-rayed and stellate ones. Stems erect or decumbent. Basal leaves subsessile or shortly petiolate, rosulate, simple, entire, ciliate, with persistent petiolar bases. Cauline leaves similar to basal ones. Racemes several flowered, ebracteate or basally bracteate. Fruiting pedicels slender, divaricate. Sepals broadly ovate or oblong, ascending, pubescent, unequal, base of lateral pair subsaccate, margin membranous. Petals yellow, longer than sepals; blade obovate, apex subemarginate; claw short, obscurely differentiated from blade. Stamens 6, erect, tetradynamous; filaments filiform, dilated at base; anthers ovate, obtuse at apex. Median glands absent; lateral glands lunar. Ovules 8–10 per ovary. Fruit dehiscent silicles, broadly ovate to ovate-oblong, latiseptate, sessile; valves papery, prominently veined, glabrous or puberulent, smooth; replum rounded; septum complete; style to 0.7 mm; stigma capitate, entire. Seeds blackish, biseriate, wingless, oblong, flattened; seed coat reticulate; cotyledons accumbent.

- One species.


穴丝荠 *xue si qi*


Herbs stoloniferous, with many stems covered with persistent petiolar remains of previous years. Stems 4–8 cm, pilose, with crisped, simple and forked trichomes; flowering stems leafless or few leaved, sterile ones shorter, several leaved. Basal leaves oblong, obovate, or oblanceolate, 4–10(–15) × 2–4(–5) mm, sparsely pilose, then glabrescent, base cuneate or attenuate, margin entire, ciliate with primarily simple trichomes to 1.1 mm, apex obtuse or acute; midvein prominent at base abaxially. Cauline leaves similar to basal ones. Fruiting pedicels straight or slightly curved, divaricate, 4–10(–14) mm, pilose, with crisped minute trichomes. Sepals broadly ovate or oblong, 1.7–2.5 × 1–2 mm, caducous; lateral pair larger than median pair, subsaccate. Petals yellow, obovate, 4–5 × 2–2.5 mm, apex shallowly emarginate; claw to 1 mm. Filaments yellow; lateral pair 1–1.3 mm; median pairs 1.2–1.6 mm, dilated basally, to 0.5 mm wide; anthers yellow, 0.3–0.4 mm. Fruit broadly ovate to ovate-oblong, 4–6.5 × 2–3.5 mm, puberulent or glabrous; style slender, 0.5–1 mm; stigma wider than style. Seeds blackish, ovate, 1.1–1.3 × 0.9–1. Fl. Jun–Jul, fr. Jul–Aug.

- Grassy slopes, rocky crevices; 3500–4000 m. Gansu, Qinghai.


葶苈属 *ting li shu*

Herbs perennial, rarely annual, biennial (or subshrubs with woody stems). Trichomes simple, forked, stellate, malpighiaceous, or dendritic, stalked or sessile, often more than 1 kind present. Stems erect or ascending, sometimes prostrate, leafy or leafless and plants scapose. Basal leaves petiolate, often rosulate, simple, entire or toothed, rarely lobed. Cauline leaves petiolate or sessile, cuneate or auriculate at base, entire or dentate, sometimes absent. Racemes bracteate or ebracteate, elongated or not in fruit. Fruiting pedicels slender, erect, ascending, or divaricate. Sepals ovate, oblong, or elliptic, base of lateral pair not saccate or subsaccate, margin usually membranous. Petals yellow, white, pink, purple, orange (or rarely red); blade obovate, spatulate, oblong, oblanceolate, orbicular, or linear, apex obtuse, rounded, or rarely emarginate; claw obscurely to strongly differentiated from blade. Stamens 6, tetradynamous; filaments dilated or not at base; anthers ovate or oblong, obtuse at apex. Nectar glands 1, 2, or 4, distinct or confluent and subtending bases of all stamens; median glands present or absent; lateral glands toothlike, semiannular, or annular. Ovules 4 to numerous per ovary. Fruit dehiscent, silicles or rarely siliques, ovate, elliptic, oblong, orbicular, ovoid, globose, lanceolate, or linear, latiseptate or terete, sometimes spirally twisted; valves distinctly or obscurely veined, glabrous or pubescent; replum rounded; septum complete, membranous, translucent; style distinct or obsolete, glabrous; stigma capitate, entire or slightly 2-lobed. Seeds biseriate, wingless (or rarely winged), oblong, ovate, or orbicular, flattened; seed coat minutely reticulate, not mucilaginous when wetted; cotyledons accumbent.

About 350 species: primarily in the N hemisphere, especially arctic, subarctic, alpine, and subalpine regions, with about 70 species in South America; 48 species (16 endemic) in China.

*Drabas* is the largest and most taxonomically difficult genus in the Brassicaceae. More than 950 binomials and nearly a fourth as many infraspecific taxa have been proposed. Numerous taxa are based on trivial characters, especially the presence vs. absence of trichomes on the fruit.

valves. Otto Eugene Schulz (Pflanzenr. 89/IV. 105): 1–396, 1927), hereafter Schulz (without a reference), was the last person to monograph Draba on worldwide basis. Although he accorded varietal names to forms with glabrous and pubescent fruits, this variation often occurs within the same population (see discussion under D. oreades). By contrast, petal color is taxonomically important and should be recorded in the field rather than from dried specimens because white petals sometimes dry yellow or vice versa. Another taxonomically important character is the number of ovules/seeds per ovary/fruit. This is easily obtained by counting the seeds and aborted ovules in the fruit.

The records from China of Draba flabnizensis Wulfen (e.g., FRPS, p. 160); Fl. Qinghai. 1: 443. 1997; Fl. Xinjiang. 2(2): 117. 1995) and D. hirta Linnaeus (e.g., FRPS, p. 164; Fl. Xinjiang. 2(2): 127. 1995) cannot be confirmed, and it is likely that these records are based on 19th Century accounts that represent misidentifications of plants of several species, including D. altaica, D. lanceolata, D. lasiophylla, D. mongolica, and D. oreades.

Draba affghanica Boissier was recorded from Gansu by Pohle (Repr. Spec. Nov. Regni Veg. Beih. 32: 128. 1925), but the present authors have seen no Chinese material of that species.

According to FRPS (p. 168), Fl. Qinghai. (1: 449. 1997), and Fl. Xinjiang. (2(2): 125. 1995), Draba borealis de Candolle was said to occur in Qinghai, Shaanxi, Sichuan, and Xinjiang. However, the present authors have seen no material from these provinces. The distribution of D. borealis in Asia is restricted to Russia (only the coastal Far East, not Siberia) and Japan. It is highly unlikely that the species occurs in China.

Draba fuhaiensis Z. X. An (Fl. Xinjiang. 2(2): 374. 1995) is not included in the present account because the present authors have not seen the type, which was the single collection cited.

1a. Annuals or rarely biennials.
   2a. Cauline leaves absent, very rarely 1; fruit base acute ............................................................... 43. D. melanopus
   2b. Cauline leaves 2–24(–30); fruit base obtuse.
      3a. Seeds and aborted ovules 30–60–(72) per fruit.
         4a. Fruit linear, (6–)9–20(–25) mm; petals 3–4 mm ................................................................. 44. D. stenocarpa
         4b. Fruit oblong or elliptic, (3–)5–8(–10) mm; petals (1.2–)1.7–2.2(–2.5) mm ......................... 45. D. nemorosa
      3b. Seeds and aborted ovules 10–24(–28) per fruit.
         5a. Fruit ovate, glabrous, acute at apex; cauline leaves (5–)10–24(–30) ................................. 47. D. eriopoda
         5b. Fruit oblong, oblong-elliptic, or rarely suborbicular, puberulent, obtuse at apex; cauline leaves 3–12.
            6a. Petals yellow, (1.2–)1.7–2.2(–2.5) mm; valves with stellate and forked trichomes; racemes (5–)12–40(–60)-flowered ................................................................. 46. D. huettei
            6b. Petals white, 0.6–1 mm; valves with exclusively simple trichomes; racemes (2–)4–10(–15)-flowered
               ................................................................................................................................. 48. D. ellipoidea
   1b. Perennials, with well-developed caudex often covered with leaf or petiolar remains of previous years.
   7a. Flowering stems leafless.
      8a. Petals white.
         9a. Stems distal half and flowering pedicels glabrous or rarely glabrescent.
            10a. Petals 2.5–3(–3.5) × 1–1.5 mm; fruit base obtuse; fruiting pedicels (1–)2–5(–7) mm; Xinjiang ................................................................. 15. D. turczaninowii
            10b. Petals (3.5–)4–6 × 2–3 mm; fruit base acute; fruiting pedicels 4–13 mm; Jilin .......... 14. D. ussuriensis
      9b. Stems and fruiting pedicels tomentose throughout.
         11a. Petals 4–7 × 1.5–4.5 mm; fruit often twisted, (3–)5–12 mm; style (0.5–)0.7–1.5 mm.
            12a. Rachis of infructescence often flexuous; fruit apex acute; petals 1.5–2.5 mm wide; stellate trichomes sessile or sub sessile, with some rayed branched .................. 11. D. winterbottomii
            12b. Rachis of infructescence straight; fruit apex obtuse; petals 2.5–4.5 mm wide; stellate trichomes long-stalked, with unbranched rays ................................................................. 13. D. sikkimensis
         11b. Petals 1.5–2.5(–3) × 0.6–1.2 mm; fruit not twisted, 2.5–5 mm; style 0.1–0.4 mm.
            13a. Sepals sparsely hairy inside; fruit oblong, 1–1.5 mm wide, apex obtuse; petals 1.5–2 mm 12. D. handelii
            13b. Sepals glabrous inside; fruit narrowly ovate or oblong-ovate, 1.5–2.5 mm wide, apex acute; petals 1.8–2.5(–3) mm ................................................................. 10. D. glomerata
      8b. Petals yellow.
         14a. Leaf margin with exclusively malpighiaceous trichomes; seeds and aborted ovules 24–30 per fruit ................................................................. 40. D. sibirica
         14b. Leaves without malpighiaceous trichomes; seeds and aborted ovules 6–24 per fruit.
            15a. Style (1–)1.5–3.5; sepals 3–4.5 mm ................................................................. 32. D. jucunda
            15b. Style to 1 mm, if to 1.5 mm then fruits linear to linear-oblong; sepals rarely to 3 mm.
               16a. Leaf margin ciliate with setose or sub setose trichomes to 1.4 mm.
                  17a. Leaves linear or linear oblong; petals 3–4 × 1–2 mm.
                     18a. Fruit ovoid to sub globose, inflated, 2.5–4.5 mm; ovules 4–8 per ovary .......... 35. D. cachemirica
18b. Fruit elliptic-ovate, rarely oblong-lanceolate, flattened, 6–10 mm; ovules 12–16 per ovary ................................................................. 34. *D. setosa*

17b. Leaves variously shaped but not linear or linear-oblong; petals 4–7 × 2–3.5 mm.

19a. Fruiting pedicels pubescent all around; valves glabrous, base obtuse; racemes 3–7(–12)-flowered; plants surculose ........................................ 33. *D. senilis*

19b. Fruiting pedicels glabrous; valves puberulent, base acute; racemes (6–)10–25(–35)-flowered;
plants not surculose ........................................................................ 38. *D. olgae*

16b. Leaf margin not ciliate or ciliate with nonsetose, shorter trichomes.

20a. Fruit inflated at least basally.

21a. Fruiting pedicels tomentose all around; ovules 16–24 per ovary; fruit apex obtuse 39. *D. humillima*

21b. Fruiting pedicels glabrous; valves puberulent, base acute; racemes (6–)10–25(–35)-flowered;
plants not surculose ................................ ............................................. 33.

20b. Fruit flattened.

23a. Fruit oblong, oblong-linear, or linear-lanceolate; fruiting pedicels (5–)7–18(–22) mm;
leaf stellate trichomes 4–6-rayed, at least 1 ray laterally branched.

24a. Fruit valves with predominantly stellate trichomes; style 0.4–0.8 mm; seeds and aborted ovules 18–24 per fruit; petals 3.5–5 mm ........................................ 28. *D. tibetica*

24b. Fruit valves with predominantly simple trichomes; style 0.7–1.5 mm; seeds and aborted ovules 10–16 per fruit; petals 4.5–6 mm ........................................ 29. *D. alajica*

23b. Fruit ovate, suborbicular, or elliptic; fruiting pedicels 1–7(–10) mm; leaf stellate trichomes 3- or 4-rayed, all rays unbranched.

25a. Leaf trichomes predominantly simple, very rarely absent; fruit apex acute to acuminate;
fruiting pedicels glabrous at least adaxially ......................................... 30. *D. oreades*

25b. Leaf trichomes predominantly stellate; fruit apex obtuse; fruiting pedicels tomentose all around .............................................................................. 31. *D. involucrata*

7b. Flowering stems 1- to many leaved.

26a. Petals white.

27a. Seeds and aborted ovules 24–60 per fruit.

28a. Fruit linear, 1–1.5 mm wide; fruiting pedicels divaricate, not appressed to rachis .......... 1. *D. ladyginii*

28b. Fruit oblong-elliptic, oblong, lanceolate, or lanceolate-linear, 1.5–3 mm wide; fruiting pedicels erect to ascending, often subappressed to rachis.

29a. Stems and pedicels hirsute with simple trichomes; leaf stellate trichomes with unbranched rays ........................................................................... 3. *D. parviflora*

29b. Stems and pedicels tomentose with primarily stellate and forked trichomes; leaf stellate trichomes with at least 1 ray laterally branched.

30a. Fruit oblong-elliptic to narrowly oblong, 2–3 mm wide; cauline leaves (2 or)3–5(–7) per stem; petals 3.5–7 mm ......................................................... 4. *D. subamplexicaulis*

30b. Fruit lanceolate to lanceolate-linear, 1.5–2 mm wide; cauline leaves 6–12(–16) per stem; petals 2.5–3.5 mm .............................................. 2. *D. lanceolata*

27b. Seeds and aborted ovules 6–20(–22) per fruit.

31a. Petals broadly obovate, 2.5–4.5 mm wide; sepals 2.5–3 mm; fruit apex obtuse; basal leaves subfluccose with long, slender trichomes .................................................................................. 13. *D. sikkimensis*

31b. Petals spatulate to narrowly obovate, 1–2(–3) mm wide; sepals 1–2(–2.5) mm; fruit apex acute to acuminate; basal leaves pubescent, pilose, or tomentose with short trichomes.

32a. Abaxial surface of basal leaves with predominantly simple trichomes, stellate trichomes with unbranched rays.

33a. Fruiting pedicels 1–4 mm; fruit not twisted; cauline leaves (1 or)2–6(–8); Gansu, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan ........................................................................ 7. *D. altaica*

33b. Fruiting pedicels 4–12 mm; fruit slightly twisted; cauline leaves 1–3; Taiwan .......... 9. *D. sekiyana*
32b. Abaxial surface of basal leaves with predominantly stellate trichomes 1 to all 4 rays of with laterally branched.

34a. Stems distal half and fruiting pedicels glabrous or rarely glabrescent.

35a. Petals 2.5–3(–3.5) × 1–1.5 mm; fruit base obtuse; fruiting pedicels (1–)2–5(–7) mm; Xinjiang .............................. 15. *D. turczaninowii*

35b. Petals (3.5–)4–6 × 2–3 mm; fruit base acute; fruiting pedicels 4–13 mm; Jilin 14. *D. ussuriensis*

34b. Stems and fruiting pedicels tomentose throughout.

36a. Fruit (5–)6–11 mm, narrowly oblong-ellipsoid to lanceolate-linear; seeds and aborted ovules
12–22 per fruit.

37a. Fruiting pedicel erect to ascending, often subappressed to rachis; cauline leaves 1–4(or 5) per stem; fruit twisted 2 or 3 turns, rarely untwisted; base of cauline leaves often ciliate with simple trichomes ........................................ 5. *D. lasiophylla*

37b. Fruiting pedicel divaricate, not appressed to rachis; cauline leaves 6–14(–17) per stem; fruit twisted 1 turn or untwisted; base of cauline leaves not ciliate with simple trichomes .................................................. 6. *D. mongolica*

36b. Fruit 2–4(–5) mm, ovate, elliptic, or rarely oblong-ovate; seeds and aborted ovules 6–12 per fruit.

38a. Fruiting pedicels divaricate; racemes bracteate at least basally, slightly elongated in fruit ........................................................................ 8. *D. lichiangensis*

38b. Fruiting pedicels erect to ascending; racemes ebracteate, distal half not elongated in fruit ........................................................................ 10. *D. glomerata*

26b. Petals yellow.

39a. Racemes bracteate throughout or only basally.

40a. Racemes 2–10(–12)-flowered; fruiting pedicels glabrous or pubescent throughout, if glabrous adaxially then style 1.5–3 mm.

41a. Petals 2.5–3.5 × 0.8–1.5 mm; style 0.2–0.5 mm; lowermost fruiting pedicels filiform, to 4 cm, strongly recurved ........................................ 41. *D. gracillima*

41b. Petals 6–8 × 3–6 mm; style longer; lowermost pedicels not filiform, to 1.8 cm, rarely recurved.

42a. Racemes bracteate basally; ovary and fruit hirsute; basal leaves ciliate ............ 26. *D. bhutanica*

42b. Racemes bracteate throughout; ovary and fruit glabrous or puberulent; basal leaves not ciliate.

43a. Style ca. 1 mm; ovules ca. 4 per ovary; racemes 8–12-flowered; pedicels divaricate 22. *D. serpens*

43b. Style 2–3.5 mm; ovules 18–22 per ovary; racemes 2–6-flowered; pedicels recurved 25. *D. remotiflora*

40b. Racemes (12–)15–60(–140)-flowered; fruiting pedicels glabrous adaxially, pubescent abaxially.

44a. Fruit pilose; abaxial leaf surface with primarily simple and forked trichomes; lateral pair of sepals not saccate at base ........................................................................ 24. *D. matangensis*

44b. Fruit glabrous; abaxial leaf surface with stellate trichomes; lateral pair of sepals subsaccate at base.

45a. Abaxial surface of basal and lowermost cauline leaves with 5–8-rayed stellate trichomes.

46a. Cauline leaves auriculate to amplexicaul, acute, dentate or denticulate; stems often branched;
plants not canescent ................................................................. 18. *D. amplexicaulis*

46b. Cauline leaves not auriculate or amplexicaul, obtuse, entire; stems simple; plants canescent at least basally ........................................................................ 16. *D. yunnanensis*

45b. Abaxial surface of basal and lowermost cauline leaves with simple, forked, or 3- or 4-rayed stellate trichomes.

47a. Cauline leaves neither auriculate nor amplexicaul; fruit 4–7 mm .......................... 23. *D. oreodoxa*

47b. Cauline leaves auriculate or amplexicaul; fruit (7–)10–15 mm.

48a. Caudex branches surculose; stems few to several from base; seeds and aborted ovules 8–12 per fruit ...................................................... 17. *D. surculosa*

48b. Caudex not surculose; stems simple at base; seeds and aborted ovules (12–)16–22(–24) per fruit .................................................................................................. 19. *D. polyphylla*

39b. Racemes ebracteate.
49a. Midvein of basal leaves prominent, persistent and often spinelike; leaf margin ciliate with setose or subsetose with simple trichomes to 1.5 mm.

50a. Fruit elliptic-ovate, rarely oblong-lanceolate; stems glabrous distally; leaves glabrous adaxially, midvein narrower than blade on each side ......................................................... 34. D. setosa

50b. Fruit linear-lanceolate; stems pubescent throughout; leaves hirsute adaxially, midvein wider than blade on each side ............................................................................. 37. D. linearifolia

49b. Midvein of basal leaves obscure or evident, not persistent and spinelike, leaf margin not ciliate or ciliate with slender, nonsetose trichomes.

51a. Petals 1–1.5 mm; seeds and aborted ovules 24–38 per fruit; style absent .......... 42. D. zangbeiensis

51b. Petals 2.5–8 mm; seeds and aborted ovules 4–20(–24); style 0.1–2 mm.

52a. Fruit ovate, suborbicular, or ovate-lanceolate.

53a. Cauline leaves 3–6(–9); fruiting pedicels 6–13(–17) mm; seeds and aborted ovules 16–20 per fruit; fruit valves pilose, flat ............................................................. 20. D. elata

53b. Cauline leaves 1(or 2); fruiting pedicels 1–7(–10) mm; seeds and aborted ovules 4–12 per fruit; fruit valves glabrous or rarely puberulent, inflated basally ................................ 30. D. oreades

52b. Fruit linear, linear-lanceolate, linear-elliptic, to oblong.

54a. Racemes (20–)30–90-flowered; fruiting pedicels glabrous adaxially, pubescent abaxially ........................................................................................................ 21. D. calcicola

54b. Racemes 2–18(–20)-flowered; fruiting pedicels either glabrous throughout or pubescent all around.

55a. Cauline leaves 2–6; fruiting pedicels filiform, lowermost often recurved; abaxial surface of basal leaves with forked or 4-rayed stellate trichomes with unbranched rays.

56a. Petals 6–8 × 3–4 mm; fruit 1.5–2.2 cm; style 1.5–2 mm ....................... 27. D. cholaensis

56b. Petals 2.5–3.5 × 0.8–1.5 mm; fruit (0.5–)0.7–1.3(–1.8) cm; style 0.2–0.5 mm 41. D. gracillima

55b. Cauline leaves 1 or very rarely 2; fruiting pedicels not filiform, suberect to divaricate, straight; abaxial surface of basal leaves with 4–6-rayed stellate trichomes 1 or more rays of which forked or with a lateral branch on each side.

57a. Fruit valves with predominantly stellate trichomes; style 0.4–0.8 mm; seeds and aborted ovules 18–24 per fruit; petals 3.5–5 mm ........................................................................ 28. D. tibetica

57b. Fruit valves with predominantly simple trichomes; style 0.7–1.5 mm; seeds and aborted ovules 10–16 per fruit; petals 4.5–6 mm .................................................. 29. D. alajica


苞序葶苈 bao xu ting li

Draba incana Linnaeus var. flaccida Maximowicz; D. incana var. microphylla W. W. Smith; D. lanceolata Royle var. chingii O. E. Schulz; D. lanceolata var. latifolia O. E. Schulz.

Herbs perennial, (7–)15–45(–60) cm tall, cespitose. Caudex slender, few branched, ultimate branches terminated in rosettes, covered with petiolar remains of previous years. Stems erect, simple or rarely branched above middle, sparsely to densely pubescent with subsessile stellate trichomes, often glabrescent distally. Basal leaves rosulate, persistent; petiole 5–10(–15) mm, sometimes undifferentiated; leaf blade elliptic, oblong, or lanceolate, (0.3–)1–2.5(–4) cm × (1–)2–7(–10) mm, abaxially pubescent with sessile or short-stalked, 4-rayed stellate trichomes 1 or 2 rays of which often branched, adaxially pubescent with similar stellate trichomes or with a mixture of stellate and simple ones, base attenuate to cuneate, margin entire or denticulate, apex acute. Cauline leaves (4–)6–19(–26), sessile; leaf blade ovate, oblong, or elliptic, 0.4–2.5(–4) cm × 1.5–7(–15) mm, pubescent as basal leaves or adaxially strigose with simple trichomes, base cuneate to obtuse, margin entire or 1–4(–7)-toothed on each side, apex acute. Racemes (8–)14–35(–45)-flowered, bracteate basally, not elongated in fruit. Fruiting pedicels 2–10(–12) mm, divaricate, straight, glabrous or pubescent all around with sub.sessile, forked or stellate trichomes sometimes mixed with simple ones. Sepals oblong or ovate, 1–1.5 × 0.5–0.6 mm, erect, abaxially pilose with simple trichomes, base of lateral pair not saccate, margin membranous. Petals white, broadly spatulate, 2–3 × 0.8–1.1 mm, apex emarginate; claw absent. Filaments 0.9–2 mm; anthers ovate, 0.2–0.3 mm. Ovules (28–)32–52(–60) per ovary. Fruit linear, (5–)7–12(–17) × 1–1.5 mm, erect or rarely divaricate, latiseptate, rarely slightly twisted; valves glabrous, base and apex obtuse, with a distinct midvein; style obsolete, rarely to 0.1 mm. Seeds brown, ovate, 0.6–0.8 × 0.4–0.5 mm. Fl. and fr. Jun–Aug.

- Sunny roadsides, sandy damp places, scrub, alpine turf, wood margins; 2100–4700 m. Gansu, Hebei, Hubei, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan.

Except for not having fully mature fruits, the type collection of Draba lanceolata var. chinii, R. C. Ching 497 (holotype, B; isotypes, E, GH, P, PE, US) is indistinguishable from that of D. ladyginii, Ladygin 381 (holotype, LE; photos, MO, PE).


Herbs perennial, 10–30(–40) cm tall, cespitose. Caudex slender, few branched, ultimate branches terminated in rosettes, covered with petiolar remains of previous years. Stems erect, simple, tomentose with subsessile sterile trichomes. Basal leaves rosulate, persistent; petiole to 1.5 cm, often undifferentiated; leaf blade elliptic, oblong, or lanceolate, (0.4–)1–2(–3) cm × (1–)2–6 mm, tomentose with sessile or short-stalked, 4-rayed sterile trichomes 1 or 2 rays of which often branched, base attenuate to cuneate, margin entire or denticulate, apex acute. Cauline leaves 6–12(–16), sessile; leaf blade ovate, oblong, elliptic, or lanceolate, 0.7–2.6(–3.5) cm × 2–7(–10) mm, pubescent as basal leaves, often adaxially pilose with predominately simple trichomes, base cuneate to obtuse, margin 2–5(–9)-toothed on each side, rarely entire, apex acute. Racemes (7–)14–32(–47)-flowered, ebracteate or lowermost flowers bracteate, elongated in fruit. Fruiting pedicels 2–4.5(–7) mm, erect or ascending, often appressed to rachis, straight, tomentose all around with subsessile, sterile trichomes sometimes mixed with simple ones. Sepals oblong or ovate, 1–2 × 0.5–0.8 mm, erect, abaxially pilose, base of lateral pair not saccate, margin membranous. Petals white, spatulate, 2.5–3.5 × 1–2 mm, apex submarginate or rounded; claw absent or to 1 mm. Filaments 1.5–2 mm; anthers ovate, 0.2–0.3 mm. Ovules 26–30(–48) per ovary. Fruit lanceolate to lanceolate-linear, (6–)7–11(–12) × 1.5–2 mm, erect and often appressed to rachis, rarely slightly twisted; valves subulate or very rarely glabrous, obscurely veined, apex acute; style 0.1–0.6 mm. Seeds brown, ovate, 0.8–1.1 × 0.5–0.6 mm. Fl. and fr. Jun–Aug. 2n = 32.

Mountain slopes, meadows, scrub, gravelly stream sides, roadsides; 1100–4900 m. Gansu, Qingshai, Xinjiang, Xizang [Afghanistan, India, Kashmir, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Sikkim, Tajikistan, E Turkmenistan, Uzbekistan].

Schulz confused the limits of Draba ladyginii, D. lanceolata, D. lasiophylla, and D. mongolica, as evidenced from the varieties he described originally under certain species and in his monograph transferred to others. The first two species are easily separated from the latter two by having usually more than 30 instead of less than 24 ovules/seeds per fruit. Other characters that distinguish the four species are given in the key above.

The records of Draba incana Linnaeus and D. stylaris J. Gay ex E. A. Thomas from China (e.g., FRPS 168–171; Fl. Qinghai. 1: 449. 1995; Fl. Sichuan. 14: 74. 1999; Fl. Xinjiang. 2(2): 123–126. 1995; Fl. Xizang. 2: 354–355. 1985) are based on misidentified plants of D. lanceolata. True D. incana (including D. stylaris) occurs only in Europe and North America (Canada and N United States). It differs from D. lanceolata in being biennial (instead of perennial with a distinct caudex) and in having fruits elliptic to oblong and glabrous (instead of almost always lanceolate to lanceolate-linear and tomentose).


Herbs perennial, (3–)6–20(–25) cm tall, compactly cespitose. Caudex few branched, ultimate branches terminated in rosettes, covered with leaf remains of previous years. Stems erect, simple, hirsute throughout with simple and coarse, forked trichomes. Basal leaves rosulate, persistent; petiole to 7 mm, ciliate; leaf blade oblong or oblanceolate, (0.3–)0.7–2(–2.5) cm × (1–)2–5 mm, abaxially hirsute with sessile or subsessile, 3- or 4-rayed sterile stellate trichomes with unbranched rays, adaxially and ciliate margin with simple, stoutish trichomes to 1 mm, base attenuate to cuneate, margin entire or 1–3-denticate, apex acute. Cauline leaves 2–4(–8), sessile; leaf blade ovate or oblong, 0.4–1.8 cm × 1–6 mm, pubescent as basal leaves, margin entire or 1–3-toothed on each side, apex subacute. Racemes 4–20-flowered, ebracteate, elongated in fruit. Fruiting pedicels 2–4 mm, erect, often appressed to rachis, straight, hirsute all around with simple trichomes. Sepals oblong-ovate, 1.5–2 × 0.5–0.8 mm, erect, abaxially pilose, base of lateral pair not saccate, margin membranous. Petals white, spatulate, 2.3–3.5 × 1–1.5 mm, papillose-submarginate or rounded; claw absent. Filaments 1.5–2 mm; anthers ovate, 0.2–0.3 mm. Ovules 24–30 per ovary. Fruit oblong-elliptic to oblong, 6–11 × 1.5–2(–2.5) mm, erect, often appressed to rachis, latiseptate, not twisted; valves glabrous, obscurely veined, base and apex subobtuse; style 0.1–0.3 mm. Seeds brown, ovate, 0.9–1.1 × 0.5–0.6 mm. Fl. and fr. Jun–Aug.

Stony meadows of alpine areas, stream sides; 2700–4000 m. Gansu, Qingshai, Xinjiang [Kazakhstan, Kyrgyzstan, Russia, Tajikistan].


半抱茎葶苈 ban bao jing ting li
Draba dasycarpa C. A. Meyer; D. hirta Linnaeus var. subamplexicaulis (C. A. Meyer) Regel.
Herbs perennial, (4–)10–25(–35) cm tall, cespitose. Caudex slender, few branched, ultimate branches terminated in rosettes, covered with leaf remains of previous years. Stems erect, simple, tomentose with sessile, stellate and forked trichomes occasionally mixed with fewer, slender, simple ones. Basal leaves rosulate, persistent; petiole to 6 mm, sometimes ciliate; leaf blade oblong, or oblancoolate, 0.5–3(–3.6) cm × (1–)2–6 (–10) mm, tomentose with sessile, 4-rayed stellate trichomes 1 to all rays of which with 1 or 2 lateral branches, base attenuate to cuneate, margin 1–5-toothed on each side, rarely subtentire, apex acute. Cauline leaves (2 or)3–5(–7), sessile; leaf blade ovate to oblong, rarely elliptic or lanceolate, 0.7–2(–6.4) cm × 2–6(–10) mm, pubescent as basal leaves, base obtuse or subamplexicaul, margin 1–5-toothed on each side, rarely entire, apex acute. Racemes (3–)7–18(–20)-flowered, ebracteate, elongated in fruit. Fruiting pedicels 2–8(–12) mm, erect or ascending, straight, glabrous or tomentose all around with subsessile, forked and stellate trichomes sometimes mixed with simple ones. Sepals oblong or ovate, 2–2.7 × 1–1.3 mm, erect, abaxially pilose, base of lateral pair not saccate, margin narrowly membranous. Petals white, spatulate, 3.5–5 × 1.5–2.5 mm, apex emarginate; claw 1–2 mm. Filaments 1.5–3 mm; anthers ovate, 0.4–0.5 mm. Ovules 30–40 per ovary. Fruit oblong-elliptic to narrowly oblong, 5–14 × 2–3 mm, erect and often appressed to rachis, latisepitate, not twisted; valves glabrous or puberulent with simple and forked trichomes, not veined, base and apex obtuse to acute; style 0.1–0.5 mm. Seeds brown, ovate, 0.9–1.1 × 0.4–0.5 mm. Fl. Jun–Aug, fr. Jul–Oct.

Rocky slopes, gravelly areas; 2300–4600 m. Qinghai, Shaanxi, Sichuan, Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia, Uzbekistan].


毛叶葶苈 mao ye ting li

Draba glomerata Royle var. leiocarpa Pamp.; D. ladygineii Pohle var. trichocarpa O. E. Schulz; D. lasiophylla var. leiocarpa (Pamp.) O. E. Schulz; D. lasiophylla var. royleana Pohle; D. torticarpa L. L. Lou & T. Y. Cheo.

Herbs perennial, 4–20(–28) cm tall, cespitose. Caudex slender, few branched, ultimate branches terminated in rosettes, covered with petiolar remains of previous years. Stems erect, simple, tomentose with subsessile stellate trichomes. Basal leaves rosulate; petiole to 6 mm, often undifferentiated; leaf blade lanceolate or elliptic-oblong, (3–)4–5(–18) × 1–4(–5) mm, tomentose with sessile, 4-rayed stellate trichomes the rays of which with 1 or 2 lateral branches, base attenuate to cuneate, margin entire or 1–3-toothed on each side, often ciliate at least near base, apex acute. Cauline leaves 1–4(or 5), sessile; leaf blade ovate, oblong, or elliptic, (4–)6–10(–20) × 1.5–4(–7) mm, pubescent as basal leaves, base cuneate to obtuse, margin entire or 1–5-toothed on each side, often subsetose ciliate at base, apex acute. Racemes (5–)7–20(–25)-flowered, ebracteate or lowermost flowers bracteate, at least lowermost portion elongated in fruit. Fruiting pedicels (1–)2–6(–10) mm, erect or ascending, straight, often subappressed to rachis, tomentose all around with subsessile, stellate trichomes rarely mixed with fewer simple ones. Sepals oblong, 1.2–1.8 × 0.5–0.9 mm, erect, abaxially pilose, base of lateral pair not saccate, margin membranous. Petals white, spatulate, 2.3–5 × 0.8–1.1 mm, apex submarginate or rounded; claw absent. Filaments 1–1.8 mm; anthers ovate, ca. 0.2 mm. Ovules 12–20(–22) per ovary. Fruit narrowly oblong-ellipsoid to lanceolate-linear, (5–)7–10(–11) × 1.5–2 mm, erect to ascending, sometimes appressed to rachis, latiseptate, often twisted 2 or rarely 3 turns, rarely untwisted; valves tomentose or glabrous, obscurely veined, base obtuse, apex acute or acuminate; style 0.1–0.5 mm. Seeds brown, ovate, 0.8–1.1 × 0.4–0.5 mm. Fl. Jun–Aug, fr. Jul–Oct.

Mountain slopes, crevices, Kobresia turf; 3000–5200 m. Gansu, Hubei, Qinghai, Shaanxi, Sichuan, Xinjiang, Xizang [Butan, India, Kashmir, Kazakhstan, Kyrgyzstan, Nepal, Sikkim, Tajikistan, Uzbekistan].

The above first records of Draba lasiophylla from Hubei, Sichuan, and Xinjiang are based on Wilson 209 (A, E, K, NY, P, W), Harry Smith 11182 (UPS), and Wu, Ohba, Wu & Fei 2108 (KUN, TI), respectively.


蒙古葶苈 meng gu ting li

Draba incana Linnaeus var. mongolica (Turczaninow) Regel; D. mongolica var. chinenesis Pohle; D. mongolica var. elongata Pohle; D. mongolica var. trichocarpa O. E. Schulz; D. mongolica var. turczaninovi Pohle.

Herbs perennial, (3–)5–15(–20) cm tall, cespitose. Caudex slender, few branched, ultimate branches terminated in rosettes, covered with petiolar remains of previous years. Stems erect, simple, tomentose with subsessile stellate trichomes. Basal leaves rosulate; petiole absent or to 1.2 cm; leaf blade lanceolate, 0.8–3 cm × 1–5 mm, tomentose with sessile, 4-rayed stellate trichomes the rays of which with 1 or 2 lateral branches, base attenuate to cuneate, margin entire or dentate, not ciliate, apex acute. Cauline leaves 6–14(–17), sessile; leaf blade ovate, oblong, or elliptic, 0.6–1.5 cm × 2–7 mm, pubescent as basal leaves, base cuneate to obtuse, margin entire or 1–6-toothed on each side, not ciliate at base, apex acute. Racemes 7–20-flowered, ebracteate or lowermost flowers bracteate, elongated slightly in fruit. Fruiting pedicels 1–5(–6) mm, divaricate, straight, tomentose all around with
subsessile, stellate trichomes. Sepals oblong, 1–1.8 × 0.5–0.9 mm, erect, abaxially pilose, base of lateral pair not saccate, margin membranous. Petals white, spatulate, 2–3.5 × 1–1.3 mm, apex subemarginate or rounded; claw Filaments 1–1.8 mm; anthers ovate, 0.1–0.2 mm. Ovules 12–18(–20) per ovary. Fruit narrowly oblong-ellipsoid to lanceolate-linear, (5–6–8–9) × (1–1.5–2.5 mm, erect, latisepalous, flat or twisted to 1 turn; valves tomentose or glabrous, obscurely veined, base obtuse, acetous or acuminate; style 0.1–0.3 mm. Seeds brown, ovate, 0.9–1.1 × 0.5–0.6 mm. Fl. and fr. Jun–Aug.

Crevices, grassy areas, slopes, river banks; 1700–4000 m. Gansu, Hebei, Heilongjiang, Jilin, Nei Mongol, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang [Mongolia, Russia].

The above first record from Jilin is based on Anonymous 986 (PE), collected from Antu Xian. Draba mongolica was recorded from Xizang in FRPS and by Pohle (Repert. Spec. Nov. Regni Veg. Beih. 32: 78. 1925), but the present authors have not examined material from that autonomous region.


阿尔泰葶苈  a er tai ting li

Draba rupestris R. Brown var. altaica C. A. Meyer in Ledebour, Fl. Altaic. 3: 71. 1831; D. altaica var. foliosa O. E. Schulz; D. altaica var. glabrescens Lipsky; D. altaica var. microcarpa O. E. Schulz; D. altaica var. modesta (W. W. Smith) O. E. Schulz; D. altaica var. racemosa O. E. Schulz; D. modesta W. W. Smith; D. rupestris var. pusilla Karelín & Kirilov.

Herbs perennial, 1–2–8–10 cm tall, cespitose. Caudex many branched, ultimate branches terminated in rosettes and covered with petiolars of previous years. Stems erect, simple, sparsely to densely tomentose with stellate trichomes. Basal leaves rosulate, persistent; petiole to 4 mm, persistent, ciliate with simple trichomes or not ciliate; leaf blade spatulate, oblanceolate, or rarely oblong. (2–4–8) × (0.5–3) mm, abaxially tomentose with stellate trichomes the rays of which with 1 or 2 lateral branches, adaxially subglabrous or with simple or stellate trichomes, base attenuate, margin entire or minutely 1–4-toothed, apex obtuse to acute. Cauline leaves (1)2–8(–11), sessile; leaf blade ovate, oblanceolate, or elliptic, similar in indumentum to basal leaves. Racemes (3–)5–10(–13)-flowered, lowermost flower(s) bracteate, very rarely bracteate throughout, slightly elongated in fruit. Fruiting pedicels (1)2–8(–15) mm, divaricate, straight, sparsely to densely tomentose all around with stellate and forked trichomes. Sepals oblong, 1.8 × 0.6–0.8 mm, erect, abaxially sparsely pubescent, base of lateral pair not saccate, margin not membranous. Petals white, spatulate, (1.2–)1.5–2.5 × (0.5–)0.7–1 mm, apex emarginate; claw 0.7 mm. Filaments 0.6–1.5 mm; anthers ovate, 0.1–0.2 mm. Ovules 10–20 per ovary. Fruit ovate or oblong, (3–)4–7(–8) × 1.5–2 mm, latisepalous, not twisted; valves glabrous, not veined, base obtuse, acetous; style 0.1–0.2 mm. Seeds brown or ovate, 0.7–0.9 × 0.5–0.6 mm. Fl. Jun–Aug., fr. Jul–Sep.

Rocky slopes, gravelly areas, moraine, stream-sides, Kobresia mats, Juniperus forests, grassy slopes; 2000–5600 m. Gansu, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan [Afghanistan, India, Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia, Sikhim, Tajikistan].

A widespread and highly variable species divided by Schulz into seven infraspecific taxa that were based primarily on minor, continuous differences in plant height, number and size of cauline leaves, density of indumentum, and fruit size. However, a critical examination of the types of these taxa reveals that none of them merits recognition.


丽江葶苈  li jiang ting li

Draba daochengensis W. T. Wang; D. hicksii Grierson; D. lichiangensis var. microcarpa O. E. Schulz; D. lichiangensis var. trichocarpa O. E. Schulz.

Herbs perennial, 1–2–5(–8) cm tall, often densely cespitose, scapose. Caudex many branched, ultimate branches terminated in rosettes and covered with petiolars of previous years. Stems erect, simple, sparsely to densely tomentose with stellate trichomes. Basal leaves rosulate, persistent; petiole to 4 mm, persistent, ciliate with simple trichomes or not ciliate; leaf blade spatulate, oblanceolate, or rarely oblong. (2–4–8) × (0.5–3) mm, abaxially tomentose with stellate trichomes the rays of which with 1 or 2 lateral branches, adaxially subglabrous or with simple or stellate trichomes, base attenuate, margin entire or minutely 1–4-toothed, apex obtuse to acute. Cauline leaves (1)2–8(–11), sessile; leaf blade ovate, oblanceolate, or elliptic, similar in indumentum to basal leaves. Racemes (3–)5–10(–13)-flowered, lowermost flower(s) bracteate, very rarely bracteate throughout, slightly elongated in fruit. Fruiting pedicels (1)2–8(–15) mm, divaricate, straight, sparsely to densely tomentose all around with stellate and forked trichomes. Sepals oblong, 1.8 × 0.6–0.8 mm, erect, abaxially sparsely pubescent, base of lateral pair not saccate, margin not membranous. Petals white, spatulate, (1.2–)1.5–2.5 × (0.5–)0.7–1 mm, apex emarginate; claw 0.7 mm. Filaments 0.6–1.5 mm; anthers ovate, 0.1–0.2 mm. Ovules 10–20 per ovary. Fruit ovate or oblong, (3–)4–7(–8) × 1.5–2 mm, latisepalous, not twisted; valves glabrous, not veined, base obtuse, acetous; style 0.1–0.2 mm. Seeds brown or ovate, 0.7–0.9 × 0.5–0.6 mm. Fl. Jun–Aug., fr. Jul–Sep.

Mountain slopes, gravelly areas, crevices of limestone cliffs, scree, grassy hillsides, stony moist meadows; 3500–5000 m. Qinghai, Sichuan, Xizang, NW Yunnan [Bhutan, Nepal].

The above first record from Nepal is based on Einarsson, Skåffby & Wetterhall 2727 (UPS). The above record from Bhutan is based on the holotype and paratype of D. hicksi, Ludlow, Sherriff & Hicks 21111 (BM) and Ludlow, Sherriff & Hicks 20348 (BM), respectively.

A comparison of the type collections of Draba lichiangensis, Forrest 5698 (holotype, E; isotype, BM), and D. dasycarpa var. dasycarpa 5091 (holotype, PE; isotypes, KUN, PE), shows that the latter species is indistinguishable from plants of the former that grow in shaded rock crevices.


Herbs perennial, 3–6 cm tall, densely cespitose. Cauldrons several branched, ultimate branches terminated in sterile shoots or rosettes, covered with leaf remains of previous years. Stems erect, simple, moderately pilose or puberulent with crisped, primarily simple trichomes. Basal leaves rosulate, persistent; petiole to 5 mm, ciliate with simple trichomes; leaf blade lanceolate to oblanceolate, 4–10 × 1–2 mm, sparsely to moderately pilose with simple and much fewer, short-stalked forked trichomes, base attenuate, margin entire, apex oblongate to obtuse. Cauline leaves 1–3, sessile; leaf blade oblong to narrowly ovate, similar in idumentum to basal leaves. Racemes 4–8-flowered, ebracteate or rarely lowermost flower bracteate, elongated in fruit. Fruiting pedicels 4–12 mm, ascending to suberect, straight or slightly curved, slender, pilose or puberulent all around with simple trichomes. Sepals oblong, 1.5–2 × 0.6–0.8 mm, erect, abaxially sparsely pilose with simple trichomes sometimes mixed with much fewer ones, base of lateral pair not saccate, margin not membranous. Petals white, narrowly obovate, 2.5–3 × 0.9–1.1 mm, apex rounded. Filaments 1–1.7 mm; anthers ovate, 0.3–0.4 mm. Ovules 14–20 per ovary. Fruit oblong to elliptic, 5–10 × 1.5–2.5 mm, not inflated, latiseptate, slightly twisted; valves glabrous, obscurely veined, base obtuse, apex acute; style 0.1–0.4 mm. Seeds brown, oblong, ca. 1.1 × 0.6 mm. Fl. Jul–Aug. Aug–Sep.

- Mountain summits; 3000–3900 m. Taiwan.


Herbs perennial, (1–)2–8–(10) cm tall, densely cespitose, often scapose. Cauldrons slender, often many branched, ultimate branches terminated in rosettes, covered with leaf remains of previous years. Stems erect, simple, tomentose with subsessile stellate trichomes. Basal leaves rosulate; petiole absent, rarely to 4 mm, rarely ciliate; leaf blade obovate, oblong, or lanceolate, 2–8 × (0.7–)1–2 mm, densely tomentose with sessile or sub sessile, very fine, 4-rayed stellate trichomes the rays of which with 1 or 2 lateral branches on each side, base attenuate to cuneate, margin entire, not ciliate, apex obtuse. Cauline leaves (0 or)1–3–(5), sessile; leaf blade ovate, oblone, or elliptic, 2–5 × 0.5–2 mm, pubescent as basal leaves, base cuneate to obtuse, margin entire or rarely with 1 or 2 minute teeth on each side, not ciliate, apex subobtuse. Racemes 3–10–flowered, ebracteate or rarely lowermost flower bracteate, basally slightly elongated, remainder often subumbellate in fruit; racis straight. Fruiting pedicels 1–3–(4) mm, ascending, straight, tomentose all around with sub sessile, stellate trichomes. Sepals oblong, 1–2 × 0.6–0.8 mm, erect, abaxially sparsely tomentose, base of lateral pair not saccate, margin narrowly membranous. Petals white, spatulate, 1.8–2.5(–3) × 0.8–1.2 mm, apex subemarginate. Filaments 1–1.5 mm; anthers ovate, ca. 0.2 mm. Ovules (6–)8–12 per ovary. Fruit ovate, rarely oblong-ovate, (2.5–)3–4(–5) × 1.5–2.5 mm, not inflated, latiseptate, not twisted; valves glabrous or rarely puberulent, obscurely veined, base obtuse, apex acute; style obsolete or 0.1–0.2(–0.4) mm. Seeds brown, ovate, 0.7–1 × 0.5–0.7 mm. Fl. Jun–Aug. fr. Jul–Oct.

Grassy areas, sandy river banks, gravelly slopes; 2900–5500 m. Gansu, Sichuan, Qinghai, Xizang [India, Kashmir, Nepal, Pakistan].


Herbs perennial, (1–)2–7–(12) cm tall, densely or laxly cespitose, scapose. Cauldrons slender, often many branched, ultimate branches terminated in rosettes, covered with stramineous petiolar remains of previous years. Stems erect, simple, tomentose with sub sessile stellate trichomes. Basal leaves rosulate; petiole absent, rarely to 6 mm, rarely ciliate; leaf blade obovate, oblone, spatulate, or lanceolate, 2–10 × 0.5–2 mm, densely tomentose with sessile or sub sessile, very fine, 4-rayed stellate trichomes the rays of which with 1 or 2 lateral branches on each side, base attenuate to cuneate, margin entire, not ciliate, apex obtuse. Cauline leaves absent. Racemes 5–12-flowered, ebracteate, lax and elongated in fruit; racis often flexuous, slender. Fruiting pedicels (3–)5–12–(15) mm, divaricate or rarely ascending, straight, tomentose all around with sub sessile, stellate trichomes. Sepals oblong, 2–3 × 1–1.5 mm, erect, abaxially sparsely tomentose, base of
lateral pair not saccate, margin narrowly membranous. Petals white, spatulate, 4–5 × 1.5–2.5 mm, apex subemarginate or rounded. Filaments 2–3 mm; anthers ovate, 0.4–0.5 mm. Ovules (10–)12–20 per ovary. Fruit narrowly elliptic, lanceolate, or oblong, (3–)5–9 × 1.5–2.3(–2.8) mm, not inflated, latiseptate, often twisted; valves glabrous or rarely puberulent, obscurely veined, base obtuse, apex acute; style (0.5–)0.7–1.3(–1.5) mm. Seeds brown, ovate, 0.9–1 × 0.7–0.8 mm. Fl. Jun–Aug, fr. Jul–Sep.

Grassy slopes, gravelly areas, glacial terraces; 4000–5900 m. Qinghai, Xizang [Kashmir, Pakistan].

_Ptilotrichum wagneri_ was recognized as a distinct species in FRPS (p. 127), Fl. Xinjiang, (2(2): 105–107. 1995), and Fl. Xizang. (2: 344. 1985). However, an examination of its holotype, _Wager 13_ (K), clearly reveals that it is a synonym of _Draba winterbottomii_. No perennial species of _Alyssum_ (including _Ptilotrichum_ has leafless scapes and more than four ovules per ovary. In his protologue of _P. wagneri_ (Notes Roy. Bot. Gard. Edinburgh 22: 208. 1957), Jafri erroneously stated that the ovary is 4-ovuled, though his hand-written comment on the holotype sheet correctly indicated that the ovary is 10-ovuled. The illustrations in Fl. Xinjiang. of two species of _Ptilotrichum_ represent two forms of _Alyssum canescens_.

The record in FRPS (p. 141) of _Draba incompta_ Steven from Xizang is based on misidentified plants of _D. winterbottomii_. True _D. incompta_ is endemic to the Caucasus.


_Mazzetti 9502_ (holotype, WU; isotype, W), the present authors have seen no other material of _D. handelii_. The records and illustrations in FRPS (p. 162, 164) and Fl. Xizang. (2: 352, 354. 1985) of _Draba handelii_ from Xizang are based on misidentified plants of _D. glomerata_.


_Herbs perennial, (4–)7–20(–26) cm tall, densely cespitose, scapose. Caudex several branched, ultimate branches terminated in rosettes and covered with leaves or petiolar remains of previous years. Stems erect, simple, densely tomentose proximally, sparsely so distally. Basal leaves rosulate, persistent; petiole 2–10 mm, persistent; leaf blade spatulate, oblanceolate, oblong, or rarely obovate, (0.3–)0.5–1.5(–2) cm × (1–)2–4(–6) mm, densely subfloccose with fine, stalked, stellate trichomes with simple or branched slender rays, sometimes fewer, slender, simple trichomes also present, base attenuate to cuneate, margin entire, apex obtuse to subacute. Cauline leaves absent or 1–4, sessile; leaf blade ovate to oblong, 4–15 × 2–4 mm, indumentum as basal leaves, margin entire, apex obtuse. Racemes (2–)5–16 (–20)–flowered, ebracteate, often elongated considerably in fruit; rachis straight. Fruiting pedicels (0.2–)0.7–1.7(–2) cm, erect and subpressed to rachis, or ascending, straight, tomentose all around. Sepals oblong, 2.5–3 × 1–1.5 mm, erect, abaxially sparsely pubescent, base of lateral pair not saccate, margin narrowly membranous. Petals white, broadly obovate, 5–7 × 2.5–4.5 mm, apex rounded; claw ca. 1 mm. Filaments 2.5–3; anthers ovate, 0.5–0.6 mm. Ovules 8–14 per ovary. Fruit oblong to elliptic, 6–12 × 2.5–3 mm, not inflated, latiseptate, twisted to 2 turns, very rarely not twisted; valves tomentose, not veined, base and apex obtuse; style (0.6–)1–1.5 mm. Seeds brown, ovate, 1–1.5 × 0.7–1 mm. Fl. Jun–Jul, fr. Aug–Sep._

Shady grassy slopes, stony slopes; 4800–5500 m. Xizang [Bhutan, Nepal, Sikkim].

The above first record from Nepal is based on _Miyamoto et al._ 9592300 (MO, TI).


_Herbs perennial, 3–15 cm tall, loosely cespitose, scapose. Caudex several branched, ultimate branches terminated in rosettes and covered with leaves or petiolar remains of previous years. Stems erect, simple, densely tomentose proximally, sparsely so distally. Basal leaves rosulate, persistent; petiole 5–20 mm, persistent; leaf blade spatulate, oblanceolate, oblong, or rarely obovate, 1–2 × 0.5–1 cm, densely subfloccose with fine, stalked, stellate trichomes with simple or branched slender rays, sometimes fewer, slender, simple trichomes also present, base attenuate to cuneate, margin entire, apex obtuse to subacute. Cauline leaves absent or 1–4, sessile; leaf blade ovate to oblong, 4–15 × 2–4 mm, indumentum as basal leaves, margin entire, apex obtuse. Racemes (2–)5–15 (–20)–flowered, ebracteate, often elongated considerably in fruit; rachis straight. Fruiting pedicels (0.2–)0.7–1.7(–2) cm, erect and subpressed to rachis, or ascending, straight, tomentose all around. Sepals oblong, 2.5–3 × 1–1.5 mm, erect, abaxially sparsely pubescent, base of lateral pair not saccate, margin narrowly membranous. Petals white, broadly obovate, 5–7 × 2.5–4.5 mm, apex rounded; claw ca. 1 mm. Filaments 2.5–3; anthers ovate, 0.5–0.6 mm. Ovules 8–14 per ovary. Fruit oblong to elliptic, 6–12 × 2.5–3 mm, not inflated, latiseptate, twisted to 2 turns, very rarely not twisted; valves tomentose, not veined, base and apex obtuse; style (0.6–)1–1.5 mm. Seeds brown, ovate, 1–1.5 × 0.7–1 mm. Fl. Jun–Jul, fr. Aug–Sep._

Shady grassy slopes, stony slopes; 4800–5500 m. Xizang [Bhutan, Nepal, Sikkim].
1–3-toothed on each side, ciliate with simple trichomes, apex obtuse to acute. Cauline leaves absent or 1 or 2(or 3), sessile; leaf blade ovate to oblong, 2–9 × 1–3 mm, pubescent as basal leaves, base obtuse, margin entire or 1–3-toothed, apex acute. Racemes 5–17-flowered, ebracteate, elongated in fruit. Fruiting pedicels 4–13 mm, divaricate, straight, slender, glabrous. Sepals ovate-oblong, 1.8–2.5 × 0.9–1.3 mm, erect, abaxially sparsely pubescent, base of lateral pair not saccate, margin not membranous. Petals white, narrowly obovate, (3.5–)4–6 × 2–3 mm, apex subemarginate. Filaments 1.5–2.5 mm; anthers ovate, 0.2–0.3 mm. Ovules 12–16 per ovary. Fruit lanceolate or ovate-lanceolate, (4–)6–10 × 3.5 × 1–1.5 mm, apex subemarginate. Filaments 1–1.5 mm; anthers ovate, 0.2–0.3 mm. Ovules 12–16 per ovary. Fruit lanceolate or ovate-lanceolate, (4–)6–10 × 1.5–2 (–2.5) mm, not inflated, latiseptate, not twisted; valves glabrous, not veined, base obtuse, apex acute to subacuminate; style 0.1–0.5 mm. Seeds brown, ovate, 0.9–1.4 × 0.6–1 mm. Fl. and fr. May–Aug.

Mountain slopes, alpine zone. Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia (S Siberia)].

Draba turczaninowii was first recorded for China in Fl. Xinjiang. (2:2). 119. 1995. Although the present authors have not examined the material on which that record is based, the occurrence of the species in Xinjiang is here confirmed based on Yunatov & Chen 885, 961 (LE).


云南葶苈  yun nan ting li

Draba yunnanensis var. gracilipes Franchet; D. yunnanensis var. latifolia O. E. Schulz; D. yunnanensis var. microcarpa O. E. Schulz.

Herbs perennial, (5–)10–35(–60) cm tall, cespitose, canescent at least basally. Cauline simple or few to many branched, ultimate branches terminated in rosettes. Stems erect, simple, densely pubescent with a mixture of simple and sessile stellate trichomes, apiately tomentose with appressed stellate ones. Basal leaves rosalate, persistent, sessile, oblong, oblong-linear, to narrowly oblongate, (0.5–)1–3.5(–5) cm × (1.5–)2–6(–8) mm, abaxially densely pubescent with subsessile, 5–8-rayed stellate trichomes, adaxially with a mixture of primarily simple trichomes and fewer stellate ones, rarely exclusively simple or stellate, base cuneate, margin entire, apex obtuse. Cauline leaves (4–)6–12(–18), sessile; leaf blade narrowly oblong, rarely lanceolate, (0.5–)1–3.8(–5) cm × 1.5–5(–8) mm, pubescent as basal leaves, base obtuse, not auriculate or amplexicaul, margin entire, apex obtuse. Racemes (12–)20–60(–80)-flowered, bracteate basally, elongated considerably in fruit. Fruiting pedicels (0.3–)0.5–1.5(–2) cm, divaricate, straight or slightly curved, glabrous adaxially, pubescent abaxially with stellate trichomes. Sepals oblong or ovate, 2–3(–3.5) × 1–1.5(–2) mm, ascending, abaxially sparsely pilose with primarily simple trichomes, base of lateral pair subsaccate, margin membranous. Petals yellow, obovate, 5–7(–8) × 2–3(–4) mm, apex emarginate; claw 1–2 mm. Filaments 2–3.5 mm; anthers oblong, 0.5–0.9 mm. Ovules (4–)6–10(–12) per ovary. Fruit ovate, sometimes elliptic or suborbicular, 3–7(–10) × 2–3(–4) mm, latiseptate, sometimes slightly twisted; valves glabrous, obscurely to distinctly veined; style 0.4–1.2(–2) mm. Seeds brown, ovate, 1.4–1.9 × 0.9–1.4 mm. Fl. May–Jul, fr. Jun–Sep.

Rock crevices, limestone scree, open Pinus-Quercus forests, grassy scrub, limestone cliffs; 2300–5500 m. Sichuan, Xizang, Yunnan.


山菜葶苈  shan cai ting li
**Draba amplexicaulis** Franchet var. **bracteata** O. E. Schulz; *D. balangshanica* W. T. Wang; *D. mairei* H. Léveillé; *D. moupinensis* Franchet.

Herbs perennial, (7–)10–45–(–82) cm tall, not canescent. Caudex branches many, surculose, terminated in rosettes. Stems erect or decumbent, simple, sparsely or rarely densely pubescent with a mixture of simple and sessile stellate trichomes, apically tomentose with appressed stellate ones. Basal leaves rosulate, persistent, sessile, oblanceolate to obovate or oblong, 1–4 cm × 3–7 mm, abaxially sparsely pubescent with stalked, 3- or 4-rayed stellate trichomes, sometimes glabrescent except for margin and midvein, adaxially with a mixture of primarily simple trichomes and fewer stellate ones, rarely exclusively simple, base cuneate, margin dentate or entire, apex obtuse. Cauline leaves (3–)7–17–(–30), sessile; leaf blade oblong, lanceolate, or ovate, 1.5–5–(–8) × 0.5–1.5 cm, pubescent as basal leaves, base obtuse, often auriculate or amplexicaul, margin dentate or entire, apex obtuse or acute. Racemes (12–)20–60–(–120)-flowered, bracteate basally or to near apex, elongated considerably in fruit. Fruiting pedicels (0.5–)1–2.2–(2.7) cm, divate, straight or curved upward, glabrous adaxially, pubescent abaxially with appressed stellate trichomes. Sepals oblong or ovate, 2–3–(3.5) × 1–1.5–(–2) mm, ascending, abaxially sparsely pilose with primarily simple trichomes, base of lateral pair subsaccate, margin membranous. Petals yellow, obovate, 5–7(–8) × 2–3–(–4) mm, apex emarginate; claw 1–2 mm. Filaments 2–3.5 mm; anthers oblong, 0.6–0.9 mm. Ovules 8–12 per ovary. Fruit oblong, elliptic, or elliptic-linear, (0.7–)1–1.5(–2) cm × 3–5 mm, latiseptate, sometimes slightly twisted; valves glabrous, with a distinct midvein extending full length; style 0.5–1.5 mm. Seeds brown, ovate, 1.6–2.5 × 1–1.5 mm. Fl. Jun–Aug, fr. Jul–Sep.

- Grassy slopes, pastures, rock crevices, alpine meadows, thickets, ravines, scree; 2600–4600 m. Sichuan, Xizang, Yunnan.

*Draba surculosa* is highly variable in the density of indumentum and the relative amounts of simple and stellate trichomes. Some forms are subglabrous except on the leaf margins, while others have an abundance of simple trichomes on both leaf surfaces. Among such forms is *Draba surculosa* var. *ramosa* O. E. Schulz.

**Draba amplexicaulis** var. **dolichocarpa** O. E. Schulz; *D. yunnanensis* Franchet var. *ramosa* O. E. Schulz.

Herbs perennial, (8–)20–60–(–80) cm tall, cespitose, not canescent. Caudex simple or few to many branched, ultimate branches terminated in rosettes. Stems erect, often paniculate branched above, densely pubescent with a mixture of simple and sessile stellate trichomes, apically tomentose with appressed stellate ones. Basal leaves rosulate, sessile, narrowly obovate, oblanceolate, or oblong-linear, 0.8–7 × 0.3–2 cm, abaxially densely pubescent with subsessile, 5–8-rayed stellate trichomes, adaxially with a mixture of primarily simple trichomes and fewer stellate ones, base cuneate, margin entire or denticate, apex obtuse. Cauline leaves (6–)10–25–(–30), sessile; leaf blade oblate, narrowly oblong, or lanceolate, (1–)2–6–(–9) × (0.3–)0.5–1.5(–2) cm, pubescent as basal leaves, auriculate or amplexicaul, margin dentate or denticate, apex often acute. Racemes 30–80–(–100)-flowered, bracteate basally to almost throughout, elongated considerably in fruit. Fruiting pedicels (0.5–)0.8–2.5(–3) cm, divate or slightly reflexed, straight or slightly curved, glabrous adaxially, pubescent abaxially with stellate trichomes. Sepals oblong or ovate, 2–3–(3.5) × 1–1.5(–2) mm, ascending, abaxially sparsely pilose with primarily simple trichomes, base of lateral pair subsaccate, margin membranous. Petals yellow, obovate, 5–7(–8) × 2–3–(–4) mm, apex emarginate; claw 1–2 mm. Filaments 2.5–4 mm; anthers oblong, 0.6–1 mm. Ovules 10–14 per ovary. Fruit elliptic, oblong, oblong-linear, or rarely ovate, (0.5–)0.7–1.4–(1.7) cm × (2–)3–4 mm, latiseptate, sometimes twisted; valves glabrous, with a distinct midvein to middle; style 0.5–2 mm. Seeds brown, ovate, 1.5–2.2 × 0.9–1.4 mm, wingless or rarely narrowly winged. Fl. Jun–Aug, fr. Jul–Sep.

- Grassy areas, rocky cliffs, stony slopes, thickets, scree, ledges; 2500–4700 m. Sichuan, Xizang, Yunnan.

*Draba amplexicaulis* was recorded in FRPS (as var. *dolichocarpa*) from Gansu, but the present authors have seen no material from that province.


多叶葶苈 duo ye ting li

Herbs perennial, (20–)30–65–(–90) cm tall. Caudex simple or branched. Stems erect, simple, sparsely or rarely densely pubescent with a mixture of simple and sessile stellate trichomes, apically tomentose with appressed stellate ones. Basal leaves rosulate, persistent, sessile or rarely on pediole to 4 cm; leaf blade oblanceolate to spatulate, 1.5–5 cm × 5–11 mm, abaxially sparsely pubescent with stalked, 3- or 4-rayed stellate trichomes, sometimes glabrescent except for margin and midvein, adaxially with a mixture of primarily simple trichomes and fewer stellate ones, rarely exclusively simple, base cuneate, margin dentate or entire, apex obtuse. Cauline leaves 5–20 (–40), sessile; leaf blade oblong, lanceolate, or ovate, 1.2–3.5 (–5) cm × 4–11 mm, pubescent as basal leaves, base often auriculate or amplexicaul, margin dentate or subentire, apex obtuse or acute. Racemes 20–60–(–140)-flowered, bracteate basally to throughout, elongated considerably in fruit. Fruiting pedicels (0.3–)0.7–2 (–2.5) cm, divate, straight, glabrous adaxially, pubescent abaxially with appressed stellate trichomes. Sepals oblong or ovate, 2–3–(3.5) × 1–2 mm, ascending, abaxially sparsely pilose with primarily simple

Draba elata from these provinces.

The records in FRPS (p. 146), Fl. Sichuan. (13: 64. 1999), and Fl. Yunnan [Bhutan, Nepal, Sikkim].


灰岩葶苈 hui yan ting li


Herbs perennial, 7–45 cm tall, cespitose, canescent at least basally. Caudex branched. Stems erect, much branched above, densely pubescent with a mixture of simple and sessile stellate trichomes, apically tomentose with appressed stellate ones rarely with fewer simple trichomes. Basal leaves rosulate, sessile, obl Alpine-linear to narrowly oblanceolate, 3–6 cm × 2–4 mm, abaxially densely pubescent with subsessile, 5–8-rayed stellate trichomes, adaxially with a mixture of primarily simple trichomes and fewer stellate ones, rarely exclusively simple, base attenuate, margin entire, apex obtuse. Cauline leaves 3–20, sessile; leaf blade ovate, oblong, or lanceolate, 1–5 cm × 3–7 mm, pubescent as basal leaves, base auriculate or amplexicaul, margin entire, apex obtuse. Racemes (20–)30–90-flowered, ebracteate, elongated considerably in fruit. Fruiting pedicels 3–15 mm, divaricate, straight or slightly curved, glabrous adaxially, pubescent abaxially with stellate trichomes. Sepals oblong or ovate, (2–)2.5–3.5 × 1–1.5 mm, ascending, abaxially sparsely pilose with primarily simple trichomes, base of lateral pair subsaccate, margin membranous. Petals yellow, obovate, (4.5–)5–7 × 2.5–4 mm, apex emarginate; claw 1–2 mm. Filaments 1.5–4 mm; anthers ovate, 0.4–0.6 mm. Ovules 6–12 per ovary. Fruit oblong to linear-elliptic, 4–10 × 2–4 mm, latiseptate, not twisted; valves densely pilose with simple, forked, or stellate trichomes, sometimes sparsely pilose only near fruit base; style 0.5–1.5 mm. Seeds brown, ovate, 1.2–1.5 × 0.8–1 mm. Fl. and fr. Jun–Aug.


中甸葶苈 zhong dian ting li

Herbs perennial, 4–12 cm tall, creeping, with few, slender stolons terminated in rosettes. Stems erect, simple, moderately pubescent with appressed, sub sessile, forked and trifid trichomes, simple trichomes absent. Basal leaves rosulate, persistent, sessile, oblanceolate to narrowly obovate, 5–10 × 1–2.5 mm, abaxially densely hirsute with coarse, stalked, forked trichomes, adaxially with a mixture of simple and forked trichomes, base attenuate, margin entire, apex obtuse. Cauline leaves 7–15, sessile, oblong to narrowly obovate, 6–12 × 2–4 mm, glabrous or sparsely pilose, sometimes margin ciliate with simple and forked trichomes, base cuneate, not auriculate, margin entire, apex obtuse. Racemes corymbose, 8–10(–12)-flowered, ebracteate, elongated considerably in fruit. Fruiting pedicels 4–8 mm, divaricate, glabrous. Sepals ovate, 1.8–2.5 × 1–1.5 mm, ascending, narrowly obovate, (0.7–)1–2.5 × 0.8–1.5 mm. Petals yellow, obovate, (5.5–)6–7 × 2.5–3 mm, apex emarginate; claw to 1 mm. Filaments 1.5–3 mm; anthers ovate, 0.4–0.6 mm. Ovules 12–20 per ovary. Fruit ovate, (3.5–)4–5 × 2–3 mm, latiseptate, not twisted; valves densely pilose with simple, forked, or stellate trichomes, sometimes sparsely pilose only near fruit base; style 0.5–1 mm. Seeds brown, ovate, 1.2–1.5 × 0.8–1 mm. Fl. and fr. Jun–Aug.

Mountain slopes, roadsides, wet grassy areas; 3400–4900 m. Xizang [Sikkim].

The records in FRPS (p. 146), Fl. Sichuan. (14: 64. 1999), and Fl. Yunnan. (6: 44. 1995) of Draba elata from Sichuan and Yunnan are most likely based on misidentified plants of D. surculosa and D. amplexicaulis. The present authors have seen no specimens of D. elata from these provinces.


Herbs perennial, 5–24 cm tall, cespitose. Caulbreaks to many branched, with petiolar remains of previous years, ultimate branches terminated in rosettes. Stems erect to decumbent, simple, sparsely to densely pubescent with a mixture of simple, forked, and stellate trichomes, apically tomentose with appressed stellate ones. Basal leaves rosluate, persistent; petiole to 1 cm, base often persistent; leaf blade obovate, spatulate, to narrowly oblanceolate, 0.4–2 cm × (2–)3–7 mm, abaxially pubescent with subsessile, 4(or 5)-rayed, soft, fine stellate trichomes, axadially with a mixture of primarily simple trichomes with fewer stellate and forked ones, sometimes trichomes restricted to leaf margins and midvein, base cuneate, margin entire or denticulate, apex obtuse or rounded. Cauline leaves 3–7, sessile; leaf blade narrowly oblong, oblongate, or ovate, 0.5–2 cm × (1.5–)2.5–5(–7) mm, pubescent as basal leaves, base obtuse, not auriculate, margin entire or denticulate, apex obtuse. Racemes 12–35-flowered, bracteate basally, elongated considerably in fruit. Fruiting pedicels 0.5–2.5(–3.2) cm, divaricate to ascending, straight or slightly curved, glabrous adaxially, pubescent abaxially with soft, simple and short-stalked forked trichomes. Sepals oblong, 2–3 × 1–1.7 mm, ascending, abaxially pilose with simple trichomes, base of lateral pair not saccate, margin membranous. Petals yellow, obovate, 5.5–7 × 3–4 mm, apex emarginate; claw ca. 1 mm. Filaments 2–3.5 mm; anthers oblong, 0.6–1 mm. Ovules 4–8 per ovary. Fruit ovate to suborblicular, 3–8 × 3–4 mm, latiseptate, sometimes slightly twisted; valves puberulent with simple trichomes, obscurely to distinctly veined; style 0.4–1 mm. Seeds brown, ovate, 1.3–1.6 × 0.9–1.3 mm. Fl. Jun–Jul, fr. Jul–Sep.

• Rocky mountain slopes; 3600–5100 m. Sichuan, Xizang.

The above first record from Xizang is based on Ludlow, Sherriff & Elliot 15386 (BM, E, TI). The only other collections examined by the present authors are the type collection, Harry Smith 4415 (holotype, UPS; isotypes, B, W), and Li Xin 77774 (IBSC, MO).


Herbs perennial, 10–35 cm tall, without stellate trichomes. Caulbreaks few branched, ultimate branches terminated in rosettes. Stems erect, simple, densely pubescent with a mixture of simple and short-stalked trichomes crisped and soft on distal parts of plant. Basal leaves rosulate, persistent; petiole 0.5–5 cm; leaf blade oblong, elliptic to obo lanceolate, 0.7–4 cm × 5–12 mm, moderately pilose on both surfaces with simple and short-stalked forked trichomes, base cuneate to attenuate, margin entire or denticulate, apex acute. Cauline leaves 4–14, sessile; leaf blade narrowly oblong, elliptic, or lanceolate, 1–3 cm × 4–7 mm, pubescent as basal leaves, base cuneate, not auriculate, margin dentate or denticulate, apex acute. Racemes 15–32-flowered, bracteate basally, elongated considerably in fruit. Fruiting pedicels 0.5–2.5(–3.2) cm, divaricate to ascending, straight or slightly curved, glabrous adaxially, pubescent abaxially with soft, simple and forked trichomes. Sepals oblong, 2–3 × 1–1.7 mm, ascending, abaxially pilose with simple trichomes, base of lateral pair not saccate, margin membranous. Petals yellow, obovate, 5.5–7 × 3–4 mm, apex emarginate; claw ca. 1 mm. Filaments 2–3.5 mm; anthers oblong, 0.6–1 mm. Ovules 4–8 per ovary. Fruit ovate to suborblicular, 3–8 × 3–4 mm, latiseptate, sometimes slightly twisted; valves puberulent with simple trichomes, obscurely to distinctly veined; style 0.4–1 mm. Seeds brown, ovate, 1.3–1.6 × 0.9–1.3 mm. Fl. Jun–Jul, fr. Jul–Sep.

• Mountain slopes; 3400–4500 m. Yunnan.

Draba serpens, which is known only from the type collection, Handel-Mazzetti 6961 (holotype, B; isotypes, E, W, WU), resembles Coelonema draboides (including Draba stepposa; see above) in many respects, but differs in having slender instead of dilated filament bases. Without mature fruits, however, its generic placement remains doubtful.


Herbs perennial, 5–15 cm tall. Caulbreaks several branched, ultimate branches subfiliform, terminated in rosettes. Stems decumbent, simple, basally sparsely pubescent with stalked, forked trichomes, distally with crisped, appressed, sessile or short-stalked, forked or 3-branched trichomes. Basal leaves rosulate, persistent; petiolelike base 2–15 mm; leaf blade broadly obovate, 0.5–1.7 cm × 3–8 mm, abaxially sparsely pilose with a mixture of long-stalked, forked and minutely 3- or 4-rayed stellate trichomes, adaxially with predominantly long-stalked forked trichomes, base cuneate to attenuate, margin 1- or 2-toothed on each side, sometimes subtrilobed and with the terminal lobe largest, apex subacutet. Cauline leaves 5–10, similar to basal leaves in shape and indumentum, uppermost bracts entire, oblone. Racemes 2–6-flowered, bracteate throughout, elongated considerably in fruit. Fruiting pedicels 0.5–1.5 cm, strongly recurved or uppermost ascending, sparsely pubescent all around with appressed, subsessile, forked
and 3-branched trichomes. Sepals oblong or ovate, 3–3.5 × ca. 1.5 mm, spreading, abaxially pilose with simple trichomes, not saccate, margin membranous. Petals yellow, broadly obovate, 6–8 × 3–4 mm, spreading, apex emarginate; claw 2–3 mm. Filaments 3.5–5 mm, spreading; anthers oblong, 0.7–1 mm. Ovules 18–22 per ovary. Fruit suborbicular, ovate to oblong, 0.7–1.3 cm × 3–6 mm, pendulous, latisepitate, not twisted; valves puberulent with simple trichomes and fewer, forked trichomes, obscurely veined; style 2–3.5 mm. Seeds brown, ovate, 1.2–1.5 × 0.9–1.1 mm. Fl. and fr. Aug.

- Rocky crevices; ca. 4600 m. Sichuan.


Herbs perennial, 3–8 cm tall, densely cespitose, scapose. Cauldex many branched, ultimate branches terminated in rosettes and covered with remains of previous years. Stems erect, simple, often densely pubescent with a mixture of simple and subsessile forked trichomes. Basal leaves rosulate, persistent, sessile; leaf blade obovate-oblancoenate to oblong, 3–12 × 1.5–5 mm, thickish, sparsely pubescent with simple and rigid, stalked, forked trichomes, subglabrous axially except for margins, base cuneate, margin entire or rarely 1–3-toothed, often ciliate with simple trichomes, apex obtuse to acute. Cauline leaves (bracts) 2–8, sessile, proximal ones elliptic to oblong, 3–11 × 1–4 mm, base subobtuse, margin entire, apex obtuse to subacute. Racemes 2–10-flowered, bracteate basally, soon elongated. Flowering pedicels 0.2–1.8 cm, divaricate or divaricate-ascending, straight, tomentose or pilose abaxially, glabrous adaxially. Sepals oblong to ovate, 2.5–3.5 × 1.5–2 mm, erect, abaxially sparsely pilose, base of lateral pair subsaccate, margin narrowly membranous. Petals yellow, broadly obovate, 6–8 × 3.5–5.5 mm, apex subemarginate or rounded; claw to 1 mm. Filaments 3–4 mm; anthers oblong, 0.7–1 mm. Young fruits oblong, latisepitate; valves subhisurate with simple or forked trichomes, base and apex obtuse; style 1.5–3 mm. Seeds of previous season brown, ovate, ca. 1.3 × 1 mm. Fl. Jun–Jul.

Alpine pastures, open hillsides; 3900–4400 m. Xizang [Bhutan].

The above first record from China is based on Gould 2025 (K).


**Draba bhutanica** var. *chitralensis* (J. D. Hooker & Thomson) Pohle

**Draba bhutanica** var. *leiocarpa* (Lipsky) Pohle

**Draba bhutanica** var. *tibetica* (O. E. Schulz) Jafri

**Draba bhutanica** var. *turkestanica* (Regel & Schmalhausen) O. E. Schulz

**Draba bhutanica** subvar. *leiocarpa* O. E. Schulz; *d. tranzschelii* Litvinov; *d. turkestanica* Regel & Schmalhausen; *d. tranzschelii* subvar. *leiocarpa* Lipsky; *d. tranzschelii* Lipov. & Schmalhausen

**Draba bhutanica** Lipsky.

Herbs perennial, 6–25 cm tall, densely cespitose, scapose. Cauldex few to many branched, ultimate branches terminated in rosettes and covered with leaves of previous years. Stems erect, simple, densely tomentose with stellate trichomes, or glabrous throughout. Basal leaves rosulate, persistent; petiole to 1 cm; leaf blade oblong-lanceolate to oblong, sometimes oblong-lanceolate, (0.4–0.8–2.5–3 cm × (1–)2–5(–7) mm, densely tomentose with short, 4–6-rayed stellate trichomes 1 or more rays of which forked or with a lateral branch on each side, base attenuate or cuneate, margin entire or rarely 1-toothed on each side, apex obtuse. Cauline leaves absent or 1, very rarely 2, sessile; leaf blade oblong, 0.5–1.5 cm × 1–2 mm, tomentose as
basal leaves, margin entire, apex obtuse. Racemes 5–9(–13)-flowered, ebracteate, elongated considerably in fruit. Fruiting pedicels (0.5–)0.7–1.8(–2.2) cm, ascending to suberect, straight, tomentose all around. Sepals ovate or oblong, 2–3 × 0.7–1.2 mm, erect, abaxially sparingly pubescent, base of lateral pair not saccate, margin narrowly membranous. Petals yellow, sometimes drying white, obovate, 3.5–5 × 1.5–2.5 mm, apex subemarginate or rounded. Ovules 10–16 per ovary. Fruit linear-lanceolate to oblong-linear, (0.5–)0.7–1.3 cm × 1.5–2 mm, not inflated, latiseptate, not ovary. Fruit oblong, oblong-linear, or narrowly lanceolate, (0.7–)0.9–1.7 cm × 1.5–2.5(–3) mm, not inflated, latiseptate, twisted or not; valves puberulent with predominantly stellate and fewer forked trichomes, not veined, base obtuse, apex subacute; style 0.7–1.5 mm. Seeds brown, oblong, 1–1.5 × 0.6–0.9 mm. Fl. and fr. Jun–Aug.

Mountain slopes, shrubby areas; 2500–4600 m. Xinjiang, Xizang [Afghanistan, Kashmir, Kazakstan, Kyrgyzstan, Pakistan, Sikkim, Tajikistan].


Draba alajica var. lasiocarpa Pohle; D. alajica var. leiocarpa Pohle; D. winterbottomii (J. D. Hooker & Thomson) Pohle var. stracheyi O. E. Schulz. Herbs perennial, 3–15 cm tall, densely cespitose, scapose. Caulox few to many branched, ultimate branches terminated in rosettes and covered with leaves of previous years. Stems erect, simple, sparingly tomentose proximally, glabrous or glabrescent distally, rarely sparsely with stellate trichomes. Basal leaves rostate, persistent; petiole to 6 cm; leaf blade oblong or oblong-spatulate, rarely linear-oblong, (0.3–)0.6–1.7(–1.9) cm × 1.5–4 mm, densely tomentose with 4–6-rayed stellate trichomes 1 or more rays of which forked or with a lateral branch on each side, base attenuate or cuneate, margin entire, apex obtuse. Cauline leaves absent or rarely 1, sessile; leaf blade oblong, tomentose as basal leaves, margin entire, apex obtuse. Racemes 5–18 (–20)-flowered, ebracteate, elongated in fruit. Fruiting pedicels (0.5–)0.7–1.5 cm, ascending to subdivaricate, straight, glabrous or rarely sparingly tomentose all around. Sepals ovate or oblong, 2–3 × 1.5–1.5 mm, erect, abaxially sparingly tomentose with stellate trichomes, base of lateral pair not saccate, margin narrowly membranous. Petals yellow, obovate, 4.5–6 × 2–3 mm, apex subemarginate or rounded. Filaments 2–3 mm; anthers oblong, 0.5–0.6 mm. Ovules 10–16 per ovary. Fruit linear-lanceolate to oblong-linear, (0.5–)0.7–1.3 cm × 1.5–2 mm, not inflated, latiseptate, not twisted or slightly twisted; valves puberulent with predominately simple and fewer forked trichomes, not veined, base obtuse, apex subacute; style 0.7–1.5 mm. Seeds brown, oblong, ca. 1 × 0.6 mm. Fl. and fr. Jun–Aug.

Grassy and stony slopes in alpine areas; 3400–4700 m. SW Xizang [Tajikistan].

The above first record of Draba alajica from China is based on the type collection of D. winterbottomii var. stracheyi, J. E. Winterbottom s.n. (holotype, K; isotypes, BM, GH, P). The species was previously known to be endemic to SE Tajikistan (Pamir Alay and adjacent parts), and it is likely to be found in neighboring SW Xinjiang and Kashmir.


Draba algida Adams var. brachycarpa Bunge; D. alpicola Klotzsch; D. alpina Linnaeus var. rigidida Franchet; D. kizylarti (Korshinsky) N. Busch; D. oreades var. alpicola (Klotzsch) O. E. Schulz; D. oreades var. chinensis O. E. Schulz; D. oreades var. ciliolata O. E. Schulz; D. oreades var. commutata (Regel) O. E. Schulz; D. oreades var. dasycarpa O. E. Schulz; D. oreades var. depauperata O. E. Schulz; D. oreades var. estylosa O. E. Schulz; D. oreades var. exigua O. E. Schulz; D. oreades var. glorabrescens O. E. Schulz; D. oreades var. occulta O. E. Schulz; D. oreades var. pikei O. E. Schulz; D. oreades var. pulvinata O. E. Schulz; D. oreades var. racemosa O. E. Schulz; D. oreades var. tafelii O. E. Schulz; D. pilosa Adams var. commutata Regel; D. pilosa var. oreades (Schrenk) Regel; D. qinghaiensis L. L. Lou; D. rockii O. E. Schulz; D. tianschanica Pohle; Pseudobraya kizylarti Korshinsky. Herbs perennial, (0.5–)1.5–14(–20) cm tall, cespitose, scapose. Caulax simple to many branched, ultimate branches terminated in rosettes and covered with petiolar remains of previous years. Stems erect, simple, often densely pubescent with a mixture of simple and subsessile forked trichomes, sometimes subhirsute with almost exclusively simple trichomes, rarely glabrous. Basal leaves rostate, persistent; petiole absent or short, rarely to 2 cm, persistent, often ciliate with simple and/or long-stalked forked trichomes; leaf blade suborbicular, obovate, spatulate, oblanceolate, or lanceolate, (0.3–)0.5–2(–3) cm × (1–)2–6(–8) mm, sparsely or densely pubescent with simple trichomes, these often mixed abaxially with stalked forked and subsessile, 3- or 4-rayed stellate ones with unbranched rays, adaxially with predominantly simple trichomes, rarely glabrous except for margins, base cuneate to attenuate, margin entire or rarely 1- or 2-toothed on each side, apex obtuse to acute. Cauline leaves absent, sometimes 1, very rarely 2, sessile, similar to basal.

Racemes (2–)4–15(–25)-flowered, ebracteate, subumbellate and not elongated or rarely subracemose and slightly elongated in fruit. Fruiting pedicels 1–7(–10) mm, divaricate or divaricate-ascending, straight or rarely slightly curved, tomentose or pilose abaxially, glabrous adaxially or rarely throughout. Sepals oblong or ovate, 1.5–2.5(–3) × 0.8–1.5(–1.8) mm, erect, caducous or rarely persistent, abaxially sparsely pilose
or glabrous, base of lateral pair not saccate, margin narrowly membranous. Petals yellow, obturate to narrowly spatulate, 2.5–5 (–6) × (0.9–)1.5–2.5 (–3) mm, apex emarginate or rounded; claw absent, rarely 1 (–2) mm. Filaments 1.5–2.5 (–3) mm; anthers ovate, 0.2–0.4 (–0.6) mm. Ovules (4–)6–12 per ovary. Fruit ovate suborbicular, rarely ovate-lanceolate, (3–)4–9 (–12) × 1.5–4.5 (–6) mm, latiseptate and basally inflated, not twisted; valves glabrous or rarely pubescent, with simple or forked trichomes, not veined, base obtuse, apex acute to subacute; style (0.1–)0.3–0.8 (–1) mm. Seeds black to dark brown, ovate, (0.7–)1–1.5 × 0.5–0.9 (–1) mm. Fl. and fr. Jun–Aug. 2n = 40*.

Rock crevices, moraine, scree, alpine meadows and tundra, glacier margins, hillside, swampy meadows, muddy gravel, rocky出crops, cliffs; 2300–5500 m. Gansu, Nei Mongol, Qinghai, Shaanxi, Sichuan, Xinjiang, Xizang, Yunnan. [Bhutan, India, Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Sikkim, Tajikistan].

*Draba oreades* is the most probable variety of all Asian species in the *D.*. A critical examination of the type collections of all except one of the taxa synonymized above (*D. tianschanica*) clearly reveals the following facts: firstly, all of the 14 infraspecific taxa recognized by Schulz are based on qualitative differences of highly variable characters (e.g., density of indumentum, scape length, petal and fruit length, and presence vs. absence of fruit trichomes); secondly, the infraspecific taxa recognized by Schulz occur sporadically throughout most of the range of the species, and none has a distinct geographic distribution; thirdly, Schulz repeatedly recognized two or more varieties from a single collection and often from a single sheet; and fourthly, some of Schulz’s varieties (see below) are based on erroneously interpreted characters. Therefore, none of Schulz’s varieties merits recognition, a conclusion already reached by several authors who wrote accounts of *Draba* for countries bordering China.

In the protologue of *Draba rockii*, Schulz (Notizbl. Bot. Gart. Berlin-Dahlem 10: 555. 1920) compared his new species with *D. involucrata*, and he was correct in pointing out the differences between the two taxa. However, had the type collection of *D. rockii* been compared with material of *D. oreades*, no differences would have been found. Indeed, *D. rockii* is indistinguishable from any collection that Schulz in his monograph cited under *D. oreades var. ciliolata* and *D. oreades var. chinensis*. The records in FRPS, Fl. Qinghai. (1: 439. 1995; Fl. Xizang. 2(2): 114. 1995; Fl. Xizang. 2: 348. 1985; Fl. Yunnan. 6: 39. 1995), but these records are based on misidentified plants of *D. oreades*. True *D. alpina* is distributed in arctic and subarctic Alaska, N Canada, Europe, Mongolia, and Russia (Far East and Siberia), and the present authors have examined no Chinese material of it. *Draba alpina* is easily distinguished from *D. oreades* by having fruits typically oblong and flattened, instead of ovate and basally inflated.


**总苞葶苈 zong bao ting li**


Herbs perennial, 0.5–3 cm tall, densely cespitose, scapose. Cauldix many branched, ultimate branches terminated in rosettes and covered with petiolar remains of previous years. Stems erect, simple, often densely tomentose with a mixture of subessbile, forked and 3- or 4-rayed stellate trichomes, very rarely glabrescent distally. Basal leaves rosulate, persistent; petiole 1–5 (–8) mm, persistent, rarely ciliate with simple trichomes; leaf blade suborbicular or obovate, 2–5 × 1–4 mm, abaxially sparsely to densely tomentose with subessible, forked and 3- or 4-rayed stellate trichomes with unbranched rays, adaxially glabrous or sparsely tomentose, base cuneate, margin entire, apex rounded or obtuse. Cauline leaves absent. Racemes 3–8-flowered, ebracteate, elongated in fruit. Fruiting pedicles 2–7 (–10) mm, divaricate straight, tomentose all around, very rarely glabrescent. Sepals oblong, 1.2–2 × 0.6–1.2 mm, erect, abaxially sparsely pilose or glabrous, base of lateral pair not saccate, margin narrowly membranous. Petals yellow, obovate, 2.5–4 (–4.5) × (1–)1.5–2.5 (–3) mm, apex emarginate; claw absent, rarely to 1 mm. Filaments 1–1.6 mm; anthers ovate, ca. 0.2 mm. Ovules 8–16 per ovary. Fruit suborbicular to elliptic, 2.4–5 (–6) × 2–3 mm, latiseptate, twisted or not; valves glabrous or rarely puberulent, not veined, base and apex obtuse; style 0.1–0.6 (–1) mm. Seeds brown, ovate, 1–1.3 × 0.5–0.9 mm. Fl. Jun–Aug, fr. Aug–Sep.

- Rocky cliffs, crevices, montane ravines, scree, scrub, damp mossy rocks, streamside; 3300–5100 m. Sichuan, E Xizang, Yunnan. The records of *Draba involucrata* from Qinghai (FRPS. p. 140; Fl. Qinghai. 1: 438. 1997) and from Xizang (Fl. Xizang. 2(2): 112. 1995) are most likely based on misidentified plants of the closely related *D. oreades*. The present authors have seen no material of *D. involucrata* from this province and autonomous region.
Herbs perennial, 2–10 cm tall, densely cespitose, scapose. Caudex many branched, ultimate branches terminated in rosettes and covered with remains of previous years. Stems erect, simple, often densely pubescent with a mixture of simple and fewer, subsessile forked trichomes, rarely subglabrous. Basal leaves rosulate, persistent, sessile; leaf blade elliptic to oblong-oblanceolate, 3–10(–12) × 1.5–4 mm, thickish, sparsely pubescent with simple and rigid, stalked, forked trichomes, rarely with primarily, rigid stellate trichomes abaxially, often subglabrous adaxially except for margins, base cuneate, margin entire, often ciliate with simple trichomes, apex obtuse to acute. Cauline leaves absent. Racemes 2–7(–10)-flowered, ebracteate, elongated in fruit. Fruiting pedicels (2–)5–10(–14) mm, divaricate or divaricate-ascending, straight or rarely slightly curved, pubescent all around. Sepals oblong or ovate, 2.5–1 × 1.5 mm, erect, abaxially sparsely pilose or glabrous, base of lateral pair not saccate, margin narrowly membranous. Petals yellow, obovate, 4.5–6 × 2–3(–3.5) mm, rounded; claw to 1 mm. Filaments 2.5–3 mm; anthers oblong, 0.5–0.6 mm. Ovules 6–10 per ovary. Fruit ovate, 3–4 × 3–5 mm, latiseptate, not twisted; valves glabrous, not veined, base obtuse, apex acute; style 0.5–0.8 mm. Seeds dark brown, ovate, 1.5–2 × 1–1.5 mm. Fl. May–Jul, fr. Jul–Sep.

- Rocky crevices, alpine meadows; 4000–4900 m. Qinghai, Sichuan, Xizang, Yunnan.

A detailed study of the type collections of Draba senilis, Rock 3968 (holotype, B; isotypes, E, GH, P, PE, US, W), and D. piepunensis, Handel-Mazzetti 4712 (holotype, B; isotypes, W, WU), leads to the immediate conclusion that they are flowering and fruiting material (respectively) of the same species.

The above first record from Sichuan is based on Rock 16320 (E, F, GH, NY, P, US, W), collected from Gongga Shan. Draba senilis was recorded, as D. piepunensis, from Qinghai (Fl. Qinghai. 1: 438. 1997), and that record is here confirmed based on Wang Weiyi 234a (HNWP).


Draba pyriformis Pohle; D. setosa var. pyriformis (Pohle) O. E. Schulz; D. setosa var. pyriformis subvar. glabrata O. E. Schulz.

Herbs perennial, 5–15 cm tall, densely cespitose, scapose. Caudex often many branched, ultimate branches terminated in rosettes and covered with papery leaf remains of previous years. Stems erect, slender, simple, glabrous throughout or distally, often sparsely pubescent proximally with minute, forked or stellate trichomes. Basal leaves densely rosetulate, persistent, sessile; leaf blade linear or linear-oblong, 2(–)4–15 × (0.5–)0.7–1.8 (–2.5) mm, sparsely to densely pubescent with sub sessile, forked or stellate trichomes, often glabrous adaxially, rarely so on both surfaces, always ciliate with setose or sub setose simple trichomes to 1 mm, base sub obtuse, margin entire, apex obtuse to acute; midvein prominent abaxially almost to apex, narrower than blade on each side. Cauline leaves absent, if 1 then sessile, oblanceolate. Racemes 3–7(–12)-flowered, ebracteate, elongated slightly in fruit. Fruiting pedicels 3–9(–12) mm, divaricate or divaricate-ascending, straight or rarely slightly curved, pubescent all around. Sepals oblong or ovate, 2.5 × 1–1.5 mm, erect, abaxially sparsely pilose or glabrous, base of lateral pair not saccate, margin narrowly membranous. Petals yellow, obovate, 3–4 × 1–1.5 mm, apex emarginate. Filaments 1.5–2 mm; anthers oblong, 0.2–0.3 mm. Ovules 12–16 per ovary. Fruit elliptic-ovate, rarely oblanceolate, 6–10 × (1.5–)2.5–3.5 mm, latiseptate, sometimes slightly twisted; valves glabrous or rarely puberulent, obscurely


Draba composita O. E. Schulz; D. piepunensis (Pohle) O. E. Schulz.

Herbs perennial, 1–5 cm tall, cespitose, succulose, scapose. Caudex with many, slender branches terminated in rosettes and covered with petiolar remains of previous years. Stems erect, simple, often densely subululate with primarily simple and smaller, sub sessile forked trichomes, sometimes with few stellate trichomes. Basal leaves rosetulate, persistent; petiole 1–5(–8) mm, persistent and becoming stramineous, often ciliate with simple, setose or sub sessile trichomes to 1.4 mm; leaf blade oblong, elliptic, or narrowly obovate, 3–10(–15) × (1.5–)2.4–(–)4–7 mm, densely pubescent with whitish, long-stalked, stellate and forked trichomes, adaxially villous with predominantly simple trichomes, rarely softly stellate, base cuneate, margin entire, apex obtuse to subulate. Cauline leaves absent. Racemes 3–7(–12)-flowered, ebracteate, elongated slightly in fruit. Fruiting pedicels 3–9(–12) mm, divaricate or divaricate-ascending, straight or rarely slightly curved, pubescent all around. Sepals oblong or ovate, 2.5 × 1–1.5 mm, erect, abaxially sparsely pilose or glabrous, base of lateral pair not saccate, margin narrowly membranous. Petals yellow, obovate, 4.5–6 × 2–3(–3.5) mm, rounded; claw to 1 mm. Filaments 2.5–3 mm; anthers oblong, 0.5–0.6 mm. Ovules 6–10 per ovary. Fruit ovate, 4–7 × 3–5 mm, latiseptate, not twisted; valves glabrous, not veined, base obtuse, apex acute; style 0.5–0.8 mm. Seeds dark brown, ovate, 1.5–2 × 1–1.5 mm. Fl. May–Jul, fr. Jul–Sep.

- Gravelly or sandy areas, scree; 3400–4600 m. SE Xizang, NW Yunnan.

The above first record from Xizang is based on Rock 23083 (BM, E, GH, K, NY, US) and Forrest 19280 (E, P), both of which were collected from the vicinity of “Tsarung” (28°40’N, 98°15’E). However, the Forrest specimen at E is a mixed collection of Draba jucunda and D. involucrata.
veined, base obtuse, apex acute; style 0.4–0.7 mm. Seeds brown, ovate, 1–1.4 × 0.6–0.7 mm. Fl. Jun–Jul, fr. Jul–Aug.

Mountain slopes, gravelly areas, scree; 3200–4600 m. Xizang [India, Kashmir].

Draba setosa was recorded from Xinjiang (Fl. Xinjiang. 2(2): 114. 1995), but the present authors have seen no material from that autonomous region, and the record is likely based on misidentified plants of D. korshinskyi.


Herbs perennial, 1.5–10 cm tall, densely cespitose, scapose. Caudex many branched, ultimate branches terminated in rosettes and covered with papery leaf remains of previous years. Stems erect, slender, simple, glabrous throughout, sometimes sparsely pubescent with minute, forked or stellate trichomes. Basal leaves densely rosulate, persistent, sessile; leaf blade linear or linear-oblong, 2–7 × 0.5–1(–1.5) mm, abaxially tomentose with short-stalked or subsessile, stellate trichomes mixed with fewer simple ones, adaxially glabrous or sparsely tomentose distally with branched and simple trichomes, sometimes ciliate with soft simple trichomes rarely to 0.5 mm, base subobtuse, margin entire, apex obtuse to acute; midvein obscure or prominent abaxially rarely to apex, much narrower than blade on each side. Cauline leaves absent. Racemes 3–18(–25)-flowered, ebracteate, elongated in fruit. Fruiting pedicels 2–6 mm, ascending, straight or slightly curved, glabrous, slender. Sepals oblong, 1.5–2 × 0.8–1.1 mm, erect, glabrous or abaxially tomentose with simple trichomes, base of lateral pair not saccate, margin narrowly membranous. Petals yellow, narrowly obovate, 0.2–0.4 mm. Ovules 8–12 per ovary. Fruit ovoid to subglobose, 2–4 × 2–3 mm, inflated, not twisted; valves glabrous, obscurely veined, base semicordate, apex acute; style 0.2–0.4 mm. Seeds brown, ovate, 1–1.2 × 0.6–0.7 mm. Fl. Jun–Jul, fr. Jul–Aug.

Gravelly areas; 3700–5300 m. Xizang [Kashmir].

Although Draba cachemirica was first recorded from Xizang by Schulz, that record was overlooked in FRPS and Fl. Xizang. (vol. 2. 1985). The occurrence of the species in Xizang is here confirmed based on Slaglurinov 2464 and 2410 (both mounted on one sheet at GH). Pohle (Repert. Spec. Nov. Regni Veg. Beih. 32: 135. 1925) recognized the latter gathering as the type collection of D. korshinskyi var. setosa, but D. korshinskyi can easily be distinguished from D. cachemirica by having leaves abaxially tomentose (vs. glabrous or rarely sparsely pubescent) with the margin non-seto-se and ciliate.

36. Draba korshinskyi (O. Fedtschenko) Pohle, Trudy Imp. S.-Peterburgsk. Bot. Sada 21: 266. 1903. Herbs perennial, 1–8(–12) cm tall, densely cespitose, scapose. Caudex many branched, ultimate branches terminated in rosettes and covered with papery leaf remains of previous years. Stems erect, slender, simple, glabrous throughout, sometimes sparsely pubescent proximally with minute, forked or stellate trichomes. Basal leaves densely rosulate, persistent, sessile; leaf blade linear to narrowly oblong, 2–8 × 0.5–1(–1.5) mm, abaxially tomentose with short-stalked or subsessile, stellate trichomes mixed with fewer simple ones, adaxially glabrous or sparsely tomentose distally with branched and simple trichomes, sometimes ciliate with soft simple trichomes rarely to 0.5 mm, base subobtuse, margin entire, apex obtuse to acute; midvein obscure or prominent abaxially rarely to apex, much narrower than blade on each side. Cauline leaves absent. Racemes 3–18(–25)-flowered, ebracteate, elongated in fruit. Fruiting pedicels 2–6 mm, ascending, straight or slightly curved, glabrous, slender. Sepals oblong, 1.5–2 × 0.8–1.1 mm, erect, glabrous or abaxially tomentose with simple trichomes, base of lateral pair not saccate, margin narrowly membranous. Petals yellow, narrowly obovate, 2.5–4 × 1–1.5 mm, apex subemarginate. Filaments 1.5–2.5 mm; anthers ovate, 0.2–0.4 mm. Ovules 4–8 per ovary. Fruit ovoid to subglobose, 2–4 × 2–3 mm, inflated, not twisted; valves glabrous, obscurely veined, base semicordate, apex acute; style 0.2–0.4 mm. Seeds brown, ovate, 1–1.2 × 0.6–0.7 mm. Fl. Jun–Jul, fr. Jul–Aug.

Stony grounds; 3900–5100 m. Xinjiang, Xizang [Afghanistan, Kashmir, Pakistan, Tajikistan].

The first record of Draba korshinskyi from Xizang was made by Hedge (Fl. Iran. 57: 181. 1968) and later confirmed by Tolmachev and Junussov (Fl. Tajik. 5: 194. 1978). The above first record from Xinjiang is based on Qinghai-Xizang Team 870482 (HNWP, KUN) and Xizang Team 1368 (WUK).


Herbs perennial, to 10 cm tall, densely cespitose, scapose. Caudex many branched, ultimate branches terminated in columnar rosettes and covered with spiny leaf midveins of previous years. Stems erect, slender, simple, pubescent with subsessile, forked and stellate trichomes. Basal leaves densely rosulate, persistent, sessile; leaf blade linear, 5–10 × 0.5–0.8 mm, abaxially subhirsute with sub sessile, forked and 3–5-rayed stellate trichomes, adaxially densely hispid with simple trichomes, ciliate with setose simple trichomes to 1 mm, base subobtuse, margin entire, apex obtuse to acute; midvein obscure or prominent abaxially rarely to apex, much narrower than blade on each side. Cauline leaves absent. Racemes 18–25-flowered, ebracteate, elongated in fruit. Fruiting pedicels 1.5–3 mm, ascending, straight or slightly curved, glabrous, slender. Sepals obovate, 1.5–2 × 0.8–1.1 mm, erect, glabrous or abaxially tomentose with simple trichomes, base of lateral pair not saccate, margin narrowly membranous. Petals yellow, narrowly obovate, 2.5–4 × 1–1.5 mm, apex subemarginate. Filaments 1.5–2.5 mm; anthers ovate, 0.2–0.4 mm. Ovules 4–8 per ovary. Fruit ovoid to subglobose, 2–4 × 2–3 mm, inflated, not twisted; valves glabrous, obscurely veined, base semicordate, apex acute; style 0.2–0.4 mm. Seeds brown, ovate, 1–1.2 × 0.6–0.7 mm. Fl. Jun–Jul, fr. Jul–Aug.

Herbs perennial, to 10 cm tall, densely cespitose, scapose. Caudex many branched, ultimate branches terminated in columnar rosettes and covered with spiny leaf midveins of previous years. Stems erect, slender, simple, pubescent with subsessile, forked and stellate trichomes. Basal leaves densely rosulate, persistent, sessile; leaf blade linear, 5–10 × 0.5–0.8 mm, abaxially subhirsute with sub sessile, forked and 3–5-rayed stellate trichomes, adaxially densely hispid with simple trichomes, ciliate with setose simple trichomes to 1.5 mm, base attenuate, margin entire, apex acute; midvein very prominent abaxially to apex, usually as broad as or broader than blade on each side, 0.2–0.3 mm wide near base. Cauline leaves 1–3, sessile, obovate-linear, with indumentum similar to that basal leaves, margin entire, apex acute. Racemes 8–12-flowered, ebracteate, elon-
Herbs perennial, 3–15(–20) cm tall, loosely cespitose, scapose. Caudex few branched, ultimate branches terminated in rosettes and covered with leaf remains of previous years. Stems erect, simple, lowermost part sparsely pubescent with stellate or simple and forked trichomes, glabrous elsewhere or throughout. Basal leaves rosulate, persistent; petiole 1–4 mm, ciliate with simple trichomes; leaf blade oblong-obovate, oblancoate, oblong, or lanceolate, (0.4–)0.7–1.5(–2.5) cm × 1.5–3(–6) mm, abaxially moderately to densely hisrate with simple, 3–5-rayed stellate trichomes 1 or 2 rays of which sometimes with a lateral branch, these sometimes mixed with fewer simple trichomes, adaxially with primarily simple trichomes sometimes mixed with smaller, fewer stellate ones, margin ciliate with setose or subsetose trichomes to 1 mm, base cuneate to rarely attenuate, margin entire or rarely 1- or 2-toothed, apex obtuse to acute. Cauline leaves absent. Racemes (6–)10–25(–35)-flowered, ebracteate, elongated considerably in fruit. Fruiting pedicels 2–5(–8) mm, divaricate-ascending, straight, stout, tomentose all around. Sepals oblong, 2–2.5 × 0.7–1 mm, erect, abaxially sparsely pubescent with simple trichomes, base of lateral pair not saccate, margin not membranous. Petals yellow, obovate, 3.5–4.5 × 1–1.5 mm, apex subemarginate; claw ca. 1 mm. Filaments 1.5–2 mm; anthers ovate-oblong, ca. 0.4 mm. Ovules 16–24 per ovary. Fruit oblong, 5–7 × 3–4 mm, inflated, latissipate, not twisted; valves glabrous, not veined, base and apex obtuse; style 0.5–0.6 mm. Seeds dark brown, ovate, 0.9–1 × 0.6–0.7 mm. Fl. and fr. Jul–Sep.

Scree, shaded shelter below rocks; 4300–5600 m. Xizang [Sikkim]. Draba humillima was first recorded from Xizang by Schulz in his monograph (p. 114). However, that record was overlooked in FRPS and Fl. Xinjiang. (vol. 2(2). 1995). The occurrence of the species in Xizang is here confirmed based on Strachey & Winterbottom 2


*Draba sibirica* Pallas, Reise Russ. Reich. 3: 34. 1776, not Schweigter (1812); *Draba gmelinii* Adams; *D. repens* Marschall von Bieberstein.

Herbs perennial, 5–25 cm tall, scapose. Caudex many branched, ultimate branches terminated in rosettes and covered with leaf remains of previous years. Sterile stems subdecumbent, sparsely to densely hispid with malpigigaceous trichomes; flowering scapes sparsely pilose proximally with simple trichomes, often glabrous along distal half. Basal leaves subrosulate or not rosulate; petiole to 1 cm, persistent; leaf blade oblong-lanceolate or oblancoate, 0.4–2.2 cm × 1–5(–10) mm, sparsely or densely hispid or strigose with appressed,
malpighiaceous trichomes, these sometimes with 1 or 2, shorter lateral branches and appearing 3-fid or cross-shaped, sometimes adaxially or both surfaces glabrous except for margin, base attenuate, margin entire, always with malpighiaceous trichomes, apex acute. Cauline leaves of flowering stems absent, those of sterile shoots similar to basal ones. Racemes 7–20-flowered, ebracteate, glabrous, elongated considerably in fruit. Fruiting pedicels 0.5–1.8(−2.3) cm, divaricate, straight or curved, often filiform, glabrous. Sepals oblong or ovate, 2–2.7 × 0.9–1.2 mm, erect, glabrous or abaxially sparsely pilose with simple trichomes, base of lateral pair subsaccate, margin not membranous. Petals yellow, narrowly obovate, 4–6 × 2–3 mm, apex emarginate. Filaments 2–2.5 mm; anthers ovate-subcordate, 0.4–0.5 mm. Ovules 24–30 per ovary. Fruit oblong to elliptic, rarely sublinear, 4–8 × 1.5–2.2 mm, latisepitate, not twisted; valves glabrous, obscurely veined, base and apex subobtuse; style 0.5–1 mm. Seeds brown, ovate, 0.9–1.2 × 0.5–0.6 mm. Fl. May–Jul, fr. Jun–Aug. 2n = 16.

Mountain slopes, sunny or shady wet places; 2000–2900 m. Gansu, Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia].

*Draba sibirica* is very rare in China and is known to the present authors from a few collections, including *Jiang Qingtang s.n.*, 24 Jun 1957 (PE), collected from Fuhai, Xinjiang. The species was first recorded from “Dscachor,” Gansu by Maximowicz (Fl. Tangut. 65. 1889, as *D. repens*), but apparently no recent collections have been made from that province, nor was the species recorded from there in FRPS. The present record from Gansu is based on *Przewalski s.n.*, 24 Jun 1890 (LE).

The descriptions and illustrations in FRPS (p. 166) and FL. Xinjiang. (2(2): 112-113. 1995) of *Draba sachalinensis* Traubvetter are based on misidentified plants of *D. sibirica*, which is the only Chinese species with typically malpighiaceous leaf trichomes. True *D. sachalinensis* is highly restricted to E Russia (Sakhalin) and N Japan (Hokkaido, N Honshu); it does not occur in China.


纤细葶苈 xian xi ting li

*Draba gracillima* Handel-Mazzetti; *D. wardii* W. W. Smith.

Herbs perennial, 5–55 cm tall, slender. Caudex with several slender branches terminated in rosettes. Stems decumbent, simple, very slender, somewhat flexuose, basally sparsely pubescent with short-stalked, 3- or 4-rayed, stellate trichomes, rarely densely pilose with primarily simple trichomes, apically glabrous. Basal leaves rosulate; persistent; petiolelike base to 7 mm; leaf blade broadly obovate, spatulate, to oblanceolate, 0.5–2 cm × 1.5–7(−10) mm, abaxially sparsely pubescent with short-stalked, 4-rayed stellate trichomes rarely mixed with more, simple and forked ones, abaxially pilose with simple trichomes replaced with forked or stellate ones at leaf apex, rarely blade glabrous except for margin, base cuneate to attenuate, margin denticulate or subentire, often ciliate, apex subacute or obtuse. Cauline leaves 2–6, sessile, ovate, 2–7 × 1–3 mm, pubescent as basal leaves, base obtuse, not auriculate, margin entire or denticulate, apex acute. Racemes 3–10(−12)-flowered, ebracteate or lowermost flowers bracteate, lax, elongated considerably in fruit. Fruiting pedicels 0.4–4 cm, filiform, glabrous, lowermost longest and strongly recurved, uppermost straight and ascending. Sepals oblong, 1.5–2 × 0.6–1.5 mm, erect, glabrous or rarely with a few trichomes, not saccate, margin narrowly membranous. Petals pale yellow or yellowish white, narrowly obovate to oblanceolate, 2.5–3.5 × 0.8–1.5 mm, apex obtuse or subemarginate; claw absent. Filaments 1.2–2 mm; anthers ovate, 0.2–0.4 mm. Ovules 10–20 per ovary. Fruit narrowly oblong, linear, or linear-lanceolate, (0.5–)0.7–1.3(−1.8) cm × 1–2 mm, pendulous, latisepitate, not twisted; valves glabrous, not veined; style 0.2–0.5 mm. Seeds brown, ovate, 0.9–1.1 × 0.5–0.7 mm, subcompressed, wingless. Fl. and fr. May–Aug.

Mountain slopes, grassy areas, ravines, stony slopes, scree, alpine grasslands; 3200–5000 m. Xizang, Yunnan [Bhutan, NW India, Nepal, Sikkim].

The type collection of *Draba granitica*, Handel-Mazzetti 9497 (holotype, WU; isotype, W), is indistinguishable from that of *D. gracillima*, J. D. Hooker s.n. (holotype, K; isotypes, E, K, NY, P, W), in every aspect except flower color. The former species was said to have white instead of yellowish white or pale yellow flowers, but the present authors believe that this distinction is artificial, and the two taxa are united here.

*Draba wardii*, which is known only from the type gathering, Kingdom Ward 849 (holotype, E), collected from Xizang, was not listed in FRPS or Fl. Xizang. (vol. 2. 1985). It is no more than a young plant of *D. gracillima* with simple trichomes more abundant that stellate ones.


藏北葶苈 zang bei ting li

Herbs perennial, 1–5(−8) cm tall, cespitose. Caudex simple or few branched, ultimate branches terminated in rosettes and covered with petiolar remains of previous years. Stems erect or rarely decumbent, simple or branched, tomentose basally with stellate trichomes, glabrous along distal half. Basal leaves rosulate; petiole 1–4(−8) mm, persistent and becoming stramineous, rarely ciliate with simple trichomes; leaf blade oblanceolate to elliptic-lanceolate, 3–10(−15) × 1–3(−6) mm, abaxially densely tomentose with sessile, stellate trichomes 2 or all 4 rays of which with a lateral branch on each side, adaxially similar or with simple trichomes also, rarely subglabrous, base attenuate, margin entire, apex acute. Cauline leaves 2–6(−8), sessile; leaf blade ovate to oblanceolate, 3–10(−17) × 1–4(−7) mm, uppermost subglabrous or indumentum as basal leaves, base obtuse or subamplexicaul, margin subentire or minutely 1–4-toothed on each side, apex obtuse or acute. Racemes 6–16 (−20)-flowered, ebracteate, elongated slightly in fruit. Fruiting pedicels 1–3.5(−5) mm, divaricate, slightly curved upward or straight, stout, glabrous. Sepals oblong, 0.9–1.1 × 0.4–0.5 mm, erect, abaxially sparsely pubescent with simple trichomes,
D. stenocarpa var. Litvinov; Draba media Linn. Soc., Bot. 5: 153. 1861.


Petals yellow drying whitish, narrowly spatulate, 1–1.5 × 0.5–0.6 mm, apex subemarginate. Filaments 0.8–1 mm; anthers ovate, ca. 0.2 mm. Ovules 24–38 per ovary. Fruit linear to oblong-linear, 4–10 × 1–1.5 mm, not inflated, slightly latisspetate, not twisted; valves glabrous, often with a distinct midvein, base and apex obtuse; style absent. Seeds brown, ovate, 0.5–0.8(–0.9) × 0.3–0.4(–0.5) mm. Fl. and fr. Jul–Aug.

• Dry mountain slopes, rocky outcrops, frost-heave areas, dry grasslands, steppe on moraine sands; 4000–5000 m. Qinghai, Xizang.

The above first record from Qinghai is based on Ho, Bartholomew; Watson & Gilbert 1602 (BM, CAS, E, HNWP, MO).


45. Draba nemorosa

Herbs annual, (3–)6–45(–60) cm tall. Stems solitary or a few from base, erect, simple or few branched near base, densely hirsute basally with subsetose simple trichomes to 1.5 mm, these rarely mixed with fewer, smaller, stalked forked trichomes, glabrous along distal half. Basal leaves rosulate. sub sessile; leaf blade oblong-obovate to narrowly oblong, (0.5–)0.8–3.5(–4.2) cm × 2–8(–12) mm, abaxially densely subhirsute with long-stalked, 3- or 4-rayed stellate trichomes with simple rays, sometimes with a few simple trichomes, adaxially with predominantly simple trichomes mixed with fewer, stalked forked ones, base cuneate, margin entire or 1–3-toothed, ciliate with simple trichomes, apex subobtuse. Cauline leaves 2–5(–7), sessile, oblong-ovate to oblong lanceolate, with indumentum similar to basal leaves, margin entire or minutely 1–3-toothed, apex obtuse to subacute. Racemes (4–)10–50(–60)-flowered, ebracteate, elongated considerably in fruit; rachis straight. Fruiting pedicels (0.1–)0.5–1.8(–2.5) cm, divaricate, slightly curved upward or straight, slender, glabrous. Sepals ovate-oblong, 1.5–2 × ca. 1 mm, erect, abaxially hirsute with simple trichomes, base of lateral pair not saccate, margin narrowly membranous. Petals yellow, spatulate, 3–4 × 1–1.5 mm, apex subemarginate. Filaments 1.5–2 mm; anthers ovate, 0.2–0.3 mm. Ovules (32–) 38–46 per ovary. Fruit linear, (0.6–)0.9–2(–2.5) cm × 1.5–2.5 mm, not inflated, latisspetate, not twisted, straight or slightly curved; valves antrorse puberulent with simple trichomes rarely mixed with forked ones, very rarely glabrous, with obscure midvein, base and apex subobtuse; style 0.1–0.2 mm. Seeds brown, ovate, 0.7–1 × 0.4–0.5 mm. Fl. and fr. Jun–Aug.

River beaches, shady rocky areas, forest margins; 2500–5000 m. Gansu, Qinghai, Sichuan, Xinjiang, Xizang [Afghanistan, India, Kashmir, Kyrgyzstan, Kazakhstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan].

Glabrous fruits are extremely rare in Draba stenocarpa and have not been found among the Chinese material examined by the present authors. It is likely that records of such plants in FRPS and provincial Chinese floras are based on misidentified plants of other species, notably D. ladyginii. However, the latter species is perennial with white flowers and (4–)6–19–(26)-leaved stems.


Draba nemoralis Ehrhart; D. nemorosa var. brevisilicula Zapalowicz; D. nemorosa var. hebecarpa Lindblom; D. nemorosa var. leiocarpa Lindblom.

Herbs annual, (3–)6–45(–60) cm tall. Stems erect to ascending, simple or branched a little above base, densely pubescent with a mixture of simple (to 1.3 mm), forked, and stalked or sub sessile stellate trichomes, glabrous from proximal flower to apex. Basal leaves rosulate, often persistent through flowering or fruiting; petiole

Dry mountain slopes, rocky outcrops, frost-heave areas, dry grasslands, steppe on moraine sands; 4000–5000 m. Qinghai, Xizang.
Herbs annual, 4–45(–60) cm tall. Stems erect, simple or rarely branched above middle, sparsely to densely pubescent with a mixture of simple and subsessile stellate and forked trichomes, sometimes glabrous distally. Basal leaves subrotulate, often withered by flowering. Cauline leaves (5–)10–24(–30), sessile; leaf blade ovate, oblong, elliptic, or lanceolate, 0.5–2.7 (4.2) cm × 1.5–7(–15) mm, abaxially pubescent with primarily 4-forked, short-stalked stellate trichomes, adaxially strigose with simple trichomes mixed with fewer forked and smaller stellate ones, base cuneate to obtuse, margin 1–6(–10)-toothed on each side, apex acute. Racemes 10–45(–65)-flowered, ebracteate, elongated in fruit. Fruiting pedicels (0.2–)5–13(–22) mm, divaricate, straight, pubescent all around, glabrous adaxially, or glabrous. Sepals oblong or ovate, 1–1.8(–2) × 0.6–0.8 mm, erect, abaxially pilose with simple trichomes, base of lateral pair not saccate, margin membranous. Petals yellow, spatulate or narrowly oblong, 0.7–2.5(–3) cm, divaricate, straight, glabrous, filiform, longer than fruits. Sepals ovate, (0.7–)0.9–1.6 × 0.5–1 mm, suberec, abaxially sparsely pubescent with simple trichomes, base of lateral pair not saccate, margin not membranous. Petals yellow, spatulate, (1.2–1.7–2.2(–2.5) × (0.4–)0.6–1 mm, apex emarginate; claw absent. Filaments (0.9–1–1.7–2(–2.2) mm; anthers broadly ovate to subreniform, 0.1–0.2 mm. Ovules (30–)36–60(–72) per ovary. Fruit oblong or elliptic, (3–)5–8(–10) × 1.5–2.5 mm, slightly latiseptate, not twisted; valves glabrous or puberulent with simple, antrorse trichomes 0.05–0.2 mm, base and apex obtuse, often with a distinct midvein and anastomosing lateral veins; style obsolete, rarely to 0.1 mm. Seeds reddish brown, ovate, 0.5–0.7(–0.8) × 0.3–0.4(–0.5) mm. Fl. and fr. Mar–Jun. 2n = 16.

Grassy areas, roadsides, wet valleys, river banks, forest margins, stream sides, mountain slopes; near sea level to 4800 m. Anhui, Gansu, Guizhou, Hebei, Henan, Heilongjiang, Jiangsu, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan, Zhejiang [Afghanistan, Japan, Kashmir, Korea, Kazakhstan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia, Europe, North America].


中亚葶苈 zhong ya ting li

Herbs annual, 5–20(–30) cm tall. Stems erect, simple or branched just above base, densely pubescent throughout with a mixture of simple (to 1.2 mm), forked, and sub sessile stellate trichomes. Basal leaves subrotulate, often withered by fruiting; petiole obsolete; leaf blade obvate or spatulate, 4–7 × 2–4 mm, pubescent with simple and stalked, forked and stellate trichomes with simple rays, base cuneate, margin entire or denticulate, apex obtuse. Cauline leaves 3–6, sessile; leaf blade ovate or spatulate, 4–7 × 2–4 mm, pubescent with simple and stalked trichomes with simple rays, base cuneate, margin entire or denticulate, apex obtuse. Racemes (5–)12–40(–60)-flowered, ebracteate, elongated in fruit. Fruiting pedicels (1.5–2.5–5.5(–7) mm, divaricate, straight, pubescent all around, longer than fruits. Sepals oblong, 0.9–1.5(–2) × 0.4–0.6 mm, suberec, abaxially pubescent, base of lateral pair not saccate, margin narrowly membranous. Petals yellow, spatulate, (1.2–1.5–2(–2.5) × 0.4–0.6 mm, apex emarginate; claw absent. Filaments (0.7–1–1.5 mm; anthers ovate, 0.1–0.2 mm. Ovules 12–18(–20) per ovary. Fruit oblong, 5–8(–10) × 2–3 mm, slightly latiseptate, not twisted; valves densely puberulent with antrorse, simple trichomes 0.1–0.2 mm, base and apex obtuse, obscurely veined; style obsolete, rarely to 0.1 mm. Seeds brown, ovate, 0.9–1.2 × 0.6–0.9 mm. Fl. and fr. Mar–Jun.

Slopes; 500–2300 m. Xinjiang [Kazakstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].


dra eriopoda var. kamensis Pohle; D. eriopoda var. sinensis Maximowicz; D. pingwuensis Z. M. Tan & S. C. Zhou.

Herbs annual, 4–45(–60) cm tall. Stems erect, simple or rarely branched above middle, sparsely to densely pubescent with a mixture of simple and sub sessile stellate and forked trichomes, sometimes glabrous distally. Basal leaves subrotulate, often withered by flowering. Cauline leaves (5–)10–24(–30), sessile; leaf blade ovate, oblong, elliptic, or lanceolate, 0.5–2.7 (4.2) cm × 1.5–7(–15) mm, abaxially pubescent with primarily 4-forked, short-stalked stellate trichomes, adaxially strigose with simple trichomes mixed with fewer forked and smaller stellate ones, base cuneate to obtuse, margin 1–6(–10)-toothed on each side, apex acute. Racemes 10–45(–65)-flowered, ebracteate, elongated in fruit. Fruiting pedicels (0.2–)5–13(–22) mm, divaricate, straight, pubescent all around, glabrous adaxially, or glabrous. Sepals oblong or ovate, 1–1.8(–2) × 0.6–0.8 mm, erect, abaxially pilose with simple trichomes, base of lateral pair not saccate, margin membranous. Petals yellow, spatulate or narrowly obvate, 2–3(–3.5) × (0.5–)0.8–1 mm, apex emarginate; claw to 1 mm. Filaments 1–2 mm; anthers ovate, 0.1–0.2(–0.3) mm. Ovules 12–24(–28) per ovary. Fruit ovate, (3–)4–9(–10) × 2–3(–4) mm, often erect, latiseptate, not twisted; valves glabrous, obscurely veined, base obtuse, apex acute; style obsolete, rarely to 0.2 mm. Seeds brown, ovate, 0.8–1.3 × 0.5–0.9 mm. Fl. and fr. Jun–Sep. 2n = 16*.

Rocky slopes, grasslands, scrub, moist stream sides, limestone cliffs, forests, river valleys; 2000–4900 m. Gansu, Hebei, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Bhutan, India, Mongolia, Nepal, Russia, Sikkim].

The above first records from Hebei and Yunnan are based on Wu & Yang 37631 and T. T. Yü 9310 (KUN, PE), respectively.


椭圆果葶苈 tuo yuan guo ting li

Herbs annual, (0.5–)2–12(–17) cm tall. Stems erect to ascending, simple, slender, flexuous, densely pubescent...
with short-stalked to subsessile stellate trichomes, usually glabrous distally. Basal leaves not rosalate, soon withered. Cauline leaves 3–12, obovate, elliptic-oblong, or lanceolate, (0.2–)0.5–2(–3) cm × (1.5–)3–8(–10) mm, pubescent on both surfaces with short-stalked, 4-rayed, stellate trichomes, sometimes adaxially with primarily simple trichomes mixed with fewer, forked or sessile ones, cuneate to attenuate into a petiolelike base to 5 mm, margin entire or denticulate, apex obtuse or acute. Racemes (2–)4–10(–15)-flowered, ebracteate, lax and elongated in fruit. Fruit-ing pedicels (1–)3–10(–18) mm, ascending, straight, glabrous or pubescent all around with subsessile, 3- or 4-rayed stellate trichomes, slender. Sepals oblong, 0.9–1.4 × 0.4–5 mm, erect, abaxially pubescent with simple trichomes sometimes mixed with fewer forked ones, base of lateral pair not saccate, margin not membranous.

Petals white, narrowly spatulate, 0.6–1 × 0.1–0.2 mm, apex obtuse or subretuse; claw absent. Filaments 0.7–1 cm; anthers ovate, to 0.1 mm. Ovules 10–18(–22) per ovary. Fruit oblong, oblong-lanceolate, or rarely orbicular, (2–)4–8 × (1–)2–3(–4) mm, latiseptate, not twisted; valves puberulent with exclusively subsessile stellate trichomes, or with a mixture of stellate, forked, and simple trichomes, rarely only sparsely ciliate at margin, base and apex obtuse to rounded; style obsolete. Seeds blackish, ovate, 0.7–0.9 × 0.5–0.7 mm, slightly compressed, wingless. Fl. and fr. Jun–Oct.

Scree slopes, streamsides, woods, pastures, alpine ledges, meadows, scrub; 3100–5200 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan [Kashmir, Nepal, Sikkim].

Three species: C and S Europe, Russia; one species (introduced) in China.


Armoracia sativa Bernhardi; Cochlearia armoracia Linnaeus; Nasturtium armoracia (Linnaeus) Fries; Rorippa armoracia (Linnaeus) A. S. Hitchcock; R. rusticana (G. Gaertner et al.) Godron.

Herbs with fusiform or cylindric, fleshy or woody roots. Stems 50–120(–200) cm tall. Basal leaves few; petiole to 60 cm, broadly expanded at base; leaf blade broadly oblong, oblong-lanceolate, or ovate, (10–)20–45(–60) × (3–)5–12(–17) cm, coarsely crenate or rarely pinnatifid. Lower and middle cauline leaves show short petiolate, pinnatifid or pinnatisect, with oblong to linear-oblong lobes, smaller than basal leaves; upper cauline leaves sessile or shortly petiolate, linear to linear-lanceolate, base cuneate or attenuate, margin serrate, crenate, or rarely entire. Fruiting pedicels ascending, slender, 0.8–2 cm. Sepals ovate, 2–4 mm. Petals obovate or oblongate, 5–7(–8) mm; claw to 1.5 mm. Filaments 1–2.5 mm; anthers ovate, 0.5–0.8 mm. Ovules 8–12 per ovary. Mature fruit rarely produced, ovate, oblong, or orbicular, angustiseptate, sessile; valves veinless, glabrous, smooth; replum rounded; septum perforated or reduced to a rim; style obsolete or short and to 2 mm; stigma capitate, entire or 2-lobed. Seeds biseriate, wingless, oblong, plump; seed coat punctate, not mucilaginous when wetted; cotyledons accumbent.

Cultivated and naturalized. Hebei, Heilongjiang, Jilin, Jiangsu, Liaoning [native to Europe; cultivated and naturalized elsewhere].

This species has been widely cultivated for some 2000 years for its fleshy roots, which are grated to produce the pungent horseradish sauce. The plant is also a weed that is very difficult to eradicate.
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, 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 semimembranous. 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 cinctately coiled; replum strongly flattened; septum complete, translucent; style distinct or rarely obsolete; stigma capitately 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. cheotaiyienii*
   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. changbaiana*
   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 auricle-like, 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(–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(–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 auricle-like, 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. multilora*
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 nondecurrent 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, binate, or palmately S-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 oblance, elliptic, or oblaveolate, 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 of cauline leaves lanceolate to linear-lanceolate, 4–9 mm wide; petiole winged .......................................................... 14. *C. franchetiana*

33b. Terminal leaflet of cauline leaves filiform to narrowly linear, 0.5–1.5(mm) mm wide; petiole slender, wingless ...................... 18. *C. granulifera*

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 leaflets 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 cauleine leaves obovate .............................................................. 35. C. calcicola
46b. Stems glabrous or puberulent; petals 5–6 mm; sepals 2–2.5 mm; terminal leaflet of cauleine leaves suborbicular, reniform, or ovate-suborbicular .... 37. C. hydrocotyloides
43b. Leaf blade or terminal leaf lobe of rhizomal, basal, and lowermost cauleine 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. fragarifolia
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 cauleine leaves petiolulate, apex caduate-acuminate, acuminate, or rarely acute ........................................... 3. C. leucantha
51b. Flowers deep purple or lavender; stems straight or rarely subflexuous; terminal leaflet of cauleine 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 cauleine 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 cauleine leaves decurrent at base, rarely all cuneate .......................................................... 1. C. macrophylla


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 (Wildenow) Bunge ex Maximowicz; D. sinomanshurica Kitagawa; D. wallichii G. Don; D. wildenowii 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 subobtuse; 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 petiolo to 1 cm, base cuneate, margin ciliate and crenate, serrate, or serrulate, rarely subentire or doubly serrate, apex acute, rarely acuminate; lateral leaflets 2–7–(11) pairs, sessile or petiolo, 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–)0.5–2.5–(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 submarginate. Median filament pairs 7–9–(11) mm, lateral pair 6–7 mm; anthers oblong, 1.5–2–(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)–(9) mm. Seeds brown, ovoid or oblong, (1.5–)2–3–(4) × 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, stream sides, 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, Xizang, Yunnan, Zhejiang [Bhutan, India, Japan, Kashmir, Kazakhstan, Mongolia, Nepal, Pakistan, Russia, Sikkim].

The above first records from Anhui, Henan, Hunan, and Jiangxi are based on Yio 8927 (A), Boufford et al. 26199 (A, MO), Handel-Mazzetti (E, W, WU), and Tan Ceming 9604090 (MO), respectively. Cardamine macropophylla 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. polyphyllo is said to have four or more pairs, is quite variable, though a maximum of seven pairs (e.g., Yu 22173, at A) was found in China, whereas serrate, serrulate, and doubly serrate leaflets were observed in one population (Al-Shebbaci 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; islectotypes, G, K, US). The islectotype 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.


唐古碎米荠 tang gu sui mi qi

Herbs perennial, (8–)10–30–(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, oblanceolate, or elliptic, (2–)3–5–(6) × 0.7–1.2–(2) cm, sessile, base cuneate, margin serrate and ciliate, apex acute to subobtuse; lateral leaflets 3–5(or 6) pairs, not deciduous at base. Cauline leaves 1–3–5(–5) × 3–10–(15) cm, subleathery; petiole (0.5–)1–2.5–(4) cm, not auriculate at base; terminal leaflet oblong, 2–4 cm × 3–10–(15) mm, sub sessile, glabrous or rarely sparsely pilose, base cuneate, margin ciliate and serrate, rarely subentire or doubly serrate, apex acute or acuminate; lateral leaflets 2–4 pairs, similar to terminal but slightly smaller, not deciduous 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;
  1300–4000 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.


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 obovate-elliptic, (3–)4–9–(13) × (0.6–)1–3.5–(4) cm, adaxially shorty strigose or puberulent, abaxially pilose or long strigose, with a petiolo 5–13–(20) mm, base cuneate, margin antorsely ciliate and irregularly serrate, doubly serrate,
or subdentate, apex acuminate or rarely acute; lateral leaflets 2 or 3 pairs, rarely uppermost leaf trilobulate, 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-ob lanceolate, 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.


周氏碎米荠  zhou shi sui mi qi


Herbs perennial, scapose. Rhizomes ca. 5 mm in diam., with prominent petiolar scars. Rhizomall leaves 2, trilobulate; 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; petiolume 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 86636 (holotype, KUN; isotype, IBSC).


博氏碎米荠  bo shi 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, trilobulate, rarely lowest with 4 or 5 leaflets, often simple below raceeme; 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 stream sides, wet forests, rocky places, moist grasslands; 1000–3000 m. Guangxi, Guizhou, Hubei, Hunan, Sichuan, 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) cauli ne leaves, and a serrate to crenate terminal leaflet (1.5–)3–8(–12) cm.


博氏碎米荠  bo shi sui mi qi


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
herbaceous, glabrous; style 1–3 mm. Seeds brown, 12–16 per ovary. Fruit linear, 1–2 cm × 1.2–1.5 mm; pair 2.5–3.5 mm; anthers oblong, 0.9–1.3 mm. Ovules apex rounded. Median filament pairs 3.5–5 mm, lateral subsaccate. Petals purple, spatulate, 6–8 × 2.5–3.5 mm, or oblong, 2–3 × 1–1.5 mm, 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; Bodnierz 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. fragaritifolia, 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.


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 petioloide 2–1 cm, base cuneate and often decurrent with adjacent lateral lobes, margin crenate, apex obtuse to subacute; lateral lobes 1–4–5 on each side of rachis, similar to terminal lobe but smaller. Uppersmost 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 cm 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, 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.


堇色碎米荠 jin se sui mi qi
Herbs perennial, 20–100 cm tall, slightly 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 subpubescent, 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 sacctae. 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].


浮水碎米荠 fu shui sui mi qi
Cardamine borealis Andrzejewski 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 petioloide 2–10 mm, margin crenate or repand; lateral leaflets 1–5 pairs, often sessile, similar to terminal ones but smaller. Cauline leaves 3–5–folio- late, often glabrous; petiole to 7 cm, not auriculate at base; terminal leaflet ellipptic, oblong, or rhomboid, 1–3.5(–5) × 0.5–1.8(–2.5) cm, with a petioloide 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 petioloide, 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 subapiculate. 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, ovoid or suboblong, 1.5–2.2 × 1–1.6 mm, wingless. Fl. May–Jul, fr. Jun–Aug.

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


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 petioloile 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 or as smaller than terminal leaflet, orbicular, ovaite, or obovate, petioloulate or sessile, margin crenate or repand. Cauline leaves including petiole 2–17 cm, pinnatisect, glabrous; petiole base not auriculate; terminal lobe linear, oblong, obovate, or lanceolate, 1.2–5(–3.5) cm × 5–8(–10) mm, petioloulate or sessile; lateral lobes 4–7(–13) on each side of rachis, similar to terminal lobe, base petioloulate 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 obovate, (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–)1.5–3.5 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 stream sides. Heilongjiang, Nei Mongol, Xinjiang, W Xizang [Japan, Kazakhstan, Korea, Mongolia, Russia; Europe, North America].


細叶碎米荠 xi ye sui mi qi

Dentaria trifida Lamarck ex Poiret, Encycl. Suppl. 2: 465. 1812; Cardamine schulziana Baehni; C. tenuifolia (Ledebour) Turczaninow (1842), not Hooker (1834); D. alaunica Golitsin; D. tenuifolia Ledebour; Sphaerotorrhiza trifida (Lamarck ex Poiret) 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. Glabrous, 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 ovoid, or suborbicular in outline, to 2 × 1.3 cm, with a petioloile 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 line- ar, 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, Kazakhstan, Korea, Mongolia, Russia (Far East, Siberia)].


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; petioloile absent and leaf base appearing auriculate; rachis 2–15 mm; terminal lobe of lowermost leaf obvate, 4–14 × 2–6 mm, apically 3-toothed, sometimes with a minute tooth subbasally on each side, base cuneate into a petioloile 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.


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. Pistil glabrous; style 1–1.5 mm; stigma entire. Fruit and seeds not seen.

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


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-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 divaricato-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, crevices of boulders, meadows, moist pastures; 2300–4800 m. Qinghai, Sichuan, Xizang, Yunnan.


细巧碎米荠 xi qiao sui mi qi

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 obovate 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 × 2–3 × 1.7 mm × 1.2–2 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, 1.1–1.7 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 streambeds, scree, mountain slopes; 3400–4600 m. Qinghai, Sichuan, Xizang, Yunnan [Bhutan, India, Nepal, Sikkim].

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 petiolo 2 cm, 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. Yunnan.

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


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 petiolo 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).


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 obovate, 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 all 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, 2.1–1.5 × 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.

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.

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


Herbs perennial, 10–45 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 petiolo 4 cm, 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.

The above first records from Sichuan and Bhutan are based on Smith 10441 (UPS) and Cooper 4917 (BM, E), respectively.
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 petioloide 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; petioloide (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 pedicles (5–)1–2.5 cm, ascending to suberect, glabrous. Sepals broadly obovate, 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, obovate, 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].
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; petioloide 1–1.5 cm; terminal leaflet orbicular, 2–4 mm in diam., with a petioloide 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; petioloide 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. Fruiting pedicles 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 mm × 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. elegansula 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. elegansula has compound leaves with 5–7 pairs of elliptic or oblong, petiolulate, apicately 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. puriflora.
单茎碎米荠 dan jing sui mi qi
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; petioloide (1.3–)2–6(–8) cm; terminal leaflet broadly obovate, 3–12 × 5–13 mm, with a petioloide 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 petiolate, somewhat similar to terminal leaflet but smaller. Cauline leaves (1 or)2–5–14(–16)-flowered. Stems erect or ascending, (0.8–)1–2.5 mm. Racemes lax, (2–)5–14(–16)-flowered, rachis often flexuous. Fruiting pedicles erect or ascending, (0.8–)1–2.5(–3) cm, straight, glabrous, proximal ones often much longer than distal. Sepals obovate 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 3–5.5 mm; anthers oblong, 0.8–1.1 mm. Ovules 8–14 per ovary. Fruit linear, (1–)1.5–2.5(–2.8)
because it was based on the same type collection, naturally superfluous when published and is therefore illegitimate. 

Cardamine flexuosoides

C. fragariifolia

misidentified plants of Xizang. (2: 360. 1985), and Fl. Yunnan. (6: 58. 1995) are all based on accounts of Cardamine trifoliolata (E, GH, US) and Rock 4166 var. Pratt 762 based on The above first record of Cardamine trifoliolata Sikkim.

areas; 2500–4300 m. Sichuan, Yunnan [Bhutan, India, Nepal, Moist rocky crevices, meadows, marshy areas, stream- or ditchsides; 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.


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, 3–5 or 5( or 7)-folioliolate, 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)-folioliolate; petiole 0.5–1.5 cm, not auriculate at base; terminal and lateral leaflets similar to those of basal leaves; petiolule 0.5–1.5 cm. 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 × 1.4–1.7 mm, glabrous, base subacute, petals white, obovate or spatulate, 5–8 × 2.5–4.5 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) andACE 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. fragarifolia.

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.


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 rosetulate, 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, subequalling 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 × (1.5–)1.2–1.6 mm, margin membranous, base of lateral pair subacute. Petals white, obovate, 7–9 × 2.5–4.4 mm, cuneate into a claw-like base to 2 mm, apex rounded or submarginate. Median filament pairs 4–5 mm, slightly dilated, not flattened; lateral pair 2.5–3.5 mm; anthers narrowly oblong, 1.5–1.5 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.


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, petiole 1–3 mm, basis subacute, 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, oblollong, 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.


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 0.5–4(–9) cm, proximal margin 1- or 2-toothed, distal margin symmetric or not, pilose, base oblique, or rarely with a petiolule to 0.5 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 × 1.1–1.7 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 × 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.


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, 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 petiole to 0.5 mm, base oblique, proximal margin 1- or 2(–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 subascate. 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 obovate, 0.5–1.6 mm, anther locules 10–14 per ovary. Fruit linear, 2.4–4 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.

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.

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, cauleine; 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 auriculike, attached at or just above node, often giving appearance of amplexicaul leaf base. Uppermost leaves smaller. Fruiting pedicels ascending 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 cauleine 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 cauleine 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.


Herbs perennial, (20–)40–100(–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, cauleine; 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 petiolo 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 auriculike, 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. Stamina 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. Guizh. (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.entaloba*, 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.


*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 auriculike leaflets; petiole 3–12 cm; leaf blade suborbicular, cordate, or reniform, (0.7–)1–2(–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 petiolo (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 auriculike, 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, streamsides; near sea level to 1000 m. Anhui, Fujian, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hunan, Jiangsu,
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 hygrophiila


**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 sublanateolate, (0.5–)1.2–3(–3.5) × (0.5–)1–2.5(–3) cm, with a petiolo 5–12(–20) mm, round based 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 3.5–7.5 cm long, divericate or ascending, slender. Sepals ovate, 2.5–3 × 1–1.5 mm, lateral pair subcuneate. 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.

**Herbs perennial, 12–75 cm tall. Rhizomes short, stout. Stems erect, simple at base, branches 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, orbiculate-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 divericate 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.
on the same type collection,
Both Cardamine violifolia plants of jiang (also in Fl. Zhejiang 3: 55. 1993) are based on misidentified C. circaeoides. FRPS of no doubt that this taxon is conspecific with Although the present authors have not seen the type collection of Sikkim, Thailand, Vietnam, Guangxi, Hunan, Sichuan, Taiwan, Yunnan [India, Laos, Myanmar, moist pastures, roadsides, forests; 400–3300 m. Gansu, Guangdong, 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. macrocephala. 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: 280–263. 1903) separated C. violifolia from C. circaeoides mainly on account of the former having minutely auriculate instead of nonauriculate petiolate bases. However, he overlooked the occurrence of minute petiolar auricules 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 auricules. 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.


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 ciliolate; leaf blade or terminal leaflets cordate or ovate, rarely suborbicular, (0.7–)1.5–5.5–(6.7) cm × (0.7–)1.5–4.3–(5) cm, always longer than wide, pilose or glabrous, base cordate, sometimes obtuse, subtruncate, or subcordate, margin often repand-crenate, sometimes coarsely crenate, crenulate, or subentire, often distinctly mucronate at vein endings, apex obtuse; lateral leaflets (when present) petiolar or sessile, much smaller than terminal one. Cauline leaves 1–4, simple or rarely 1 of which 2- or 3-foliolate, petiolar 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) cm × 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].

The above first records from Guangdong, Sichuan, and Myanmar are based on Guo Subai 8008 (IBSC, MO), 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).


驴蹄碎米荠

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, petiolar 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 3.5–5.5 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-i,” 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).


岩生碎米荠

Herbs perennial, 10–35 cm tall, sparsely 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 petiolo 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 petiolate. 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, 0.8–1.3 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.

• 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 on not the two are indeed the same taxon.


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 petiolo 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.


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 × 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 × 0.9–1 mm, apex membra


Herbs perennial, 15–40 cm tall, sparsely pilose or glabrescent. Rhizomes slender. Stems simple, slightly 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 × 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) × 0.2–1(–1.5) mm; terminal leaflet lanceolate, elliptic, oblong, ovate, or suborbicular, (1–) 1.3–4.5(–6) × (0.4–)0.6–2(–3) cm, sparsely pilose adaxially, often glabrous abaxially, with a petiolo


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 × 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) × 0.2–1(–1.5) mm; terminal leaflet lanceolate, elliptic, oblong, ovate, or suborbicular, (1–) 1.3–4.5(–6) × (0.4–)0.6–2(–3) cm, sparsely pilose adaxially, often glabrous abaxially, with a petiolo

About 1900 m. Yunnan.

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


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 × 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) × 0.2–1(–1.5) mm; terminal leaflet lanceolate, elliptic, oblong, ovate, or suborbicular, (1–) 1.3–4.5(–6) × (0.4–)0.6–2(–3) cm, sparsely pilose adaxially, often glabrous abaxially, with a petiolo

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About 1900 m. Yunnan.

Cardamine libengiana is the most distinctive of all Eurasian species in the genus on account of its having very lax racemes that are bracteate throughout.
brown, narrowly oblong, 1.5–2 × 0.6–0.8 mm, apically winged. Fl. and fr. Mar–Jul.

- 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. Yu 16025 (A, KUN), T. T. Yu 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).


弹裂碎米荠 tan lie sui mi qi Cardamine basisagittata W. T. Wang; C. dasycarpa Marshall von Bieberstein; C. glaphyropoda O. E. Schulz; C. impatiens var. crenata T. Y. Cheo & R. C. Fang; C. impatiens var. angustifolia O. E. Schulz; C. impatiens var. dasycarpa (Marshall 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. Lévêillé; C. impatiens var. microphylla O. E. Schulz; C. impatiens var. obtusifolia Knaef; C. impatiens var. pilosa O. E. Schulz; C. nakaiana H. Lévêillé; 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 rosetulate, often withered by flowering; petiole 1–4 cm, not auriculate; leaf blade pinnatisect and appearing compound. Cauline leaves to 15 mm 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, 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, Sri Lanka, 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.


天池碎米荠 tian chi sui mi qi Cardamine resedifolia Linnaeus var. morii Nakai.

Herbs perennial, 2–8 cm tall, scapeose, glabrous throughout. Rhizomes slender, 0.4–0.7 mm in diam. Stems erect, leafless or rarely 1-leaved. Basal leaves rosetulate, 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 subemarginate. 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 marginated. Fl. and fr. Jul–Aug. Rocky slopes; 2400–2500 m. S Jilin (Changbai Shan) [Korea].


日本碎米荠 ri ben sui mi qi Cardamine resedifolia Linnaeus var. nipponica Nakai.

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 rosetulate, (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 subacuminate; 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].


细裂碎米荠 xi lie sui mi qi
Herbs perennia, 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. Rhizomalous and lowermost cauline leaves pilose; petiole 1–3 cm; leaf blade pinnatisect into linear to linear-oblong bases on each side of midvein, 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, subapressed 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 8889 (PE), is a delicate plant resembling C. parviflora, but is distinct on account of its stoloniferous rhizomes and larger flowers.


碎米荠 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. Haras

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, subequalling 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 mm, pinnatisect or pectinate; petiole not auriculate at base; lateral lobes (2–)4–7(–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, oblong-lanceolate, (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, Kazakhstan, 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. microphylla, and C. parviflora f. hispida, are morphologically the same as C. parviflora, and are therefore here reduced to synonymy.


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 ciliolate, 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. Fruitling 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.


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. 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. Hará; C. sylvatica Link; C. zollingeri Turczaninow; Nasturtium obtium Zollinger.

Herbs annual or biennial, (6–)10–50 cm tall, sparingly 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(–7) on each side of midvein, petiolulate or subsecise, 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. Fruitling 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, stream sides, 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 Massow 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 fruitling 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. purpurea, C. sylvestra, and the North American C. pennsylvanica.[...]

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.


圆齿碎米荠 yuan chi sui mi qi

Cardamine angulata Hooker var. kantschatica Regel; C. autumnalis Koidzumi; C. baishanensis P. Y. Fu; C. dentipetala Matsumura; C. drakeana H. Boissieu; C. flexuosa Withering var. kantschatica (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. Harata; C. scutata var. rotundiloba (Hayata) T. S. Liu & S. S. Ying; C. sylvestrica 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 subsessile, 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.


**单花荠属** dan hua qi shu

Herbs perennial, with simple or branched caudex. Trichomes absent or simple. Stems reduced to tiny portions added annually to apex of caudex or its branches. Basal leaves fleshy or not, rosulate, simple, entire or toothed. Cauline leaves absent. Flowers solitary, borne on pedicels from axils of rosette leaves. Fruiting pedicels ascending, straight, reflexed in geocarpic taxa. Sepals broadly ovate or oblong, ascending or spreading, glabrous or pubescent, base not saccate. Petals white, pink, purple, blue, or rarely bright yellow, longer than sepals; blade broadly obovate or suborbicular, rarely spatulate, apex rounded or subemarginate; claw often absent. Stamens 6, erect or spreading, subequal; filaments dilated at base; anthers ovate, 0.3–0.6 mm. Ovules 2–15 per ovary. Fruit dehiscent silicles, rarely siliques, oblong, ovate, orbicular, subequal; filaments dilated at base; anthers ovate or oblong, obtuse at apex. Nectar glands confluent, subtending suborbicular, rarely spatulate, 2.5–4.5(–6) × (1–)1.5–2.5 mm. Petals white, pink, purple, blue, or rarely bright yellow, longer than sepals; blade broadly obovate or suborbicular, rarely spatulate, apex rounded or subemarginate; claw often absent. Stamens 6, erect or spreading, subequal; filaments dilated at base; anthers ovate or oblong, obtuse at apex. Nectar glands confluent, subtending bases of all stamens. Ovules 2–15 per ovary. Fruit dehiscent silicles, rarely siliques, oblong, ovate, orbicular, ovoid, or globose, terete, latisepitate, or angustisepitate, geocarpic or not, sessile or stipitate; valves membranous or papery, not veined or obscurely veined, smooth, glabrous or pubescent; replum flattened; septum absent; style obsolete or to 3 mm, subconical; stigma discoid, entire. Seeds uniseriate, wingless, oblong, ovate, or suborbicular, plump or flattened; seed coat obscurely reticulate, not mucilaginous when wetted; cotyledons accumbent.

Six species: Bhutan, China, India, Kashmir, Myanmar, Nepal, Pakistan, Sikkim; four species (one endemic) in China.

1a. Fruit angustisepitate, geocarpic; valves ± carinate; fruiting pedicel strongly recurved; replum narrow, wingless; gynophore absent ................................................................. 4. *P. angustisepatum*

1b. Fruit subterete or latisepitate; valves flat; fruiting pedicels usually straight; replum wide, winged; gynophore present.

2a. Fruiting pedicels pubescent along 1 side, persisting for more than one season; fruit narrowly oblong; sepals apically ciliate ................................................................. 1. *P. minutum*

2b. Fruiting pedicels glabrous or distally pubescent on all sides, not persistent; fruit oblong, ovate, orbicular, ovoid, or subglobose; sepals not ciliate.

3a. Fruit ovoid or subglobose; valves membranous, puberulent apically; sepals 1.1–1.3 mm; petals 1.6–2(–2.5) mm; seeds plump, 1–1.1(–1.3) × 0.5–0.6(–0.8) mm ............................. 3. *P. nepalense*

3b. Fruit subterete or latisepitate; valves flat; fruiting pedicels usually straight; replum wide, winged; gynophore present.


**单花荠属** dan hua qi shu

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 subsessile, 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)].

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3b. Fruit oblong, orbicular, or ovate, flattened; valves papery, glabrous; sepal 2–(3–)5–6–(10) mm; petals (3.5–)5–12–(15) mm; seeds flattened, 1.5–3.5–(4) × 1.2–(2.5) mm.


Herbs with slender, branched caudex 0.75–2 mm in diam. Peltiole 3–5(–10) mm; leaf blade ovate, orbicular, or orbiculate, 1.4–(5) × (0.5–)1–1.5(–2) mm, somewhat fleshy, adaxially sparsely puberulent with trichomes 0.02–0.08 mm, rarely glabrous, abaxially glabrous, base cuneate or subattenuate, margin entire, apex obtuse to subrounded. Fruiting pedicles slender, puberulent along 1 side of entire length with trichomes 0.02–0.08 mm, (1–)1.5–2.5(–4) mm, persistent. Sepals broadly ovate, 1.2–2 × 0.8–1.2 mm, free, glabrous, distinctly ciliate with flattened trichomes to 0.05 mm. Petals white, lilac, or violet, broadly ovate or suborbicular, (1.5–)2–3(–4.5) × 1.5–2.5(–3) mm, tapering to claw-like base 0.7–1.5 mm. Filaments dilated at base, (0.9–)1.5–1.5 mm; anthers broadly ovate or suborbicular, 0.3–0.4 mm. Fruit latiseptate, not geocarpic, narrowly oblong, 3–5 × (1.5–)2–3(–3.5) mm, length (1.8–)2–2.5(–3) × width; gynophore 0.25–0.5 mm; style 0.3–0.4 mm. Seeds 3–5, broadly ovate, brown, flattened, 1.5–3.5(–4) × 1–2.5(–3) mm.

Blue, occasionally white with greenish or bluish center, sparsely pubescent, not ciliate. Petals white, pink, or blue, sometimes white with greenish or bluish center, broadly ovate, orbicular, or orbiculate, 3.5–5–12(–15) × (1.5–)2–9(–10) mm, tapering to claw-like base (0.5–)1–3(–3.5) mm. Filaments dilated at base, (2.5–)3–5(–7) mm; anthers oblong to narrowly so, (0.5–)1–1.5(–2) mm, sagittate at base. Fruit latiseptate, not

1a. Petals (6–)8–12–(15) × (5–)6–9(–10) mm, length (1–)1.2–1.5 × width; caudex stout, simple or rarely branched at apex; seeds 2–3.5–(4) × (1.5–)2–2.5(–3) mm.

2a. *Pegaeophyton scapiflorum* subsp. *scapiflorum*


粗壮单花荠 *cu zhuang dan hua qi*

Caudex mostly stout, (5–)8–20(–30) mm in diam., simple or rarely branched at apex. Petals (6–)8–12(–15) × (5–)6–9 (–10) mm, length (1–)1.2–1.5 × width. Seeds (2–)2.5–3.5(–4) × (1.5–)2–2.5(–3) mm. Fl. Apr–Oct, fr. Jul–Nov.

Among rocks, gravel in stream beds, dry slopes, alpine brooks, wet gravel, swampy ground, glacier stream beds, peaty soil, wet screes; 3500–4800 m. Sichuan, Xizang, Yunnan [Bhutan].


尼泊尔单花荠

Herbs with slender caudex ca. 1 mm in diam. Leaves 5–12 per caudex; petiole (2–)6–10(–14) mm, slender at base, glabrous or with few trichomes; blade suborbicular or broadly obovate, 2.4–4.5 × 1.5–3.5(–4.5) mm, somewhat fleshy, adaxially moderately pubescent with trichomes 0.3–0.5 mm, abaxially glabrous, base obtuse, margin entire, apex rounded or subrounded. Flowers 3–8 per plant. Pedicels slender, distally pubescent all around with trichomes 0.3–0.5 mm, 2–5 mm at anthesis, not elongated in fruit. Sepals oblong, 1.1–1.3(–1.5) × 0.5–0.7 mm, free, spreading or ascending, not saccate, pubescent on distal half with trichomes to 0.3 mm, membranous margin 0.05–0.1 mm wide, obtuse. Petals white, broadly obovate or suborbicular, slightly emarginate, 1.6–2(–2.5) mm; blade 0.8–1.5 × 0.8–1.5 mm; claw 0.8–1.2 mm. Filaments erect, white, slightly dilated at base, 1.2–1.5 mm, persistent to fruit maturity; anthers suborbicular, 0.2–0.3 mm, slightly sagittate at base. Fruit latiseptate, not geocarpic, dehiscent, suborbicular or broadly oblong, 2–3 × 1.8–2 mm; valves membranous, rounded, extending along part of fruit length, glabrous or minutely puberulent distally; gynophore 0.1–0.2 mm; replum strongly flattened, 0.4–0.5 mm wide, glabrous; septum absent; style 0.5–0.7 mm; stigma entire. Seeds 2–4, oblong, brown, plump, 1–1.1(–1.3) × 0.5–0.6(–0.8) mm. Fl. Jun–Sep, fr. Aug–Sep.

Stable moraine, among moss, under rocks by stream, damp or gravelly scree, alpine grassland, wet sand; 3900–5100 m. Xizang [Bhutan, Nepal, Sikkim].


窄隔单花荠

Herbs with thick, unbranched caudex 3–6 mm in diam. Petiole 1.5–4.5 cm, glabrous; leaf blade spatulate or oblongate, 1–2.5 cm × 2–10 mm, not fleshy, sparsely pilose adaxially with simple trichomes, glabrous abaxially, base cuneate or subattenuate, margin entire or obscurely 1- or 2-toothed on each side, sparsely ciliate with trichomes to 1 mm, apex obtuse or subrounded. Fruiting pedicels slender, sparsely to densely pubescent with spreading trichomes along distal half, strongly recurved to the ground, to 7 cm. Sepals broadly ovate, 2.5–3 × 1.5–1.8 mm, sparsely pubescent with trichomes 0.1–0.3 mm, not ciliate. Petals white, broadly obovate, 4–5 × 2.5–3 mm, tapering to clawlike base ca. 2 mm. Filaments 2–2.5 mm; anthers ovate, 0.5–0.6 mm. Fruit angustiseptate, geocarpic, dehiscent, suborbicular or broadly oblong, 4–7 × 4–5 mm, rounded at base and apex; valves carinate, extending along full fruit length, minutely papillate at apex; gynophore absent; style 1.5–2 mm. Seeds brown, up to 10, broadly ovate or suborbicular, compressed, 1.6–1.9 × ca. 1.2 mm. Fl. and fr. Jul.

• Open moist pastures. Yunnan.


藏芥属

Parryopsis Botschantzev; Wakilia Gilli; Vvedenskysella Botschantzev.

Herbs perennial, with well-developed caudex. Trichomes dendritic, forked, submalpighiaceous, or almost exclusively simple. Stems erect or ascending, simple or branched. Basal leaves petiolate, rosulate, simple, entire, coarsely dentate, or lyrate, with persistent petioles. Cauline leaves absent, if present sessile or shortly petiolate, exclusively simple. Stems erect or ascending, not saccate. Sepals oblong, 2.5–3.5 × (1.5–)2–3 mm, length (1–)2.5–3 mm, persistent to fruit maturity; anthers suborbicular, 0.3–0.4 mm, slightly emarginate, 1.6–2(–2.5) mm; blade 0.8–1.5 × 0.8–1.5 mm; claw 0.8–1.2 mm. Filaments erect, white, slightly dilated at base, 1.2–1.5 mm, persistent to fruit maturity; anthers suborbicular, 0.2–0.3 mm, slightly sagittate at base. Fruit latiseptate, not geocarpic, broadly ovoid or subglobose, 2–3 × 1.8–2 mm; valves membranous, rounded, extending along part of fruit length, glabrous or minutely puberulent distally; gynophore 0.1–0.2 mm; replum strongly flattened, 0.4–0.5 mm wide, glabrous; septum absent; style 0.5–0.7 mm; stigma entire. Seeds 2–4, oblong, brown, plump, 1–1.1(–1.3) × 0.5–0.6(–0.8) mm. Fl. Jun–Sep, fr. Aug–Sep.

Stable moraine, among moss, under rocks by stream, damp or gravelly scree, alpine grassland, wet sand; 3900–5100 m. Xizang [Bhutan, Nepal, Sikkim].

Seven species: Afghanistan, Bhutan, China, Kashmir, Nepal, Tajikistan; six species (three endemic) in China.

1a. Flowering stems leafy; lowestmost flowers bracteate.

2a. Leaves lyrate or coarsely dentate; trichomes on stems, pedicels, and fruit submalpighiaceous ....... 3. P. fengii

2b. Leaves entire or rarely subapically 1–3-toothed; trichomes on stems, pedicels and fruit simple or dendritic.
3a. Petals white; trichomes branched; petiole of basal leaves 1–5 mm, slender, not persistent; young fruit linear; anthers 0.5–0.6 mm ................................. 2. P. albiflorum
3b. Petals lavender or purple; trichomes simple; petiole of basal leaves (7–)10–30 (–40) mm, broadly expanded at base, persistent; fruit ovoid or oblong; anthers 1–1.2 mm ................................. 5. P. villosum

1b. Flowering stems leafless; flowers ebracteate.
4a. Sepals, distal leaf margin, and petiole with subsetose simple trichomes; fruit lanceolate, 2.5–4 mm wide; sepal soon caducous .......................................................... 6. P. kashgaricum
4b. Plants tomentose throughout with dendritic, forked, and simple nonsetose trichomes; fruit linear, to 2 mm wide; sepals persistent.
5a. Leaves green, with simple and forked, crisped, flattened trichomes, oldest leaves (7–)10–25 mm wide; fruit straight, replum not constricted between seeds .................................................. 4. P. jafrii
5b. Leaves canescent, exclusively with dendritic, slender trichomes, oldest leaves 1–4 mm wide; fruit subcontorted, replum constricted between seeds .................................. 1. P. parryoides


Dry hillsides; 3300–4200 m. Xizang [Kashmir].

The illustration of Phaeonychium parryoides in FRPS is based on a plant of P. jafrii, but the trichomes were erroneously drawn.

Plants 2–8 cm tall; caudex slender, few branched, usually without leaf remains of previous years. Trichomes short-stalked, dendritic or few forked, appressed. Stems erect, often simple from caudex, pubescent. Basal leaves rosulate; petiole 1–5 mm, not ciliate, slender; leaf blade oblong to ovate or narrowly spatulate, 2–10 (–17) × 1–4 mm, uniformly tomentose on both surfaces, base attenuate or cuneate, margin entire or distally 1–3-toothed, apex obtuse to subacute. Cauline leaves similar to basal, smaller upward, narrowly oblong or ovate or sublinear, middle and upper ones always entire. Racemes 8–15-flowered, basally bracteate. Pedicel slender, suberect or ascending, straight, 2–5 mm in flower, tomentose. Sepals 2–2.7 × 1–1.5 mm, sparsely pubescent, margin broadly membranous. Petals white, fading lavender on claw, broadly spatulate, 6–8 × 3–4 mm, apex rounded; claw 3–4 mm. Filaments white, median pairs 2.7–3.5 mm, lateral pair 1.5–2 mm; anthers oblong, 0.5–0.6 mm. Immature fruit linear, densely tomentose; style ca. 0.5 mm; stigma capitulate, entire. Seeds unknown.

Xizang [Kashmir].

Herbs perennial, 3–9 cm tall, cespitose; caudex stout, woody, few branched, to 8 mm in diam., covered with petiolar remains of previous years. Trichomes submalpighiaceous on stems, pedicels, and fruit, these mixed with simple ones especially on leaves and sepals. Stems erect, simple from caudex. Basal leaves rosulate; petiole 0.5–1.5 cm, ciliate with simple trichomes to 1 mm, becoming papery at base; leaf blade oblong or obovate, 3–15 × 1.5–6 mm, sparsely pilose, base attenuate, margin coarsely dentate and with 3–7 teeth on each side, or lyrate, rarely earliest ones subentire, apex subacute. Upper cauline leaves similar to basal, subsessile. Racemes corymbose, ebracteate or lowermost 1 or 2 flowers bracteate. Young fruiting pedicel divaricate-ascending, straight, 5–10 mm. Sepals oblong, 2.5–3.5 × 1–1.5 mm, sparsely pilose, caducous, margin membranous. Petals rose-pink, obovate, 6–7 ×
becoming papery, strongly expanded and to 2 mm wide at base; leaf blade narrowly oblanceolate or oblong-linear, (0.8–)1.5–2.8(–3.5) cm × (1.5–)2.5–6(–8) mm, villous, base attenuate, margin entire, apex obtuse. Cauline leaves shortly petiolate; leaf blade often oblong or elliptic-lanceolate, about as large as that of basal leaves. Racemes 10–25-flowered, basally bracteate; flowers fragrant. Fruiting pedicels divaricate, straight or slightly curved, (0.5–)0.7–1.5–2 cm, villous. Sepals oblong or ovate, 3–5 × 1.5–2 mm, sparsely villous, persistent, margin membranous. Petals purple or purple, broadly spatulate, 8–10 × 4–6 mm, apex emarginate; claw 2.5–3.5 mm. Filaments lavender; median pairs 3–4 mm; lateral pair 1.5–2 mm; anthers oblong, 1–1.2 mm. Ovules 4–8 per ovary. Fruit oblong or ovoid, (5–)7–12 × 2.5–4 mm, terete, sessile or on gynophores to 1 mm; valves obscurely veined, slightly pubescent; style 1–1.5 mm; stigma capitate, entire or slightly 2-lobed. Seeds ovoid, 2–2.5 × 1–1.5 mm. Fl. Jun–Jul, fr. Aug–Sep.

• Slopes; 1800–2400 m. Xinjiang.

In both FRPS (33: 292, 440. 1987) and Fl. Qinghai. (1: 469, 502. 1997), the flowering material of Phaeonychium villosum was recognized as Christolea villosa and the fruiting material as Braya koko-norica; the two species were placed in different tribes.


kah shi zang jie

Vvedenskya kashgarica Botschantzev, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 17: 174. 1955; Christolea kashgarica (Botschantzev) Z. X. An. Plants 3–15 cm tall; caudex slender, few branched, covered with petiolar remains of previous years. Trichomes simple, rigid, subsessile, to 0.4 mm. Stems erect, simple from caudex, glabrous. Basal leaves rosetulate; petiole 0.5–3 cm, ciliate, persistent base becoming papery, expanded and to 2 mm wide at base; leaf blade narrowly oblanceolate or spatulate, 1–3.5 cm × 3–10 mm, glabrous, base attenuate, margin entire, ciliate distally, apex obtuse or subacute. Cauline leaves absent. Racemes 7–18-flowered, ebracteate. Fruiting pedicels ascending, straight or slightly curved, 5–15 mm, glabrous. Sepals oblong or ovate, 3–4 × 1–1.8 mm, subapically hispid, caducous, margin membranous. Petals purple, spatulate, 6–9 × 2.5–4 mm, apex rounded; claw 2–3 mm. Filaments lavender; median pairs 3–3.5 mm; lateral pair 1.5–2.5 mm; anthers oblong, 0.8–1 mm. Ovules 6–10 per ovary. Fruit lanceolate, 2–2.5 cm × 2.5–4 mm, latiseptate, sessile or on gynophore to 1 mm; valves with a distinct midvein, glabrous; style 1–2 mm; stigma capitate, slightly 2-lobed. Mature seeds not seen. Fl. May–Jun, fr. Jun–Jul.

• Slopes; 1800–2400 m. Xinjiang.
Herbs biennial or perennial, with rhizomes or woody caudex, rarely annuals. Trichomes simple or absent. Stems erect, sometimes prostrate, angular. Basal leaves rosulate or not, lyrate-pinnatifid or pinnatisect, rarely undivided. Cauline leaves petiolate or sessile, auriculate or amplexicaul, entire, dentate, pinnatifid, or pinnatisect. Racemes many flowered, often ebracteate; rachis striate. Fruiting pedicels slender or thickened, erect or divaricate. Sepals oblong or linear, erect or spreading, base of lateral pair saccate. Petals yellow, rarely creamy white; blade spatulate or oblanceolate, apex obtuse or rounded; claw obscurely differentiated. Stamens 6, tetradynamous; filaments not dilated at base; anthers oblong, obtuse at apex. Nectar glands 4, median pair toothlike; lateral pair annular. Ovules 10–40 per ovary. Fruit dehiscent siliques, linear or rarely elliptic-linear, terete, 4-angled, or latiseptate, sessile or shortly stipitate; valves with a prominent midvein and distinct marginal veins, mostly glabrous, smooth or torulose; replum rounded; septum complete; style obsolete or to 5 mm; stigma capitate, entire or slightly 2-lobed. Seeds uniseriate or subbiseriate, wingless, margined, or winged, oblong, ovoid, or orbicular, plum or slightly flattened; seed coat reticulate, rarely tuberculate, not mucilaginous when wetted; cotyledons accumbent.

About 22 species: mainly in SW Asia, Australia, Europe, and North America; five species (two endemic, one introduced) in China.

1a. Terminal lobe of basal and lowermost cauline leaves nearly as large as adjacent lateral lobes; uppermost cauline leaves with (4–)6–10(–12) lateral lobes; plants perennial ............................................................. 1. Barbarea taiwaniana

1b. Terminal lobe of basal and lowermost cauline leaves much larger than adjacent lateral lobes; uppermost cauline leaves unlobed or with 1–4 lateral lobes; herbs annual or biennial, rarely perennial.

2a. Fruit strongly compressed, 2–2.5 wide; valve apex retuse; seeds 1.6–2 × 1.4–1.7 mm, winged all around ............................................................. 2. Barbarea hongii

2b. Fruit terete, quadrangular, or slightly compressed, 1–1.8(–2) mm wide; valve apex obtuse or subacut; seeds smaller, wingless.

3a. Uppermost cauline leaves pinnatisect into linear or linear-oblong lateral lobes; fruit 1.5–1.8(–2) mm wide ........................................................................................................................................... 4. Barbarea intermedia

3b. Uppermost cauline leaves undivided, dentate, or lyrate-pinnatifid into oblong or ovate lateral lobes; fruit 1–1.5 mm wide.

4a. Style in fruit stout, 0.5–1(–1.2) mm; uppermost cauline leaves usually lyrate-pinnatifid 3. Barbarea orthoceras

4b. Style in fruit slender, 1.5–3 mm; uppermost cauline leaves undivided ............................. 5. Barbarea vulgaris

1. Barbarea taiwaniana

Herbs perennial, (6–)10–20(–35) cm tall. Caudex apically branched or simple in younger plants, often with petiolar remains or previous years. Stems erect or rarely decumbent when many branched from base, angled, glabrous throughout. Basal and lowermost cauline leaves petiolate; petiole (2–)3–7(–10) cm, ciliate, base rounded, entire or rarely tooth-ed; lateral lobes linear, narrowly oblanceolate, oblong, or rarely ovate, to 15 × 5 mm, glabrous, entire or usually lobed or obtusely toothed on proximal margin; terminal lobe mostly 3-lobed. Racemes ebracteate, slightly elongated in fruit. Sepals yellowish brown, broadly ovate or suborbicular, 1.5–2 × ca. 1 mm, uniseriate or subbiseriate, somewhat compressed, often winged all around, wing to 0.2 mm wide. Fl. Jun–Jul, fr. Aug–Sep.

* Above timberline in rock crevices, under Abies, sunny rocky areas; 3200–4000 m. Taiwan.

The illustration and description of Barbarea taiwaniana in FRPS represent plants of Barbarea orthoceras.

2. Barbarea hongii

Herbs annual or biennial, 35–60 cm tall. Stems erect, angled, glabrous throughout. Basal leaves not seen; lowermost cauline leaves petiolate; petiole 2.5–6 cm, glabrous; leaf blade 4–7 cm, lyrate-pinnatifid, with 1–3 lobes on each side of midvein, not fleshy; lateral lobes oblong or ovate, 2–10 × 1–5 mm, entire; terminal lobe oblong or ovate, considerably larger than lateral ones, 2–3 × ca. 1.5 cm. Cauline leaves usually with 1 lateral
lode on each side, with the uppermost unlobed, obtusely toothed, sessile, conspicuously auriculate; auricles narrowly oblong, to 10 × 3 mm, only sparsely ciliate, entire; lateral lobes oblong, to 10 × 3 mm, glabrous, entire; terminal lobe much larger than lateral ones, ca. 3 × 1 cm, re功用 to or obtusely dentate. Fruiting racemes ebracteate, elongated considerably. Flowers not seen. Fruiting pedicels erect, appressed to stem, 4–7 mm, terete or subquadrangular, glabrous, slender, much narrower than fruit. Fruit linear, 1.2–3 cm × 2–2.5 mm, strongly flattened and latiseptate, torulose, erect; gynophore to 0.5 mm; valves apex acute; style stout, 0.5–1(–1.2) mm, strongly flattened and latiseptate, torulose, erect to erect-ascending; gynophore to 0.3 mm; ovate to ovate-oblong, 1.6–2 × 1.4–1.7 mm, uniseriate, strongly compressed, winged all around; wing 0.1–0.3 mm wide. Fr. Jul.

• Basaltic rock; ca. 1700 m. Jilin.

This species is known only from the type collection.


山芥 shan jie

Barbarea americana Rydberg; B. cochlearifolia H. Boissieu; B. hondoensis Nakai; B. orthoceras var. formosana Kitamura; B. patens H. Boissieu; B. vulgaris R. Brown var. orthoceras (Ledebour) Regel.

Herbs biennial or perennial, (10–)20–60(–100) cm tall. Stems erect, angled, glabrous throughout. Basal and lowermost cauline leaves petiolate; petiole (0.5–)1–5(–7) cm, glabrous or rarely ciliate basally; leaf blade (1–)1.5–4(–6) cm, lyrate-pinnatifid, with (1 or)2–4(–6) lobes on each side of rachis, rarely unlobed, not fleshy; lateral lobes oblong or ovate, 2–10 × 1–5 mm, entire; terminal lobe considerably larger than lateral ones, 1.5–5 × 1–2.5 cm. Cauline leaves usually lyrate-pinnatifid, with 1–4 lateral lobes, rarely coarsely toothed, sessile, conspicuously auriculate; auricles ovate or narrowly oblong, to 8 × 5 mm, ciliate, entire; lateral lobes oblong or ovate, rarely lanceolate, to 2 × 1 cm, glabrous, entire; terminal lobe much larger than lateral ones, to 5 × 3 cm, entire, repand, or rarely dentate. Racemes ebracteate, elongated considerably in fruit. Sepals yellow, oblong, 2.5–3.5 × 1–1.5 mm, erect, margin scarios, lateral pair slightly saccate. Petals yellow or pale yellow, oblong or suboblong, rounded, (3–)4–5(–6) × 1.5–2 mm, attenuate to base. Filaments yellow, 3–4.5 mm; anthers oblong, ca. 1 mm. Fruiting pedicels erect or ascending, (2–)3–6(–7) mm, terete or subquadrangular, glabrous, stout, slightly narrower than fruit. Fruit linear, (1.5–)2–4(–5) cm × 1.2–1.5 mm, terete-subquadrangular, torulose, erect to erect-ascending; gynophore to 0.3 mm; valves apex obtuse to subacute; style stout, 0.5–1(–1.2) mm. Seeds brown, ovate or oblong, 1.2–1.5 × 0.9–1 mm, uniseriate, somewhat plump, wingless. Fl. Jun–Jul, fr. Aug–Sep. 2n = 16.

Open grasslands, scree, temperate mixed forests, river and stream-sides, moist grassy slopes; 400–2100 m. Gansu, Heilongjiang, Jilin, Liaoning, Nei Mongol, Taiwan, Xinjiang [Japan, Korea, Mongolia, Russia; North America].


羽裂山芥 yu lie shan jie

Herbs biennial, 15–60 cm tall. Stems erect, angled, glabrous. Basal and lowermost cauline leaves petiolate; petiole 0.5–3(–4.5) cm, glabrous or ciliate; leaf blade 1.5–7 cm, lyrate-pinnatifid, with 1–4(–7) lobes on each side of midvein, not fleshy; lateral lobes oblong or ovate, 3–10(–15) × 1–5(–7) mm, entire or re功用; terminal lobe ovate, considerably larger than lateral ones, 1–3 × 0.7–1.5 cm. Cauline leaves pinnatifid or pinnatisect, with 1–4 lateral lobes, entire, sessile, conspicuously auriculate; auricles ovate or narrowly oblong, to 10 × 5 mm, ciliate; lateral lobes linear to linear-oblong, to 2.5 × 0.5 cm, glabrous or ciliate, entire; terminal lobe obovate-oblong, larger than lateral lobes and to 4 × 1.5 cm, entire or repand or rarely dentate. Racemes ebracteate, elongated considerably in fruit. Sepals yellow, oblong, 2–3 × 1–1.3 mm, erect, margin scarios, lateral pair slightly saccate. Petals yellow, oblong-obovate, rounded, 4–6 × 1–1.5 mm, attenuate to base. Filaments yellow, 3–4 mm; anthers oblong, ca. 1 mm. Fruiting pedicels erect or ascending, rarely divaricate, (2–)3–5 mm, terete or subquadrangular, glabrous, stout, slightly narrower than fruit. Fruit linear, (1–)1.5–3 cm × 1.5–1.8(–2) mm, terete or slightly compressed, torulose, erect to erect-ascending; gynophore to 0.5 mm; valves apex acute to subobtuse; style slender or slightly stout, 1–1.5 mm. Seeds brown, ovate to ovate-oblong, 1.2–1.7 × 1–1.2 mm, uniseriate, somewhat plump or slightly compressed, wingless. Fl. Jun–Jul, fr. Jul–Aug. 2n = 16.

Woods, along ditches, stream-sides; ca. 4100 m. Xinjiang, Xizang [Bhutan, India, Nepal, Pakistan, Sikkim; native to SW Asia and C Europe].


欧洲山芥 ou zhou shan jie

Barbarea arcuata (Opiz ex J. & C. Presl) Reichard; B. vulgaris var. arcuata (Opiz ex J. & C. Presl) Fries; Erysimum arcuatum Opiz ex J. & C. Presl; E. barbarea Linnaeus.

Herbs biennial or rarely perennial, glabrous throughout or sparsely hairy. Stems (20–)30–80(–100) cm tall, erect, angled, branched above. Basal and lowermost cauline leaves petiolate; petiole (0.5–)2–8(–12) cm, glabrous or ciliate; leaf blade 1.5–7 cm, lyrate-pinnatifid, with 1–3(–5) lobes on each side of midvein, rarely early ones undivided, sometimes slightly fleshy; lateral lobes oblong or ovate, 0.3–2(–4) cm × 1–8(–15) mm, entire, repand, crenate, or dentate; terminal lobe ovate or suborbicular, considerably larger than lateral ones, (0.7–)1.5–4.5(–7) × (0.4–)1–3(–5) cm. Upper cauline leaves ovate or suborbicular, undivided, coarsely dentate, sinuate, or rarely subentire, sessile,
conspicuously auriculate; auricles ovate or narrowly oblong, to 10 × 5 mm, often ciliate. Racemes ebracteate, elongated considerably in fruit. Sepals yellow, oblong, 3–4 × 1–1.5 mm, erect, margin scarious, lateral pair slightly saccate. Petals yellow, spatulate, rounded, 5–6–(7) × 1.5–2 mm, attenuate to base. Filaments yellow, 3–4.5 mm; anthers oblong, 0.7–1.2 mm. Fruiting pedicels divaricate or erect-ascending, 3–7 mm, terete or subquadangular, glabrous, narrower than fruit. Fruit linear, (0.7–)1.5–3 cm × 1–1.5 mm, terete, somewhat compressed, or 4-angled, torulose; style to erect-ascending; gynophore to 0.5 mm; valves apex obtuse or subacute; style slender, 1.5–3 mm. Seeds dark brown, broadly ovate or subglobose, 1.2–1.5 × 1–1.2 mm, uniseriate, plum, wingless. Fl. and fr. Apr–Aug. 2n = 16.

Along ditches, river banks, damp grasslands, waste places, roadsides, fields, disturbed sites; 700–4100 m. Heilongjiang, Jiangsu, Jilin, Xinjiang [India, Japan, Kashmir, Kazakhstan, Korea, Mongolia, Pakistan, Russia, Sri Lanka, Tajikistan; SW Asia, Europe; naturalized elsewhere].


Herbs annual. Trichomes absent. Stems few to several from basal rosette, simple, leafy or leafless. Basal leaves long petiolate, rosulate, simple, palmately veined, margin crenate-repand or rarely subentire, with distinct apiculate callosities that terminate ultimate veins and occupy marginal notches. Cauline leaves absent or similar to basal. Racemes ebracteate, elongated in fruit. Fruiting pedicels slender, erect or divaricate. Sepals ovate or rarely oblong, spreading, base of lateral pair not saccate. Petals white, spreading; blade obcordate, apex emarginate; claw absent. Stamens 6, spreading, subequal in length; filaments strongly dilated at base; anthers ovate, obtuse at apex. Nectar glands confluent, subtending bases of all stamens; median glands present. Ovules 10–40 per ovary. Fruit dehiscent siliques, linear or oblong, terete or rarely slightly latiseptate, sessile; valves papery, with an obscure midvein, torulose; replum rounded; septum complete, membranous, translucent, veinless; style absent or distinct and to 1 mm, cylindric or clavate; stigma capitate, entire. Seeds uniseriate, wingless, oblong or orbicular, slightly flattened; seed coat minutely reticulate, not mucilaginous when wetted; cotyledons accumbent.

• Three species.
1a. Stems leafy; style clavate .............................................................. 1. N. yungshunensis
1b. Stems leafless; style absent or cylindric.

2a. Style absent or rarely to 0.2 mm; sepals 1.5–2 mm; petals 4–5.5 mm; ovules 10–20 per ovary; fruit oblong-

2b. Style cylindric, to 1 mm; sepals ca. 3.5 mm; petals ca. 8 mm; ovules 30–40 per ovary; fruit linear, young

ones longer; flowers in racemes ...................................................... 3. N. grandiflora

永顺堇叶芥 yong shun jin ye jie


Herbs 20–41 cm tall. Stems erect, simple, leafy, few to several from base. Basal leaves rosulate; petiole 3–11 cm; leaf blade ovate or broadly so, 2–6 × 1–5 cm, base subacute or truncate, margin repand, with apiculate callosities to 0.5 mm, apex rounded or obtuse. Middle cauline leaves similar to basal but smaller, often subentire. Infructescence lax raceme, ebracteate. Fruiting pedicels ascending, filiform, 1–2 cm. Sepals ovate, 1.5–2 × 1–1.2 mm. Petals white, obcordate, 4–5 × 2–2.5 mm. Filaments white, 1.5–2 mm; anthers ovate, 0.6–0.8 mm. Ovules (20–)30–40 per ovary. Fruit linear, (0.8–)1.5–3.5 × 1–1.5 mm, terete, torulose; valves with an obscure midvein; style 0.6–1 mm. Seeds oblong, slightly flattened, 0.8–1.1 × 0.6–0.7 mm. Fl. Apr. fr. May.


堇叶芥 jin ye jie


Herbs (4–)7–17(–20) cm tall, scapose. Stems erect, simple, leafless, few to several from base. Basal leaves rosulate; petiole (1.5–)3–10(–14) cm; leaf blade cordate, reniform, or suborbicular, (0.8–)1.5–4(–5) × (0.6–)1–3.5(–4) cm, base cordate, margin crenate-repand or rarely subentire, with apiculate callosities to 1 mm, apex rounded or obtuse. Cauline leaves absent. Fruiting pedicels suberect or spreading, filiform, (1–)1.5–4(–7) cm, a few solitary and originate from center of rosette. Sepals ovate, 1.5–2 × 1–1.2 mm. Petals white, obcordate, 4–5.5 × 2–3 mm. Filaments white, 1.5–2 mm; anthers ovate, 0.4–0.5 mm. Ovules 10–20 per
ovary. Fruit oblong-linear to oblong, 5–12 × 1–1.5 mm, slightly compressed, subtorulose; valves with an obscure midvein; style absent or rarely to 0.2 mm. Seeds subtorulose, slightly flattened, 0.6–0.9 mm in diam. Fl. Feb–Apr, fr. Mar–May.

- Rocky areas; 800–1600 m. Guizhou, Hunan, Sichuan, Yunnan.


大花堇叶芥 da hua jin ye jie
Herbs ca. 15 cm tall, scapose. Stems erect, simple, leafless, few from base. Basal leaves rosulate; petiole 4–12 cm; leaf blade broadly ovate or suborbicular, 2–6 × 1.5–3.5 cm, base subcordate or subtruncate, margin crenate-repand, with apiculate callosities to 0.5 mm, apex rounded. Cauline leaves absent. Fruiting pedicels suberect or ascending, 1–1.5 cm, all on raceme. Sepals oblong, ca. 3.5 × 1.5 mm. Petals white, narrowly obcordate, ca. 8 × 3 mm. Filaments white, ca. 3.5 mm; anthers ovate, ca. 0.6 mm. Ovules 30–40 per ovary. Immature fruit linear, ca. 2 cm × 1 mm, subtorulose; style slender, 1–1.2 mm. Mature seeds not seen. Fl. Apr.

- Damp places by streamside; about 600 m. Hunan, Sichuan.


南芥属 nan jie shu

Parryodes Jafri.

Herbs annual, biennial, or perennial, rarely subshrubs or shrubs. Trichomes stellate, dendritic, or stalked forked, sometimes with fewer simple ones, rarely primarily simple. Stems simple or branched apically. Basal leaves petiolate, rosulate, simple, often entire, sometimes dentate, rarely lyrate-pinnatifid. Cauline leaves sessile and auriculate, sagittate, or amplexicaul, very rarely petiolate, entire or dentate. Racemes ebracteate or rarely bracteate throughout or only basally, sometimes in panicles, elongated in fruit. Fruiting pedicels erect, ascending, divaricate, or reflexed. Sepals ovate or oblong, base of lateral pair saccate or not, margin membranous. Petals white, pink, or purple; blade spatulate, oblong, or oblanceolate, rarely obovate, apex obtuse or emarginate; claw shorter than sepals. Stamens 6, tetradynamous; filaments usually not dilated at base; anthers ovate, oblong, or linear, obtuse at apex. Nectar glands confluent, subtending bases of all stamens; median glands sometimes toothlike and free, rarely absent; lateral glands semiannular or annular. Ovules 12–110 per ovary. Fruit dehiscent siliques, linear, latiseptate, sessile or rarely shortly stipitate; valves papery, with an obscure or prominent midvein, smooth or torulose; replum rounded; lateral glands semiannular or annular. Ovules 12–110 per ovary. Fruit dehiscent siliques, linear, latiseptate, sessile or rarely shortly stipitate; valves papery, with an obscure or prominent midvein, smooth or torulose; replum rounded.

About 70 species: temperate Asia, Europe, North America; 14 species (one endemic) in China.

The limits of Arabis are highly artificial, and the genus is defined primarily on the basis of having branched trichomes, flattened, linear fruit, and accumbent cotyledons. However, this combination of characters has evolved independently several times in the Brassicaceae. A critical study of the genus on a worldwide basis is much needed.

1. Racemes bracteate throughout ........................................................................................................ 10. A. axilliflora

1b. Racemes ebracteate, rarely lowermost 1–3 flowers bracteate.

2a. Annuals; fruiting pedicel thickened, at least half as wide as fruit; rachis flexuous ............... 14. A. auriculata

2b. Biennials or perennials; fruiting pedicels much narrower than fruit; rachis not flexuous.

3a. Shrubs or subshrubs; style absent or obsolete; fruit densely pubescent ......................... 12. A. fruticulosa

3b. Herbs; style distinct; fruit glabrous or if pubescent (A. flagellosa) then leaves dentate.

4a. Scapose perennials with caulicides covered with petioles of previous years; trichomes almost exclusively simple, restricted to leaf margins and sepals abaxially; stems leafless or with 1–3 leafy bracts ........................................................................................................................................... 11. A. alaschanica

4b. Non-scapose biennials or perennials often without petioles of previous years; trichomes a mixture of various kinds, very rarely restricted to leaf margins; stems leafy.

5a. Cauline leaves petiolate or cuneate to petiolelike base; fruit valves with an obscure midvein.

6a. Biennials; petals 3–5 mm; fruit apex acuminate; Xizang [Kashmir, Afghanistan, Pakistan, Tajikistan] ................................................................................................................. 13. A. tibetica

6b. Stoloniferous perennials; petals 7–10 mm; fruit apex acute; Anhui, Jiangsu, Zhejiang [Japan] ........................................................................................................................................... 9. A. flagellosa

5b. Cauline leaves sessile, auriculate, sagittate, or amplexicaul, rarely rounded at base; fruit valves often with a prominent midvein.

7a. Fruit and often fruiting pedicels erect, appressed to rachis.

8a. Petals (3.5–)4–5 mm; fruit 0.8–1.2 mm wide ................................................................. 8. A. hirsuta

8b. Petals 6–10 mm; fruit 1.5–2 mm wide.
9a. Petsals white, 3–4 mm wide, apex shallowly emarginate; sepals 4–5 mm, lateral pair saccate; middle cauline leaves pilose with primarily branched trichomes; seeds narrowly winged distally ................................................................. 6. A. stelleri
9b. Petsals purple, pink, or rarely white, 2–3 mm wide, apex rounded; sepals 2.5–3.5 mm, lateral pair not saccate; middle cauline leaves hirsute with predominantly simple trichomes; seeds broadly winged all around ... 7. A. pterosperma

7b. Fruit and fruiting pedicels divaricate or reflexed, fruit sometimes erect on divaricate or ascending pedicels never appressed to rachis.
10a. Petsals 3–6(–6.5) mm; lateral sepals not saccate; style in fruit 0.2–0.8 mm.
11a. Basal rossette absent at anthesis and fruiting; leaves with coarse subsetose trichomes mixed with sessile, much smaller stellate ones; fruit reflexed or divaricate, 1.5–2 mm wide ............................................................................................................. 4. A. pendula
11b. Basal rossette often present through fruiting; leaves with stalked, forked or 3- or 4-rayed stellate trichomes mixed with simple nonsetose ones; fruit ascending or erect, rarely reflexed or spreading, 1–1.5 mm wide ...................... 5. A. paniculata
10b. Petsals 7–15 mm; lateral sepals saccate; style in fruit 1–2.5 mm.
12a. Plants hirsute or hispid with primarily simple, subsetose trichomes 1. A. amplexicaulis
12b. Plants tomentose or pilose with almost exclusively branched trichomes, sometimes glabrescent.
13a. Leaves obtuse or auriculate at base; filaments 5–8 mm; petals 9–14 mm, obtuse at apex; 2-forked trichomes distinctly stalked ................. 2. A. bijuga
13b. Leaves cordate or amplexicaul at base; filaments 4–5 mm; petals 7–10 mm, truncate-emarginate at apex; 2-forked trichomes often submalpighiaceous ............................ 3. A. serrata


抱茎南芥 bao jing nan jie
Herbs biennial or short-lived perennial, (20–)30–60(–70) cm tall, densely to sparsely hispid or hirsute, with primarily simple subsetose trichomes to 1.7 mm, these mixed with much fewer, smaller, stalked 2–4-forked ones. Stems erect, often single from base. Basal leaves rosetulate; petiole 0.5–5 cm; leaf blade lanceolate-obovate, oblone, or ob lanceolate, 3–9(–11) × 1–2(–3) cm, base attenuate, margin dentate or entire, ciliate, apex obtuse or rounded. Middle cauline leaves sessile, oblone or ovate, (1–)1.5–5(–8) × 0.6–2.5(–4) cm, base cordate or amplexicaul, margin dentate or entire.

Racemes ebracteate. Fruiting pedicels divaricate, 0.6–1.5 cm, slender, straight, glabrous. Sepals oblone, 4–6 × 1.2–1.5 mm, glabrous, lateral pair saccate. Petals white, oblone or narrowly oblanceolate, (0.7–)0.9–1.2 cm × 2–3.5 mm, apex obtuse. Filaments 3.5–6 mm; anthers oblone, 0.8–1 mm. Ovules 50–70 per ovary. Fruit (2.5–)3.5–6.5 (–7) cm × 1–1.5 mm, erect, divaricate, or rarely reflexed; valves with a distinct midvein, torulose, glabrous; style 1–1.5 mm. Seeds brown, oblone, 1.2–1.5 × 0.8–1 mm, uniseriate, narrowly winged apically. Fl. Apr–Jun, fr. May–Jul. 2n = 16.

Forest margins, shady places; 1800–3200 m. Xizang [Afghanistan, Bhutan, India, Kashmir, Nepal, Pakistan].

The description of Arabis amplexicaulis in FRPS and the material so named that was examined by the present authors in various Chinese herbaria represent misidentifications of A. paniculata. However, the occurrence of true A. amplexicaulis in China (Xizang) is here confirmed based on Qinghai-Tibet Team 6886 (PE).


大花南芥 da hua nan jie
Arabis macrantha C. C. Yuan & T. Y. Cheo; A. pangiensis Watt.

Herbs perennial, 15–40 cm tall, often densely tomentose or pilose, with primarily short-stalked, stellate trichomes, these sometimes mixed with much fewer, simple or forked ones, rarely plants glabrescent and trichomes restricted primarily to leaf margins. Stems erect, often branched at base. Basal leaves rosetulate; petiole 0.5–5 cm; leaf blade obovate-spatulate, oblone, elliptic, or ob lanceolate, 1.5–5 × 0.5–1.5 cm, base attenuate, margin dentate or entire, apex obtuse or rounded. Middle cauline leaves sessile, oblone-linear, narrowly elliptic, or narrowly lanceolate, 1–4(–5.5) cm × 2–8 mm, base obtuse or auriculate, margin dentate or entire. Racemes ebracteate. Fruiting pedicels divaricate or ascending, (0.8–)1.2–2.4(–3) cm, slender, straight, glabrous. Sepals oblone, 3.5–5 × 1.2–1.8 mm, glabrous, lateral pair saccate. Petals white or pinkish, oblone or narrowly oblanceolate, 0.9–1.4 cm × 2–4 mm, apex obtuse. Filaments 5–8 mm; anthers oblone, 1–1.5 mm. Ovules 40–70 per ovary. Fruit 3–6 cm × 1–1.2 mm; valves with a prominent midvein extending full length, slightly torulose, glabrous; style 1–1.5 mm. Seeds brown, oblone, ca. 1.2 × 0.5 mm, uniseriate, narrowly winged apically. Fl. Apr-Jun, fr. May–Jul.
Grassy slopes, rock crevices, dry cliffs, stony pastures; 2400–3000 m. Sichuan, Yunnan [Kashmir, Pakistan].

Arabis bijuga, which was previously thought to be restricted to Kashmir and Pakistan, is recorded here for the first time from China. The records from Sichuan are based on Soulié 1493 (P) and the type collection of A. macrantha, Fang Wen-pei et al. 12402 (NAS, SZ); the record from Yunnan is based on Yu 8456 (BM), Forrest 20147 (E, US), and Forrest 16192 (E).

The type collection of Arabis bijuga is basically indistinguishable from those of A. macrantha and A. panisensis except for being glabrescent (vs. moderately to densely tomentose). However, this difference alone does not justify the recognition of more than one species.


Herbs perennial, (5–)12–35(–45) cm tall, densely to sparsely pilose, with minute, short-stalked or subsessile, submalpighiaceous and 3–5-rayed stellate trichomes, rarely glabrescent or with some near simple ones near stem base. Stems erect, single or few from base. Basal leaves roslulate; petiole (0.5–)1–4(–6) cm; leaf blade spatulate, oblanceolate, obovate, or narrowly oblanceolate, (1.5–)3–10(–15) × (0.5–)1–2.5(–4) cm, base cuneate or attenuate, margin entire, dentate, or rarely lyrate-sinuate, apex obtuse or rounded. Middle cauline leaves sessile, oblong or ovate, (1–)2–4(–6) × 0.5–2.5(–3.5) cm, basecordate or amplexicaul, margin dentate or entire. Racemes ebracteate. Fruiting pedicles ascending, divaricate, or reflexed, (0.5–)1–2.8(–3.5) cm, slender, straight or curved, stellate or subglabrous. Sepals narrowly oblong, 2.5–3.5(–4) × 1–1.3 mm, glabrous or variously pubescent, not saccate. Petals white or rarely pink, narrowly oblong-oblancopectate (3–)3.5–4.5(–5.5) × 1–1.5 mm. Filaments 3–4 mm; anthers oblong, 0.5–0.8 mm. Ovules 70–110 per ovary. Fruit (3.5–)4.5–9(–10) cm × 1.5–2 mm, spreading or unilaterally deflexed; valves glabrous or very rarely sparsely stellate, with a prominent midvein extending full length; style 0.2–0.8 mm, rarely obsolete. Seeds brown, ovate, suborbicular, or rarely oblong, (1.2–)1.4–1.8 × (0.7–)1–1.3 mm, flattened, uniseriate or biseriate, winged all around or only distally; wing 0.1–0.3 mm wide. Fl. Jun–Aug. fr. Jul–Sep. 2n = 16.

Rocky crevices, along streams, mountain slopes, deciduous forest; 100–3200 m. Anhui, Taiwan [Japan, Korea].

Arabis serrata is highly variable in basal leaf indumentum, margin, and petiole length. Of the many taxa synonymized above, none seems to merit recognition. In fact, A. formosana is indistinguishable from some of the Japanese forms of A. serrata.


Arabis pendula var. glabrescens Franchet; A. pendula var. hebecarpa Y. C. Lan & T. Y. Cheo; A. pendula var. hypoglauca Franchet; A. subpendula Ohwi.

Herbs biennial, (15–)30–110(–170) cm tall, sparsely to densely hispid, with subsetose simple trichomes to 1.7 mm, these mixed with much smaller, sessile, 3–6-rayed stellate ones usually 1 of its rays perpendicular to the surface. Stems erect, simple, often paniculate branched above. Basal and lowermost cauline leaves petiolate, often wither by anthesis. Middle cauline leaves sessile; leaf blade lanceolate, oblong, or elliptic, (1.5–)3–10(–15) × (0.5–)1–2.5(–4) cm, densely to sparsely pubescent, with a mixture of stellate and simple trichomes, often ciliate, base cuneate, auriculate, or amplexicaul, margin dentate, saccate, serrate, serrulate, repand, or entire, apex acuminate or acute. Racemes ebracteate. Fruiting pedicles ascending, divaricate, or reflexed, (0.5–)1–2.8(–3.5) cm, slender, straight or curved, stellate or subglabrous. Sepals narrowly oblong, 2.5–3.5(–4) × 1–1.3 mm, glabrous or variously pubescent, not saccate. Petals white or rarely pink, narrowly oblong-oblancopectate (3–)3.5–4.5(–5.5) × 1–1.5 mm. Filaments 3–4 mm; anthers oblong, 0.5–0.8 mm. Ovules 70–110 per ovary. Fruit (3.5–)4.5–9(–10) cm × 1.5–2 mm, spreading or unilaterally deflexed; valves glabrous or very rarely sparsely stellate, with a prominent midvein extending full length; style 0.2–0.8 mm, rarely obsolete. Seeds brown, ovate, suborbicular, or rarely oblong, (1.2–)1.4–1.8 × (0.7–)1–1.3 mm, flattened, uniseriate or biseriate, winged all around or only distally; wing 0.1–0.3 mm wide. Fl. Jun–Aug. fr. Jul–Sep. 2n = 16.

Rocky slopes, roadsides, woodlands, meadows, limestone cliffs, hillsides, waste places, thickets, forest margins, valleys, river banks, grassy areas, deserts; near sea level to 4300 m. Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan [Japan, Kazakhstan, Korea, Mongolia, Russia, Europe].

Arabis pendula is highly variable in the density of indumentum, fruit width and orientation, seed arrangement per locule, and development of the seed wing. The type collections of the taxa synonymized above are based on misidentified plants that represent only a few of the numerous variants that occur throughout the range of the species.

5. Arabis paniculata Franchet, Pl. Delavay. 57. 1889.

Arabis paniculata chui guo nan jie
Arabidopsis mollissima (C. A. Meyer) N. Busch var. yunnanensis O. E. Schulz; Arabis alpina Linnaeus var. parviflora Franchet; A. alpina var. rigida Franchet; A. alpina var. rubrocalyx Franchet; A. paniculata var. parviflora (Franchet) W. T. Wang.

Herbs biennial or short-lived perennial, (10–)20–75–110 cm tall, densely to sparsely hirsute, with stalked, forked or 3- or 4-rayed stellite trichomes mixed at least basally with varying amounts of simple ones. Stems erect, simple or few from base, often branched at middle. Basal leaves rosulate, present at anthesis; petiole often absent, rarely distinct and to 2.5 cm; leaf blade oblanceolate, narrowly obovate, oblong, or lanceolate, (1–)2–6(–8) × (0.5–)1–2(–2.5) cm, base attenuate, margin dentate, serrate, or rarely entire, apex obtuse or acute. Middle cauline leaves sessile, oblong, ovate, or elliptic, rarely suboblanceolate, (0.7–)1.5–4(–6) cm × (2–)4–14(–25) mm, with stellite trichomes sometimes mixed adaxially with simple ones, base cordate or auriculate, rarely amplexicaul, margin dentate or entire, apex obtuse or acute. Racemes ebracteate. Fruiting pedicels divaricate, rarely ascending or slightly reflexed, (0.4–)0.6–1.8(–2.5) cm, slender, straight or rarely slightly curved. Sepals oblong or sub lanceolate, 2.5–3.5(–4) × 1–1.5 mm, glabrous or sparsely pubescent, not saccate. Petals white or rarely pale pink, oblong or narrowly oblanceolate, 4–6(–6.5) × 1–2 mm, apex obtuse. Filaments 3.5–5 mm; anthers oblong, 0.8–1 mm. Ovules 36–80 per ovary. Fruit (1.5–)2.5–5.5(–6) cm × 1–1.5 mm, erect or divaricate or rarely reflexed, not appressed to rachis; valves with a distinct midvein, torulose, glabrous; style 0.4–0.8 mm. Seeds brown, oblong or ovate, 1–1.3 × 0.7–0.9 mm, narrowly winged on distal half. Fl. and fr. Apr–Aug. Waste areas, road sides, grassy slopes, along ditches; 1300–3400 m. Gansu, Guizhou, Hubei, Shaanxi, Sichuan, Xizang, Yunnan [Kashmir, Nepal].

The above first record from Xizang is based on C. Y. Wu et al. 75–54 (PE) and Ludlow & Sershoff 1699 (BM). The above first record from Nepal is based on Stainton, Sykes & Williams 1933 (BM, E), Malla 10717 (BM), and Shrestha & Bista 1923 (US). The above first record from Kashmir is based on Winterbottom 59 (K), which was cited by Jafri (Fl. West Pakistan 55: 177, 1973) as A. pterosperma. That species, however, is quite different from A. paniculata in having predominantly simple trichomes, erect fruit, 1.5–2.5 mm wide, with pedicels appressed to the infructescence rachis.

An examination of all of the type collections (including syntypes) of Arabidopsis mollissima var. yunnanensis, Arabis alpina var. parviflora, A. alpina var. rigida, A. alpina var. rubrocalyx, and A. paniculata clearly shows that they all represent minor variants of one species. Arabis alpina var. parviflora is here lectotypified on Delavay s.n., 29 Aug 1883 (P) because another of the three syntypes of this variety, Delavay 2758 (P), is a specimen of A. hirsuta.

The record of Arabis chaneti in FRPS is based on misidentified plants of A. paniculata. The holotype of A. chaneti is a specimen of Orochrophagus violaceus.

Although Arabis alpina was recognized in FRPS and some other provincial floras (e.g., Fl. Guizhou. 7: 30, 32. 1989; Fl. Sichuan. 4: 117–119. 1999; Fl. Yunnan. 6: 81–83. 1995) as a distinct species and/or as var. parviflora, all such records are based on plants of A. paniculata. True Arabis alpina is a strictly European species that does not grow anywhere in Asia. It is readily distinguished from A. paniculata by having strongly saccate lateral sepals, obovate petals (0.7–)1–2 cm, and broad fruit 1.5–2.5 mm wide. By contrast, A. paniculata has non-saccate sepals, narrowly oblong-oblanceolate petals less than 0.8 mm, and narrower fruit rarely to 1.5 mm wide.


基隆南芥 jii long nan jie Arabis alpina Linnaeus var. japonica A. Gray; A. fauriei H. Léveillé (1910), not H. Boissieu (1899); A. japonica (A. Gray) A. Gray (1858), not Regel (1863); A. kelunginsularis Hayata; A. lithophila Hayata; A. stelleri de Candolle subsp. japonica (A. Gray) Voroschilov; A. stelleri var. japonica (A. Gray) F. Schmidt; A. yokkosensis Franchet & Savatier.

Herbs perennial, (10–)20–35(–45) cm tall, sparsely to densely pilose, with a mixture of simple and stalked, forked or 3- or 4-rayed stellite trichomes. Stems erect or ascending, simple or branched at base, basally with primarily simple trichomes. Basal leaves rosulate; petiole 1–2 cm, winged; leaf blade spatulate or oblanceolate, obvate, or oblong, (1–)2–5.5(–7) × (0.5–)1–2(–2.8) cm, base attenuate, margin entire or occasionally denticulate, apex rounded or obtuse. Middle cauline leaves sessile, oblong or ovate, (1.2–)2–5–7(–7) × (0.4–)0.7–1.5(–2) cm, pilose with predominantly stellite and forked trichomes, base auriculate, cordate, or rarely amplexicaul, margin dentate or entire, apex obtuse or rounded. Racemes ebracteate. Fruiting pedicels erect or rarely ascending, often subappressed to rachis, 0.7–1.5(–2) cm, slender, straight. Sepals oblong, 4–5 × 1.5–2 mm, glabrous, lateral pair saccate. Petals white, spatulate, 7–10 × 3–4 mm, apex shallowly emarginate. Filaments 3.5–6 mm; anthers oblong, 1–1.5 mm. Ovules 34–60 per ovary. Fruit (2.5–)3–5(–6) cm × 1.5–2 mm, erect, appressed to rachis; valves with a prominent midvein extending full length, torulose, glabrous; style (0.1–)0.5–1(–1.5) mm. Seeds brown, suborbicular or ovate-oblong, 0.9–1.4 × 0.8–1 mm, uniseriate, narrowly winged distally; wing to 0.1 mm wide. Fl. Apr–Jun, fr. May–Aug. 2n = 32.

Sandy coasts, roadsides, stream sides, forest margins; near sea level to 600 m. Taiwan [Japan, Korea, Russia].


Herbs biennial or short-lived perennial, (10–)20–60(–80) cm tall, densely or rarely sparsely hirsute, primarily with simple trichomes, these often mixed at least distally with long-stalked, forked or rarely stellite ones. Stems erect, simple from base, simple or branched above. Basal leaves rosulate; petiole often absent, rarely


**Arabis holanshanica** Y. C. Lan & T. Y. Cheo. Herbs perennial, (3–)8–20(–30) cm tall, scapose; caudex branched, covered with stramineous, persistent petioles of previous years; trichomes simple, subsetose, to 1.5 mm, rarely mixed with short-stalked, forked ones, often restricted to leaf margins and adaxial surface of sepals. Stems erect or ascending, leafless or few leaved. Basal leaves roslulate; petiole 0.5–3.5(–5) cm, narrowly winged, ciliate, persistent; leaf blade oblancocele, spatulate, or obovate, (0.6–)1.5–4.5(–6) cm × (3–)5–10(–14) mm, base attenuate, margin entire or sparsely serrulate distally, ciliate, apex acute. Cauline leaves 1–3 or absent, narrowly oblong or lanceolate, sessile. Racemes ebracteate or rarely lowermost 1–3 flowers bracteate. Fruiting pedicels 2–10(–20) mm, divaricate, straight, slender. Sepals oblong, 2.5–4 × 1–1.5 mm, abaxially sparsely pubescent, rarely glabrous, not saccate. petals white, pink, or purplish, spatulate, 6–9 × 2–3 mm, apex obtuse. Filaments 4–7 mm; anthers oblong, 0.7–1 mm. Ovules 12–26 per ovary. Fruit (1.5–)2.5–5(–7) cm × 1.5–2 mm; valves glabrous, slightly torulose, with a prominent midvein extending full length; style slender, 1–3 mm. Seeds brown, oblong, 1.4–2.5 × 0.8–1.4 mm, uniseriate, winged distally. Fl. May–Jun, fr. Jun–Jul.

- Calcareaous slopes, forest margins, streamsides; 2300–4200 m.
- Gansu, Nei Mongol, Ningxia, Qinghai, Shanxi, Sichuan.

The above first record from Shanxi is based on Smith 7449 (UPS).


**小灌木南芥** 蕉花南芥 ye hua nan jie


Herbs perennial, 3–20 cm tall, with a branched caudex covered with leaf remains of previous years, sparsely to moderately pilose, with simple and stalked forked trichomes. Stems erect, 1 or few from caudex. Basal leaves roslulate; petiole (0.5–)1.5–5 cm; leaf blade spatulate or oblancocele, (0.5–)1.5–5 × (0.3–)0.7–1.5 cm, pilose throughout or only along margins and midvein, base attenuate, margin entire or denticate, apex rounded. Cauline leaves 1–3, sessile, sometimes absent; leaf blade oblong, oblancocele, spatulate, or obovate, 1–4 × 0.5–1.5 cm, base cuneate, margins entire or few toothed. Racemes ebracteate throughout; bracts similar to cauline leaves but progressively smaller upward. Fruiting pedicels (0.3–)0.7–2(–2.5) cm, divaricate to divaricate-ascending, straight or slightly recurved. Sepals spreading, light purple, oblong-ovate, 4–7 × 1.5–2.5 mm, lateral pair saccate. Petals purple, spatulate or narrowly obovate, 0.7–1.5 cm × 3–6 mm, apex rounded. Filaments 4–11 mm; anthers oblong, 1–3 mm. Ovules 26–40 per ovary. Fruit (2.5–)3–5 cm × 1.5–2 mm; valves glabrous, slightly torulose, with a prominent midvein extending full length; style slender, 1–3 mm. Seeds brown, obovate, 1.4–2.5 × 0.8–1.4 mm, uniseriate, winged distally. Fl. May–Jun, fr. Jun–Aug.

Mountain slopes, cliffs, ledges; 3600–5000 m. S Xizang [Bhutan].

The holotype of **Arabis venusta** H. Hara (J. Jap. Bot. 47: 108. 1972, described from Bhutan) probably represents a small-flowered form or variety of **A. axilliflora**. Except for its small flowers (sepals 2.5–3.5 mm, petals 5–6 mm), it is indistinguishable from the latter species. In fact, the holotype of **A. axilliflora** var. brevistyla (sepals 4–5 mm, petals 7–12 mm) falls exactly halfway between those of **A. axilliflora** and **A. venusta**. Both species were recognized in Fl. Bhutan (1(2): 435. 1984), and it appears that poor sampling resulted in the recognition of three taxa instead of perhaps only one.


**西藏南芥** xi zang nan jie

**Arabis holanshanica** Y. C. Lan & T. Y. Cheo. Herbs perennial, (3–)8–20(–30) cm tall, scapose; caudex branched, covered with stramineous, persistent petioles of previous years; trichomes simple, subsetose, to 1.5 mm, rarely mixed with short-stalked, forked ones, often restricted to leaf margins and adaxial surface of sepals. Stems erect or ascending, leafless or few leaved. Basal leaves roslulate; petiole 0.5–3.5(–5) cm, narrowly winged, ciliate, persistent; leaf blade oblancocele, spatulate, or obovate, (0.6–)1.5–4.5(–6) cm × (3–)5–10(–14) mm, base attenuate, margin entire or sparsely serrulate distally, ciliate, apex acute. Cauline leaves 1–3 or absent, narrowly oblong or lanceolate, sessile. Racemes ebracteate or rarely lowermost 1–3 flowers bracteate. Fruiting pedicels 2–10(–20) mm, divaricate, straight, slender. Sepals oblong, 2.5–4 × 1–1.5 mm, abaxially sparsely pubescent, rarely glabrous, not saccate. petals white, pink, or purplish, spatulate, 6–9 × 2–3 mm, apex obtuse. Filaments 4–7 mm; anthers oblong, 0.7–1 mm. Ovules 12–26 per ovary. Fruit (1.5–)2.5–5(–7) cm × 1.5–2 mm; valves glabrous, slightly torulose, with a prominent midvein extending full length; style slender, 1–3 mm. Seeds brown, obovate, 1.4–2.5 × 0.8–1.4 mm, uniseriate, winged distally. Fl. May–Jun, fr. Jun–Aug.

- Rocky crevices, slopes, hillside; 500–3400 m. Xinjiang [Kazakstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan].


Herbs biennial, (4–)10–35(–50) cm tall, sparsely to densely covered basally with a mixture of simple and stalked, forked, stellate, or subdendritics trichomes, sometimes one type predominant, rarely mostly with simple trichomes, often glabrous or subglabrous on distal parts. Stems erect or ascending, few to several from base. Basal leaves rosulate; petiole 0.5–2(–3.5) cm; leaf blade spatulate, ovate, or oblong-oblanceolate, 0.5–2.5(–4) cm × 3–10 mm, base cuneate or attenuate, margin dentate or lyrate-dentate, apex obtuse or rounded. Middle cauline leaves shortly petiolate, linear-oblong-oblanceolate or oblong-obovate, 0.5–1.5(–2) cm × (1–)2–4 mm, base attenuate, margin entire or dentate. Racemes ebracteate. Fruiting pedicels divaricate or ascending, (2–)4–9(–12) mm, slender, straight. Sepals oblong, 1.5–3 × 0.8–1.3 mm, not saccate. Petals white or rarely pinkish, narrowly oblong-oblanceolate, 3–5 × 1–1.5 mm. Filaments 2–3.5 mm; anthers oblong, 0.4–0.7 mm. Ovules 30–60 per ovary. Fruit (2.5–)3.5–6(–7) cm × 1–2 cm, about half as thick as fruit, ascending, pubescent or glabrous. Basal leaves not rosulate; petiole 0.5–2(–3.5) cm, base cuneate or attenuate, margin entire or dentate. Middle cauline leaves sessile, subpressed to stems, ovate, oblong, or elliptic, (0.5–1–2) cm × 2–10 mm, base auriculate or ampeliscaul, margin entire or denticate. Racemes ebracteate; rachis flexuous in fruit. Fruiting pedicels 1–3(–5) mm, stout, as thick or about half as thick as fruit, ascending, pubescent or glabrous. Petals white, narrowly oblanceolate, 2–4 × 0.4–0.7(–1) mm, apex obtuse. Filaments 2–3 mm; anthers ovate, 0.2–0.3 mm. Ovules 15–50 per ovary. Fruit ascending, (1–)2–5 cm × 0.6–1(–1.2) cm, straight or slightly curved, slightly to strongly flattened; valves with distinct midvein, glabrous or puberulent with branched and simple trichomes; torulose or smooth; style 0.1–0.4 mm. Seeds brown, oblong, 0.7–1 × 0.4–0.6 mm, uniseriate, wingless. Fl. and fr. Mar-Jun. 2n = 16.

Dry mountain slopes, forests, limestone conglomerate; 500–1800 m. Xinjiang [Kazakhstan, Kyrgyzstan, Turkmenistan, Uzbekistan; N Africa, SW Asia, E Europe].

Arabidopsis tibetica has been reduced to the synonymy of A. nova Villars in some floras of countries W of China. However, the latter is a European species with much longer and more slender pedicels.


假蒜芥属 jia suan jie shu

Herbs annual, biennial, or perennial. Trichomes simple and stalked, 1- or 2-forked or dendritic. Stems erect or ascending, sometimes decumbent. Basal leaves petiolate, not rosulate, simple, pinnately lobed or coarsely dentate, rarely subentire. Cauline leaves petiolate or subsessile not auriculate, entire, dentate, or pinnatifid. Racemes several flowered, bracteate or ebracteate. Fruiting pedicels erect, ascending, divaricate, or rarely recurved. Sepals oblong, erect, glabrous or pubescent, base of lateral pair not saccate. Petals white or pink, longer than sepals; blade obovate, spatulate, or oblanceolate, apex obtuse; claw obscurely distinct. Stamens 6, slightly tetradynamous; filaments dilated or not dilated at base; anthers ovate or oblong, apex obtuse or apiculate. Nectar glands confluent and subtending bases of all stamens. Ovules 15–50 per ovary. Fruit dehiscent silique, linear, latispetate, ± rectangular in cross section, sessile; valves with a prominent midvein and 2 marginal veins and less prominent, reticulate lateral veins, pubescent or rarely glabrous, torulose; replum rounded; septum complete; style obsolete or to 1 mm; stigma capitate, entire or 2-lobed. Seeds uniseriate, wingless or distally margined, oblong, slightly flattened; seed coat minutely reticulate, not mucilaginous when wetted; cotyledons obliquely accumbent. Five species: China, Kyrgyzstan, Tajikistan; four species (three endemic) in China.

1a. Trichomes simple, flattened; petals 6–10 × 3–5 mm; fruiting pedicels 7–18(–25) mm ............... 4. S. yechengica

1b. At least some trichomes branched, not flattened; petals 2–4 × 0.6–1.5 mm; fruiting pedicels 0.5–5(–6) mm.

2a. Plants perennial; inflorescence bracteate; anthers apex obtuse ............................................. 3. S. shuanghuica


耳叶南芥 er ye nan jie

Arabidopsis cadiuna Boissier; A. recta Villars; A. sinaica Boissier; A. sogdiana Komarov; Sisymbrium sewerzowii Regel.

Herbs annual, (3–)10–40(–55) cm tall, densely pilose with stalked, forked or 3( or 4)-rayed stellate trichomes, these rarely mixed with fewer simple ones basally. Stems erect, simple at base, sometimes branched above middle. Basal leaves not rosulate; petiole 2–10 mm; leaf blade spatulate, obovate, or oblong-ovate, (0.5–1–2.5(–3) cm × 3–15 mm, base cuneate, margin dentate or sublyrate, sometimes subentire, apex obtuse or acute. Middle cauline leaves sessile, subpressed to stems, ovate, oblong, or elliptic, (0.5–1–2(–2.5) cm × 2–10 mm, base auriculate or ampeliscaul, margin entire or denticate. Racemes ebracteate; rachis flexuous in fruit. Fruiting pedicels 1–3–5 mm, stout, as thick or about half as thick as fruit, ascending, pubescent or glabrous. Petals white, narrowly oblanceolate, 2–4 × 0.4–0.7(–1) mm, apex obtuse. Filaments 2–3 mm; anthers oblate, 0.2–0.3 mm. Ovules 15–50 per ovary. Fruit ascending, (1–)2–5 cm × 0.6–1(–1.2) cm, straight or slightly curved, slightly to strongly flattened; valves with distinct midvein, glabrous or puberulent with branched and simple trichomes; torulose or smooth; style 0.1–0.4 mm. Seeds brown, oblong, 0.7–1 × 0.4–0.6 mm, uniseriate, wingless. Fl. and fr. Mar–Jun. 2n = 16.

Grassy slopes; 3000–4700 m. Xizang [Afghanistan, Kashmir, Kyrgyzstan, Pakistan, Tajikistan].

Although both FRPS and Fl. Xizang. (2: 370. 1985) recognized “Arabis attenuata” as a good species, that name was never validly published, but was merely listed as a questionable synonym in the protologue of A. tibetica. The same two floras recognized Arabidopsis tibetica as Arabidopsis tibetica, a position that might indeed prove correct with further studies.
2b. Plants annual; inflorescence ebracteate; anthers apex apiculate.

3a. Fruit glabrescent or sparsely pubescent with crisped forked trichomes to 0.4 mm; stigma subentire or slightly 2-lobed; fruiting pedicels stout; sepals sparsely pubescent with crisped forked trichomes. 1. *S. mollipila*

3b. Fruit densely villous with straight forked trichomes to 1 mm; stigma deeply 2-lobed; fruiting pedicels slender; sepals densely villous with straight simple trichomes. 2. *S. pamirica*


- Herbs annual or rarely biennial, (3–)18–45(–60) cm tall, pubescent basally with a mixture of simple and 1- or 2-forked, short-stalked trichomes, pubescent apically with crisped forked trichomes or rarely glabrescent. Stems erect, simple or sometimes branched at base. Basal leaves withered by fruiting; petiole (0.5–)1–1.7(–3) cm, strongly flattened at base, ciliate with simple trichomes to 1.5 mm; leaf blade narrowly oblong or linear-lanceolate, (1–)2–4(–7) cm × 2–8(–12) mm, base cuneate, margin coarsely dentate or pinnatifid, apex acuminate. Middle cauline leaves subsessile or shortly petiolate, similar to basal ones but progressively smaller upward. Racemes ebracteate, elongated considerably in fruit. Fruiting pedicels erect, appressed to rachis, straight, slender, 2–4 mm, densely covered with simple and branched trichomes. Sepals oblong, 1.5–2 × ca. 0.5 mm, scarious at margin, densely pubescent with straight simple trichomes. Petals pink, oblanceolate, 2–2.5 × ca. 0.7 mm, attenuate to base, apex obtuse. Filaments pink, 1.2–2 mm; anthers suboblong, ca. 0.5 mm, minutely apiculate. Fruit 3–4.7 cm × 1–1.1 mm, erect, appressed to rachis; valves densely villous with straight, stalked, forked trichomes to 1 mm; style obsolete; stigma deeply 2-lobed. Seeds yellowish brown, oblong, 0.8–1 × 0.6–0.7 mm, slightly compressed. Fl. and fr. Jul.

- About 3700 m. Xinjiang.


- Herbs perennial with a slender, simple or branched caudex, (5–)18–45(–60) cm tall, canescent, densely tomentose throughout with short-stalked, dendritic trichomes and fewer 2-forked ones. Stems erect or subdecumbent, branched basally and above. Basal leaves not rosulate; petiole (5–)18–45 cm × 1–1.1 mm, erect, appressed at base, ciliate; leaf blade spatulate or oblanceolate, (0.5–)1–2 mm, slightly compressed, distal margin sometimes with a minute wing. Fl. Jun–Aug, fr. Jul–Sep.

- Exposed banks, gravelly steep slopes, flood lands, alluvial plains, sandy or gravelly beaches, mountain valleys, grassy slopes, *Juniperus* woods; 2800–4500 m. Gansu, Qinghai, Xinjiang, Xizang [Kyrgyzstan, Tajikistan].


- Herbs annual or biennial, ca. 30 cm tall, densely villous throughout with straight, 1-forked, stalked and simple trichomes. Stems erect, branched at base and above. Basal leaves unknown; lower and middle cauline leaves shortly petiolate, lanceolate to oblanceolate, 1–3 cm × 4–10 mm, base cuneate, margin coarsely dentate or pinnatifid, apex acuminate. Racemes ebracteate, elongated considerably in fruit. Fruiting pedicels erect, appressed to rachis, straight, slender, 2–4 mm, densely covered with simple and branched trichomes. Sepals oblong, 1.5–2 × ca. 0.5 mm, scarious at margin, densely pubescent with straight simple trichomes. Petals pink, oblanceolate, 2–2.5 × ca. 0.7 mm, attenuate to base, apex obtuse. Filaments pink, 1.2–2 mm; anthers suboblong, ca. 0.5 mm, minutely apiculate. Fruit 3–4.7 cm × 1–1.1 mm, erect, appressed to rachis; valves densely villous with straight, stalked, forked trichomes to 1 mm; style obsolete; stigma deeply 2-lobed. Seeds yellowish brown, oblong, 0.8–1 × 0.6–0.7 mm, slightly compressed. Fl. and fr. Jul.

- About 3700 m. Xinjiang.
lobed. Seeds yellowish brown, oblong, 0.8–1 × 0.5–0.7 mm, slightly compressed. Fl. and fr. Jul.

- Mountain slopes; 4800–4900 m. Xizang.


**叶城假蒜芥** ye cheng jia suan jie


Herbs annual or perennial, 15–50 cm tall, glabrescent or sparsely pubescent with flattened, crisped, simple trichomes to 0.7 mm. Stems erect or subdecumbent, simple or many branched at base. Basal leaves withered by fruiting, not rosulate; petiole 0.5–3 cm, not flattened at base; leaf blade narrowly oblong or linear-lanceolate, 2–4 cm × 1–5 mm, base cuneate, margin coarsely dentate or pinnatifid and lobes to 5 × 1 mm, rarely subentire, apex acuminate. Middle cauline leaves subsessile to petiolate, similar to basal leaves but progressively reduced in size upward, 3–7 cm × 2–6 mm, margin entire or dentate, apex acuminate. Racemes ebracteate, elongated considerably in fruit. Fruiting pedicels divaricate or ascending, recurved or straight, slender, 0.7–1.8(–2.5) cm, glabrescent or sparsely with crisped, simple trichomes. Sepals oblong, 3–4 × 1.5–2 mm, scarious at margin, glabrous. Petals white or pink, ovobate, 6–10 × 3–5 mm, apex obtuse; claw 1–2 mm. Filaments white, 2.5–3.5 mm; anthers narrowly oblong, 0.9–1.1 mm, apex obtuse. Fruit (1.5–) 2.5–4 cm × 1–1.2 mm, widely spreading; valves glabrescent, rarely sparsely with crisped simple trichomes to 0.5 mm; style 0.4–0.6(–0.9) mm; stigma entire. Seeds yellowish brown, oblong, 1.2–1.7 × 0.8–1 mm, slightly compressed, distal margin with a minute wing. Fl. Jun–Jul, fr. Jul–Aug.

- Grasslands, mountain slopes, steep rocky river banks; 2500–3000 m. Xinjiang.

The single paratype cited in the protologue of *Microsisymbrium yechengicum* is a specimen of *Chorispora sibirica*.

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**50. ARABIDOPSIS** Heynhold in Holl & Heynhold, Fl. Sachsen 1: 538. 1842, nom. cons.

**鼠耳芥属** shu er jie shu

*Cardaminopsis* (C. A. Meyer) Hayek; *Hylandra* Á.. Löve.

Herbs annual, biennial, or perennial with stolons or woody caudex. Trichomes simple, mixed with stalked, 1–3-forked ones. Stems erect or decumbent, often several from base, usually glabrous above. Basal leaves rosulate, entire, toothed, or pinnately lobed. Cauline leaves petiolate or sub sessile, entire, dentate, or rarely lyrate. Racemes few to several flowered, ebracteate. Fruiting pedicels ascending or divaricate or slightly reflexed. Sepals oblong, erect or ascending, glabrous or pubescent, base of lateral pair subsaccate or not. Petals white, pink, or purple; blade obovate, spatulate, or oblanceolate, apex obtuse or emarginate; claw distinct or not. Stamens 6, erect, slightly tetradynamous; filaments not dilated basally; anthers oblong, obtuse. Nectar glands confluent, subtending bases of filaments. Ovules 15–80 per ovary. Fruit dehiscent siliques, linear or cylindric, terete or flattened and latiseptate, shortly stipitate or sub sessile; valves papery, veinless or midvein distinct, glabrous, smooth or somewhat torulose; replum rounded; septum complete; style obsolete or to 1 mm; stigma capitate, entire. Seeds numerous, uniseriate, wingless or margined, oblong or ellipsoid, plum or flattened; seed coat minutely reticulate, mucilaginous or not when wetted; cotyledons accumbent or rarely incipient.

Nine species: E and N Asia, Europe, North America; three species in China.

1a. Fruit terete; annuals; petals 2–3.5 mm; seeds usually plump; cotyledons incumbent ............... 1. *A. thaliana*

1b. Fruit strongly flattened; biennials or perennials; petals 4–6.5 mm; seeds usually flattened; cotyledons accumbent.

2a. Plants stoloniferous perennials; fruit valves not veined; basal leaves orbicular or pinnate with orbicular to suborbicular terminal lobes .......................................................... 2. *A. halleri*

2b. Plants non-stoloniferous biennials or perennials; fruit valves with a prominent midvein; basal leaves spatulate or oblanceolate, rarely obovate, without orbicular terminal lobes .............................. 3. *A. lyrata*

1. **Arabidopsis thaliana** (Linnaeus) Heynhold in Holl & Heynhold, Fl. Sachsen 1: 538. 1842.

**鼠耳芥** shu er jie


Herbs annual, (2–)5–30(–50) cm tall. Stems erect, 1 or few from base, simple or branched above, basally with predominantly simple trichomes, apically glabrous. Basal leaves shortly petiolate; leaf blade obovate, spatulate, ovate, or elliptic, 0.8–3.5(–4.5) cm × (1–)2–10(–15) mm, adaxially with predominantly simple and stalked 1-forked trichomes, margin entire, repand, or dentate, apex obtuse. Cauline leaves sub sessile, usually few; blade lanceolate, linear, oblong, or elliptic, (0.4–
0.6–1.8(–2.5) cm × 1–6(–10) mm, entire or rarely few
toothed. Fruiting pedicels slender, divaricate, straight,
3–10(–15) mm. Sepals 1–2(–2.5) mm, glabrous or
distally sparsely pubescent with simple trichomes,
lateral pair not saccate. Petals white, spatulate,
2–3.5 × 0.5–1.5 mm, base attenuate to a short claw. Filaments
white, 1.5–2 mm. Ovules 40–70 per ovary. Siliques
linear, terete, smooth, (0.8–)1–1.5(–1.8) cm × 0.5–0.8
mm; valves with a distinct midvein; style to 0.5 mm.
Seeds ellipsoid, plump, light brown, 0.3–0.5 mm;
10#.

Plains, mountain slopes, river banks, roadsides; near sea level to 2000
m. Anhui, Gansu, Guizhou, Henan, Hebei, Hunan, Jiangsu, Jiangxi,
Shaanxi, Shandong, Sichuan, Xinjiang, Xizang, Yunnan, Zhejiang
[India, Japan, Kazakhstan, Korea, Mongolia, Russia, Tajikistan,
Uzbekistan; Africa, SW Asia, Europe, North America].

Arabidopsis thaliana is the most widely used flowering plant as a
model organism for studies in genetics, development, physiology, bio-
chemistry, and related fields. It is also a naturalized weed throughout
much of the world.

2. Arabidopsis halleri (Linnaeus) O’Kane & Al-Shehbaz
.subsp. gemmifera (Matsumura) O’Kane & Al-Shehbaz,

琴叶鼠耳芥  ye ya shu er jie
Cardamine gemmifera Matsumura, Bot. Mag. (Tokyo)
8: 49. 1899; Arabis coronata Nakai; A. gemmifera
(Matsumura) Makino; A. gemmifera var. alpicola H.
Hará; A. greatrexi (Miyabe & Kudo) Miyabe &
Tatewaki; A. halleri Linnaeus var. senanensis Franchet
& Savatier; A. maximoviczii N. Busch; A. senanensis
(Franchet & Savatier) Makino; Cardamine greaterxi
Miyabe & Kudo; Cardaminopsis gemmifera
(Matsumura) Berkutenko.

Herbs perennial, stoloniferous, (10–)20–45(–60) cm tall.
Stems decumbent, few from base, simple or branched
above, basally with simple and 1-forked trichomes,
apically glabrous. Basal leaves with a petiole (5–)1–
2.5(–5) cm; leaf blade orbicular, broadly ovate, or
spatulate, (1–)2–4.5(–9) × (0.5–)1–1.5(–2.5) cm,
adaxially with a mixture of simple and stalked, 1- or
2-forked trichomes, margin lyrate-pinnatifid and with (1
or)2–4(–6) lateral lobes on each side; terminal lobe
suborbicular, much larger than lateral ones, sometimes
coarsely dentate, rarely entire or repand, apex obtuse.
Cauline leaves shortly petiolate, several; blade of
middle ones ovate, oblanceolate, oblong, or elliptic,
(0.5–)1–2.5(–8) × (0.2–)0.5–1.5(–3) cm, coarsely
toothed or rarely lobed, gradually reduced in size
upward. Fruiting pedicels slender, divaricate or slightly
reflexed, straight, (0.5–)0.8–1.3(–2) cm. Sepals 1.5–2
mm, glabrous or apically with few simple trichomes,
lateral pair saccate. Petals white or pale purple, obovate,
4–5(–6.5) × 2–2.5(–3.5) mm; claw 1–2 mm. Filaments
white, 2–2.5 mm. Siliques linear, flattened, torulose,
(0.9–)1.5–(–1.8) cm × 0.5–0.8 mm; valves without a
distinct midvein; style to 0.7 mm. Seeds oblong,
flattened, light brown, 0.5–0.7 mm; cotyledons

Gravelly or grassy slopes, forests; 1500–2600 m. Heilongjiang, Jilin,
Liaoning, Taiwan [Japan, Korea, Russia (Far East, E Siberia)].

The record of Arabidopsis halleri subsp. halleri in FRPS (as Arabis
halleri) is based on misidentified plants of subsp. gemmifera; true
subsp. halleri is distributed in E and S Europe.

3. Arabidopsis lyrata (Linnaeus) O’Kane & Al-Shehbaz
subsp. kamchatica (Fischer ex de Candolle) O’Kane & Al-

琴叶鼠耳芥  qin ye shu er jie
Arabis lyrata Linnaeus var. kamchatica Fischer ex de
Candolle, Syst. Nat. 2: 231. 1821; A. kamchatica
(Fischer ex de Candolle) Ledebour; A. kawasakiana
Makino; A. lyrata subsp. kamchatica (Fischer ex de
Candolle) Hultén; A. morrisonensis Hayata;
Cardaminopsis kamchatka (Fischer ex de Candolle) O.
E. Schulz.

Herbs biennial or perennial with a caudex, (5–)10–30(–
45) cm tall. Stems erect or decumbent, 1 to many from
base, usually branched above, basally with simple and
1-forked trichomes, apically glabrous. Basal leaves with a
petiole 0.5–2(–6) cm; leaf blade oblanceolate or ovate,
(0.5–)1–3(–8) × (0.3–)0.5–1.5 cm, adaxially with a
mixture of simple and stalked, 1-forked trichomes,
rarely glabrous, margin dentate or lyrate, with 1–3
lateral lobes on each side, apex obtuse. Cauline leaves
shortly petiolate, several; blade of middle ones
oblanceolate, (0.5–)1–3(–4) cm × (1–)2–7 mm, entire,
repand, or obscurely toothed, rarely lobed, gradually
reduced in size upward. Fruiting pedicels slender,
divaricate, straight, (0.5–)0.8–1.2 cm. Sepals 2–3 mm,
glabrous or densely pubescent, lateral pair saccate.
Petals white, spatulate or obovate, 4–5(–6) × 1.5–2(–2.5)
mm; claw to 1 mm. Filaments white, 2–3 mm. Siliques
linear, flattened, torulose, (1.5–)2–3.5(–4.5) cm × 0.5–
0.8 mm; valves with a distinct midvein extending full
length; style to 0.5 mm. Seeds oblong, flattened, light
brown, 0.9–1.2 mm; cotyledons accumbent. Fl. Mar-Jul,

Gravelly slopes, forests, alpine regions, roadsides; 1700–3400 m. Jilin,
Taiwan [Japan, Korea, Russia (Far East, E Siberia)]; NW North
America].

Arabidopsis lyrata subsp. lyrata is restricted to North America.


须弥芥属  xu mi jie shu
Herbs annual or biennial, rarely perennial with a caudex. Trichomes simple and stalked, 1- or 2-forked, sometimes stellate. Stems erect or ascending. Basal leaves rosulate or not, entire or dentate, rarely pinnately lobed. cauline leaves sessile or subsessile, usually auriculate or sagittate, entire, dentate, or rarely pinnately lobed, rarely absent. Racemes several to many flowered, ebracteate or bracteate. Fruiting pedicels erect, ascending, or divaricate. Sepals oblong, erect, pubescent, base of lateral pair not saccate. Petals white, pink, or purple, longer than sepals; blade spatulate, rounded; claw obscurely distinct from blade. Stamens 6, erect, slightly tetradynamous; filaments not dilated at base; anthers ovate or oblong, obtuse at apex. Nectar glands confluent and subtending bases of filament. Ovules (30–)40–120–(150) per ovary. Fruit dehiscent siliques, linear, terete or somewhat 4-angled, rarely latisepitate, sessile or subsessile; valves with a distinct midvein, glabrous or rarely pubescent, smooth or torulose; replum rounded; septum complete; style to 1 mm; stigma capitulate, entire. Seeds uniseriate, wingless, oblong, plump; seed coat minutely reticulate, mucilaginous when wetted; cotyledons incumbent.

Nine species: C and SW Asia, Himalayas, Mongolia, Russia; six species in China.

1a. Fruit valves densely and coarsely stellate; pedicels pubescent all around; fruit often subappressed to rachis ................................................................. 2. C. lasiocarpa

1b. Fruit valves glabrous or very rarely puberulent; pedicels glabrous adaxially, rarely (C. wallichii) pubescent all around; fruit not appressed to rachis.

2a. Cauline leaves distinctly auriculate or amplexicaul at base.

3a. Racemes bracteate at least along proximal portion; annuals or biennials; cauline leaves usually auriculate; upper leaves coarsely stellate ......................................................................................... 4. C. himalaica

3b. Racemes ebracteate; perennials; cauline leaves sagittate or amplexicaul; upper leaves softly stellate ........................................................................................ 1. C. mollissima

2b. Cauline leaves petiolate or sessile, neither auriculate nor amplexicaul, sometimes absent.

4a. Lowermost flowers of main raceme ebracteate; basal leaves lyrate or pinnatifid, often canescent, persistent in flower and fruit .................................................................................................................................................. 6. C. wallichii

4b. Lowermost flowers of main raceme ebracteate; basal leaves entire or dentate, not canescent, withered by flowering or fruiting.

5a. Cauline leaves adaxially with simple and forked trichomes, ovate, elliptic, or oblong, rarely obovate; plants 4–15(–20) cm tall; main raceme bracteate nearly throughout ....... 5. C. axillaris

5b. Cauline leaves adaxially with stellate stalked trichomes, linear-lanceolate; plants (18–)30–85(–120) cm tall; only lowermost flowers of main raceme bracteate ........................................................................... 3. C. stricta


柔毛须弥芥 rou mao xu mi jie

Sisymbrium mollissimum C. A. Meyer in Ledebour, Fl. Altaic, 3: 140. 1831; Arabidopsis mollissima (C. A. Meyer) N. Busch; A. mollissima var. dentata O. E. Schulz; A. mollissima var. glaberrima (J. D. Hooker & Thomson) O. E. Schulz; A. mollissima var. pamirica (Korshinsky) O. E. Schulz; A. mollissima var. thomsonii (J. D. Hooker) O. E. Schulz; Hesperis mollissima (C. A. Meyer) Kuntze; Sisymbrium mollissimum C. A. Meyer f. pamiricum Korshinsky; S. thomsonii J. D. Hooker; Stenophragma mollissimum (C. A. Meyer) B. Fedtschenko.

Herbs perennial, (5–)10–40(–60) cm tall. Stems erect, simple or few to many branched at base, densely pubescent, with short-stalked, stellate trichomes, often basally hisurate with horizontal simple or forked trichomes to 1.8 mm, rarely glabrous or glabrescent. Basal leaves rosulate, petiolate, often remaining throughout growing season; petiole (0.2–)0.5–1.7(–3) cm, often ciliate, base persistent; leaf blade spatulate, oblanceolate, or oblong, (0.6–)1–2.5(–5) cm × 2–8(–15) mm, finely stellate pubescent, margin coarsely dentate or rarely subentire, apex obtuse. Middle cauline leaves ovate or narrowly oblong or lanceolate, sessile, 0.7–2.5(–4) cm × 2–7(–10) mm, finely stellate pubescent or rarely glabrescent, base sagittate or amplexicaul, margin entire or rarely repand or dentate, apex acute. Racemes ebracteate. Fruiting pedicels slender, stellate pubescent laterally and abaxially, glabrous adaxially, divaricate, (3–)4–10(–16) mm. Sepals often pink, obovate, 2–2.5 × 0.8–1 mm, densely pubescent, sometimes narrowly membranous. Petals white or pink, spatulate, 3–4.5 × 0.9–1.1(–1.5) mm, attenuate to base; claw to 1 mm. Filaments 2.5–3 mm; anthers oblong, 0.4–0.6 mm. Ovules 70–120 per ovary. Fruit linear, terete, straight or often slightly curved, erect or ascending or rarely divericate, (1.2–)2.5–3.5(–5) cm × 1–1.5 mm; valves glabrous, with a prominent midvein; style (0.1–)0.4–0.7(–1) mm. Seeds brown, obovate, 0.8–1.1 × 0.3–0.5 mm. Fl. Jun–Aug, fr. Jul–Aug. 2n = 16. Open slopes, grassy meadows; 2600–4400 m. Gansu, Sichuan, Xinjiang, Xizang [Afghanistan, India, Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia (Siberia), Tajikistan].

The records of Crucihimalaya mollissima in FRPS (as Arabidopsis mollissima) from Sichuan and Yunnan are based on misidentified plants of C. himalaica.

Herbs annual or biennial, (10–)22–85(–125) cm tall. Stems erect, simple or sometimes branched at base, densely pubescent with short-stalked, stellate trichomes, often basally hirsute with horizontal simple trichomes to 1.4 mm. Basal leaves not rosulate, petiolate, often caducous by fruiting; petiole to 3 cm; leaf blade spatulate, 4–9 × 1–2 cm, stellate pubescent and sometimes mixed with simple or forked trichomes, margin coarsely dentate or rarely lyrate lobed, apex obtuse. Middle cauline leaves leaves narrowly oblong, lanceolate-linear, or narrowly oblanceolate, sessile, (1–)2–5(–8) cm × (2–)3.5–10(–17) mm, stellate pubescent, base attenuate, margin dentate, repand, or entire. Racemes basally or rarely lowermost 1 or 2 flowers bracteate; bracts similar to uppermost cauline leaves. Fruiting pedicels slender, stellate pubescent laterally and abaxially, glabrous axially, divaricate or rarely ascending, (0.5–)1–4(–6) mm. Sepals oblong, 1.7–2.5 × 0.6–0.8 mm, densely pubescent, sometimes narrowly membranous. Petals white, pink, or purple, spatulate, 2.5–3(–4) × 0.7–1 mm, attenuate to base; claw to 1 mm. Filaments 2–2.8 mm; anthers oblong, 0.4–0.6 mm. Ovules 60–120 per ovary. Fruit linear, terete, straight or curved, divaricate or rarely ascending, (1–)2–4(–5.5) cm × 0.6–1 mm; valves glabrous or very rarely puberulent, with a conspicuous midvein; style (0.2–)0.6–1.3(–1.8) mm. Seeds brown, oblong or subovoid, uniseriate, 0.6–0.9 × 0.3–0.4 mm. Fl. Apr–Aug, fr. May–Sep.

Forest margins, grassy areas; 1600–2400(–4200) m. Xizang [India, Kashmir, Nepal, Pakistan].

The record of Crucihimalaya stricta in FRPS (as Arabidopsis stricta) from Sichuan is based on misidentified plants of C. himalaica.


Herbs annual or biennial, (3–)10–50(–70) cm tall. Stems erect, simple or sometimes branched at base, densely pubescent with short-stalked, stellate trichomes, often basally hirsute with horizontal simple trichomes to 1.4 mm. Basal leaves not rosulate, petiolate, often caducous by fruiting; petiole to 3 cm; leaf blade spatulate, 4–9 × 1–2 cm, stellate pubescent and sometimes mixed with simple or forked trichomes, margin coarsely dentate or rarely lyrate lobed, apex obtuse. Middle cauline leaves leaves narrowly oblong, lanceolate-linear, or narrowly oblanceolate, sessile, (1–)2–5(–8) cm × (2–)3.5–10(–17) mm, stellate pubescent, base attenuate, margin dentate, repand, or entire. Racemes basally or rarely lowermost 1 or 2 flowers bracteate; bracts similar to uppermost cauline leaves. Fruiting pedicels slender, stellate pubescent laterally and abaxially, glabrous axially, divaricate or rarely ascending, (0.5–)1–4(–6) mm. Sepals oblong, 1.7–2.5 × 0.6–0.8 mm, densely pubescent, sometimes narrowly membranous. Petals white, pink, or purple, spatulate, 2.5–3(–4) × 0.7–1 mm, attenuate to base; claw to 1 mm. Filaments 2–2.8 mm; anthers oblong, 0.4–0.6 mm. Ovules 60–120 per ovary. Fruit linear, terete, straight or curved, divaricate or rarely ascending, (1–)2–4(–5.5) cm × 0.6–1 mm; valves glabrous or very rarely puberulent, with a conspicuous midvein; style (0.2–)0.6–1.3(–1.8) mm. Seeds brown, oblong or subovoid, uniseriate, 0.6–0.9 × 0.3–0.4 mm. Fl. Apr–Aug, fr. May–Sep.

Forest margins, grassy areas; 1600–2400(–4200) m. Xizang [India, Kashmir, Nepal, Pakistan].

The record of Crucihimalaya stricta in FRPS (as Arabidopsis stricta) from Sichuan is based on misidentified plants of C. himalaica.
dentate or rarely subentire, apex obtuse. Middle cauline leaves oblong, rarely ovate or lanceolate, sessile, 0.5–2.5×(3.2) cm × 2–7(−11) mm, pubescent as basal leaves, rarely glabrescent, base auriculate or rarely sagittate, margin coarsely dentate or rarely entire, apex acute. Racemes bracteate along entire length or only lowermost few flowers bracteate. Fruiting pedicels slender, stellate pubescent laterally and abaxially, glabrous adaxially, divaricate, (1–)2–7(−11) mm. Sepals often pink, oblong, 1.5–2.5×(−3) × 0.7–1 mm, densely pubescent, sometimes narrowly membranous. Petals purple, pink, or rarely white, spatulate, 2–3.5×(−5) × (0.6–)1–1.5(−2) mm, attenuate to base; claw to 1 mm. Filaments pubescent. Petals white or pink, spatulate, 3–4.5 × (0.8–)1–1.2 cm, attenuate to base; claw to 1 mm. Filaments 1.5–3 mm; anthers oblong, 0.4–0.6 mm. Ovules 60–90 per ovary. Fruit linear, terete, curved upward or sometimes straight, divaricate, (1.4–)2.5–4(−5) cm × 0.6–0.8 mm; valves glabrous or rarely puberulent, with an obscure midvein; style (0.1–)0.4–1 mm. Seeds brown, oblong, 0.8–1 × 0.3–0.4 mm. Fl. Mar–Jun, fr. May–Jul.

Rocky hillsides, shady banks, open woodlands, roadsides, rock crevices, terraces, forests; 2200–3000 m. Xizang [Bhutan, India, Kashmir, Nepal, Sikkim].


Herbs annual or biennial, (5–)12–50(−80) cm tall. Stems erect, simple or few to many branched at base, densely to sparsely tomentose with finely branched stellate trichomes, often basally hirsute with horizontal, simple or forked trichomes (0.5–)0.8–1.5(−2) mm, rarely glabrescent distally. Basal leaves rosetulate, petiolate, often lyrate or pinnatifid persistent or withered by fruiting; petiole 0.5–1.5(−2.5) cm, often ciliate; blade spatulate, oblanceolate, or obovate in outline, 1–6(−12) × 3–1.7(−3) cm, densely tomentose with finely branched stellate trichomes, margin coarsely dentate or rarely entire, with up to 8 lobes on each side of midvein; lateral lobes oblong or ovate, increasing in size distally, much smaller than obovate or suborbicular terminal lobe, to 1.5 × 0.8 cm, entire or dentate. Middle cauline leaves oblong, obovate, or linear, sessile, 0.7–4(−7) cm × 1–10(−20) mm, pubescent as basal leaves, rarely glabrescent, base usually minutely auriculate, margin entire, coarsely dentate, or lyrate, apex acute. Racemes ebracteate, lax. Fruiting pedicels slender, straight, stellate pubescent all around or glabrous adaxially, divaricate or rarely ascending, (0.2–)0.5–1.6(−2.5) cm. Sepals green or pink, oblong, 1.5–2.5(−3) × 0.7–1 mm, densely pubescent or glabrescent, sometimes narrowly membranous. Petals purple, pink, or white, spatulate, (2–)2.5–3.5(−4.5) × 0.4–0.6 mm, attenuate to base. Filaments 2.5–3(−3.5) mm; anthers oblong, 0.3–0.6 mm. Ovules 70–150 per ovary. Fruit linear, terete or subcompressed, arcuate or straight, divaricate- to recurved or rarely ascending, (2.5–)3.5–7.5(−9.5) cm × 0.6–1 mm; valves glabrous, with an obscure or prominent midvein; style (0.2–)0.5–1(−1.5)
mm. Seeds brown, oblong, 0.6–1 × 0.3–0.5 mm. Fl. Apr–Aug, fr. May–Sep. 2n = 14, 16, 18.


无苞芥属 wu bao jie shu

Herbs annual. Trichomes short-stalked or sessile, malpighiaceous and 3- or 4-rayed stellate. Stems erect or ascending. Basal leaves petiolate, not rosulate, simple, entire or rarely pinnatisect. Cauline leaves sessile, auriculate, entire or dentate. Racemes few to several flowered, ebracteate. Fruit pedicels ascending, divaricate, or reflexed. Sepals oblong, glabrous or pubescent, base of lateral pair not saccate. Petals yellow or yellowish white, slightly longer than sepals; blade oblanceolate, apex obtuse; claw absent. Stamens 6, slightly tetradynamous, rarely 4; filaments not dilated at base; anthers oblong, apex obtuse. Nectary glands confluent and subtending bases of all stamens. Ovules 18–60 per ovary. Fruit dehiscent siliques, linear, terete, sessile; valves with a distinct midvein, pubescent with submalpighiaceous and/or short-stalked, stellate trichomes, smooth; replum rounded; septum complete, perforated, or reduced to a rim; style obsolete or to 1 mm; stigma capitate, entire. Seeds uniseriate, wingless, oblong, plum; seed coat reticulate, slightly mucilaginous or not mucilaginous when wetted; cotyledons incumbent.

Three species: C and SW Asia, E Europe; two species in China.

1a. Septum complete; fruit 1.5–3.2(–4) cm; seeds (15–)20–40(–60) per fruit ........................................... 1. O. pumila

1b. Septum perforate or reduced to a rim; fruit 0.4–1(–1.5) cm; seeds 5–18(–20) per fruit ......................... 2. O. cabulica


无苞芥 wu bao jie

Sisymbrium pumilum Stephan in Willdenow, Sp. Pl. 3: 507. 1800; Arabidopsis griffithiana (Boissier) N. Busch; A. pumila (Stephan) N. Busch; A. pumila var. griffithiana (Boissier) Jafari; Drabopsis oronotica Stapf; Hesperis pumila (Stephan) Kunze; Microsysimbrum griffithianum (Boissier) O. E. Schulz; Sisymbrium foliosum J. D. Hooker & Thomson; S. griffithianum Boissier; S. hirtulum Regel & Schmalhausen; S. kokanicum Regel & Schmalhausen; Stenophragma griffithianum (Boissier) B. Fedtschenko; S. pumilum (Stephan) B. Fedtschenko.

Herbs annual, (1–)5–40(–60) cm tall. Stems erect or ascending, few branched at base, pubescent with short-stalked or sub sessile, stellate trichomes, rarely glabrescent distally. Basal leaves not rosulate, petiolate, often withered by fruiting, pubescent as stems; petiole (0.1–)0.8–2(–3.5) cm; blade oblanceolate, spatulate, or lanceolate, (0.4–)1–8(–12) cm × (0.1–)0.5–2(–3) cm, margin coarsely dentate, rarely pinnatifid, pinnatisect, or entire, apex acute. Middle cauline leaves oblong, ovate, or lanceolate, sessile, (0.3–)1–5(–7.5) cm × (1–)4–12(–30) mm, base auriculate or rarely sagittate, margin coarsely dentate or rarely entire, apex acute. Fruit pedicels divaricate, ascending, or strongly reflexed, (1–)2–7(–12) mm, slender or stout, stellate pubescent or rarely glabrescent. Sepals oblong, 1.4–2(–2.5) × 0.3–0.8 mm, pubescent. Petals yellow, turning whitish when dry, spatulate or oblanceolate, (1.6–)2–2.5(–3) × 0.3–0.8 mm, attenuate to base; claw absent. Filaments 1.3–1.8 mm; anthers oblong, 0.2–0.3 mm. Fruit linear, terete, curved or straight 1.5–3.2(–4) cm × 0.8–1.2 mm, only slightly torulose; valves pubescent with submalpighiaceous and/or sub sessile 3-rayed trichomes, usually with a distinct midvein; septum complete; style 0.1–0.4(–0.8) mm. Seeds brown, (15–)22–40(–60) per fruit, oblong, uniseriate, 0.5–0.9 × 0.3–0.5 mm. Fl. Mar–May, fr. Apr–Jun. 2n = 16, 32.

Fields, sandy steppe, stony slopes, scrub; 100–3800 m. Gansu, Xinjiang [Afghanistan, India, Kashmir, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkm enistan, Uzbekistan; SW Asia].

Records in FRPS from Gansu and Yunnan require verification; no material was seen by the present authors from these provinces.


喀布尔无苞芥 ka bu er wu bao jie

Sisymbrium cabulicum J. D. Hooker & Thomson, J. Proc. Linn. Soc., Bot. 5: 161. 1861; Arabidopsis korshinskii Stapf; Sisymbrium oronotica Stapf; Botschantzev; A. pumila (Stephan) N. Busch; Sisymbrium pumilum Stephan var. alpinum Korshinsky.

Herbs annual, 1–12(–30) cm tall. Stems subdecumbent to erect, few branched or rarely simple at base, pubescent with short-stalked to sub sessile, stellate trichomes. Basal leaves not rosulate, sub sessile, often withered by fruiting, pubescent as stems; leaf blade oblanceolate, obovate, or lanceolate, sessile, (0.2–)2(–3.2) cm × (1–)9–15 mm, margin entire, repand, or obscurely dentate, apex acute. Middle cauline leaves oblong or ovate, sessile, 0.2–2(–3.5) cm × 1–8(–15) mm, base auriculate, margin entire or repand, apex acute. Fruit pedicels slender, stellate pubescent, divaricate, 1–4(–6) mm. Sepals oblong, 1.1–1.5 × 0.3–0.5 mm, pubescent. Petals yellow, turning whitish when dry, spatulate or oblanceolate, 1.6–1.9 × 0.4–0.5 mm, attenuate to base; claw absent. Filaments 1.2–1.6 mm; anthers oblong.


Rocky slopes, hillsides, limestone crevices and ledges; (700–)1200–4400. Xizang [Afghanistan, Bhutan, India, Kashmir, Kazakhstan, Kyrgyzstan, Nepal, Pakistan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].
0.1–0.2 mm. Fruit linear, terete, curved or straight, 4–10 (–13) × 0.7–0.9 mm, only slightly torulose; valves pubescent with subsessile, 3-rayed trichomes, usually with a distinct midvein; sepal perforated or reduced to a rim; style 0.1–0.5 mm. Seeds brown, 5–18 (–20) per fruit, oblong, uniseriate, 0.5–0.8 × 0.3–0.4 mm. Fl. Mar–May, fr. Apr–Jun. 2n = 48.


假鼠耳芥属  jia shu er jie shu
Herbs biennial or perennial. Trichomes sessile, stellate, 4- or 5-rayed, with at least some rays branched. Stems erect or ascending, sometimes decumbent. Basal leaves petiolate, rosulate, simple, entire or dentate. Cauline leaves sessile, deeply sagittate-amplexicaul or rarely auriculate, entire or dentate. Racemes several flowered, ebracteate. Fruiting pedicels ascending or divaricate. Sepals oblong, erect, glabrous or pubescent, base of lateral pair subsaccate. petals white or pink, erect, slightly longer than sepals; blade spatulate, apex obtuse; claw absent. Stamens 6, strongly tetradymaneous; filaments not dilated at base; anthers oblong, sagittate at base, obtuse at apex. Nectar glands confluent, subtending bases of all stamens, surrounding those of lateral ones. Ovules 60–100 per ovary. Fruit dehiscent siliques, linear, terete, stipitate; valves papery, with obscure midvein, glabrous, smooth; gynophore distinct; replum rounded; septum complete, without a midvein; style distinct and to 1 mm; stigma capitate, subentire or slightly 2-lobed. Seeds 60–100 per ovary, biseriate, wingless or ovoid; plump; seed coat minutely reticulate, slightly mucilaginous when wetted; cotyledons incumbent.

One species: Afghanistan, W China, Kazakhstan, Russia.


假鼠耳芥  jia shu er jie
Herbs biennial or perennial, (0.5–)1–4.5 (–6.9) cm tall, often with petiolar remains of basal leaves. Stems erect or ascending, simple or few branched at base, pubescent with sessile stellate trichomes, rarely glabrescent distally. Basal leaves rosulate, pubescent as stems; petiole (0.3–)0.8–3.5 (–6) cm; leaf blade oblanceolate, spatulate, oblong, or ovate, (0.7–)1–4 (–8) × (0.4–)0.8–2 (–3) cm, margin entire, dentate, or rarely runcinate, apex acute. Middle cauline leaves narrow oblong or linear, sessile, 1–5.5 (–8) cm × 1–7 (–15) mm, base deeply sagittate-amplexicaul or rarely auriculate, margin entire or rarely obscurely denticate, apex acute; auricles to 10 × 1 mm. Fruiting pedicels slender, glabrous, divaricate to divaricate-ascending, (2.5–)4–10 (–15) mm. Sepals oblong, (2–)2.5–3 (–3.5) × 0.6–0.9 mm, glabrous or rarely pubescent. Petals white or pink, spatulate, (6–)6.5–8 (–9) × (1.5–)2–3 mm; claw distinct. Filaments 2.5–4 (–5) mm; anthers narrowly oblong, 0.8–1 mm. Fruit (0.8–)12–2 (–2.8) cm × 0.5–0.8 mm, only slightly torulose; gynophore distinct, (0.1–)0.2–0.6 (–10) mm; style 0.1–0.4 (–0.9) mm. Seeds brown, 50–100 per ovary, oblong or ovoid, 0.4–0.6 × 0.2–0.3 mm. Fl. May–Jun, fr. Jun–Jul. 2n = 12.

Steppe. Xinjiang, Xizang [Afghanistan, Kyrgyzstan, Tajikistan].


曙南芥属  shu nan jie shu
Herbs annual, biennial, or perennial, tomentose, usually canescent. Trichomes stellate, subsessile, with 4 unequal rays at least 1 of which with 2 subsabals branches. Stems erect, simple at base, often branched above middle. Basal leaves rosulate or not, simple, entire. Cauline leaves ebracteate, elongated in fruit. Fruiting pedicels slender, ascending or divaricate. Sepals oblong, base of lateral pair not saccate or subsaccate, margin membranous. Petals white, pink, purple, or yellowish; blade obovate or suborbicular, apex rounded; claw differentiated from blade, shorter than sepals. Stamens 6, tetradynamous; filaments dilated at base; anthers ovate or oblong, apiculate at apex. Nectar glands 4, lateral, 1 on each side of lateral stamen; median glands absent. Ovules (2–)4–40 per ovary. Fruit dehiscent siliques or silicles, linear, oblong, or elliptic, strongly latiseptate, sessile; valves obscurely veined, tomentose, torulose; replum rounded; septum complete, membranous, translucent, veinless; style distinct, to 3 mm; slender; stigma capitately entire. Seeds uniseriate, wingless or winged, oblong or suborbicular, flattened; seed coat minutely reticulate, not mucilaginous when wetted; cotyledons accumbent.

Four species: China, Mongolia, Russia; one species in China.


**曙南芥** shu nan jie

*Draba multiceps* Kitagawa.

Herbs perennial, 5–15 cm tall, canescent throughout, sometimes pulvinate, with branched caudex. Stems erect, few branched above middle. Basal leaves densely rosulate, numerous, persistent; petiole obscurely differentiated from blade; leaf blade linear, (0.4–)1–2 cm × 0.5–1.5 mm, attenuate into a petiolelike base, apex acute. Cauline leaves linear, erect, few, similar to basal. Fruiting pedicels, divaricate or ascending, slender, (2.5–)4–8(–10) mm. Sepals narrowly oblong, 1.5–2.5(–3) × 0.7–1.3 mm, base subsaccate, margin membranous. Petals white, pink, or purple, 4–5(–6) × 2–3(–3.5) mm; claw 1.5–2 mm. Filaments 1.5–2.5 mm; anthers narrowly ovate, 0.5–0.6 mm. Ovules 6–12 per ovary. Fruit linear, (0.5–)0.6–1.5(–2) cm × 1–1.5 mm, strongly torulose; replum constricted between seeds; style slender, (1–)1.5–2.7 mm. Seeds brown, suborbicular, ca. 1 mm in diam., wingless, flattened. Fl. May–Jul. 2n = 32.

Rocky slopes, crevices, alkaline grasslands. Nei Mongol [Mongolia, Russia].


**假葶苈属** jia ting li shu

Herbs annual, scapose. Trichomes stalked, 3- or 4-rayed stellate, sometimes forked or simple at leaf margin and on sepal. Basal leaves sessile or subsessile, rosulate, simple, entire or rarely few toothed. Cauline leaves absent. Racemes few to several flowered, ebracteate. Fruiting pedicels stout, often as thick as fruit, suberect or divaricate-ascending. Sepals oblong, erect, glabrous or pubescent, base of lateral pair not saccate. Petals yellow or yellowish white, ascending, slightly longer than sepals; blade oblanceolate, apex obtuse or retuse; claw obscurely differentiated from blade. Stamens 6, erect, tetradynamous; filaments not dilated at base; anthers ovate, obtuse at apex. Median glands absent; lateral glands 1 on each side of lateral stamen. Ovules 12–40 per ovary. Fruit dehiscent siliques, linear, latiseptate, sessile; valves with a prominent midvein, glabrous or rarely pubescent with stalked, forked and 3-rayed trichomes, smooth; replum rounded; septum complete; style obsolete or to 0.2 mm; stigma capitate, entire. Seeds uniseriate, wingless, oblong, flattened; seed coat minutely reticulate, slightly mucilaginous when wetted; cotyledons accumbent.

One species: C and SW Asia, SE Europe.


**假葶苈** jia ting li

*Arabis nuda* Bélanger, Voy. Indes Or., Bot. t. 15a. 1834; *Arabidopsis nuda* (Bélanger) Bornmüller; *Arabidopsis verna* (K. Koch) N. Busch; *Arabis scapigera* Boissier; *Drabopsis brevisiliqua* Naqshi & Javeid; *D. verna* K. Koch; *Sisymbrium nudum* (Bélanger) Boissier; *Stenophragma nudum* (Bélanger) B. Fedtschenko.

Herbs scapose, (1–)3–12(–20) cm tall. Stems erect, 1 to many from base, simple or rarely branched, leafless, glabrous above. Basal leaves sessile or subsessile; leaf blade obovate, oblong, spatulate, or oblanceolate, (0.2–)0.5–2(–3) cm × (0.5–)2–7(–12) mm, pubescent with stalked, 3- or 4-rayed stellate trichomes, sometimes with foraged or simple trichomes along margin, base cuneate, margin entire or rarely toothed, apex acute or obtuse. Racemes elongated considerably in fruit, rachis straight to slightly flexuous. Fruiting pedicels suberect or divaricate-ascending, 0.5–3(–5.5) mm. Sepals oblong, 1.5–2.5 × 0.5–1 mm, glabrous or pubescent with simple or branched trichomes. Petals yellow or yellowish white, oblanceolate, 2–3 (–4) × 0.5–0.8(–1) mm. Filaments erect, yellowish, 1–2 mm; anthers 0.2–0.4 mm. Fruit linear, (1–)1.7–3.3(–4.5) cm × 0.8–1 mm; valves prominently veined, glabrous or rarely pubescent with stalked, forked and 3-rayed trichomes, smooth; replum rounded; septum complete; style obsolete or to 0.2 mm; stigma capitate, entire. Seeds uniseriate, wingless, oblong, flattened; seed coat minutely reticulate, slightly mucilaginous when wetted; cotyledons accumbent.

56. **CHRISTOLEA** Cambessèdes in Jacquemont, Voy. Inde 4(Bot.): 17. 1835.

**高原芥属** gao yuan jie shu

*Koelzia* K. H. Rechinger.

Herbs perennial with a woody caudex or herbaceous base. Trichomes simple. Stems branched from caudex and above, sometimes woody at base. Basal leaves absent. Cauline leaves petiolate, dentate, uppermost sometimes entire. Racemes ebracteate, elongated in fruit. Fruiting pedicels slender, ascending, suberect, or reflexed. Sepals oblong, caducous, base of lateral pair not saccate. Petals white, longer than sepals; blade spatulate or oblong-obovate, apex rounded; claw purple, subeqading sepals. Stamens 6, tetradynamous; filaments not dilated at base; anthers oblong, apiculate at apex. Nectar glands confluent and subtending bases of all stamens; median glands present. Ovules 10–
20 per ovary. Fruit dehiscent siliques, linear, oblong, or lanceolate, latisepitate, sessile; valves papery, with a distinct midvein, glabrous or puberulent, torulose; replum rounded, covered by connate valve margin; septum complete, membranous, translucent, veinless; style obsolete, rarely to 0.5 mm; stigma capitate, entire or slightly 2-lobed. Seeds uniseriate, wingless, sometimes distally appended, oblong, slightly flattened, often transversely oriented in locule; seed coat minutely reticulate, not mucilaginous when wetted; cotyledons incumbent.

Two species: Afghanistan, China, Kashmir, Nepal, Pakistan, Tajikistan; two species (one endemic) in China.

1a. Plants with a woody caudex; petals 5–6.5 mm; fruiting pedicels ascending; fruit 1.5–3(–3.5) cm, straight, subappressed to rachis, valve apex acute or acuminate ........................................ 1. C. crassifolia

1b. Plants herbaceous; petals 2.5–3.5 mm; fruiting pedicels reflexed; fruit 1–1.5 cm, subfalcate, divaricately-reflexed, valve apex obtuse ................................................................. 2. C. niyaensis


Ermaniopsis H. Harz; Oreoblastus Suslova.

Herbs perennial, with a slender, rhizomelike caudex. Trichomes simple or mixed with short-stalked, forked ones. Stems simple, leafy or leafless, sometimes absent. Basal leaves petiolate, rosulate, simple, 3–9(–11)-toothed, rarely subentire, often palmately veined. Cauline leaves absent or similar to basal ones, entire or toothed, subsessile or petioled. Racemes 3–30-flowered, bracteate or ebracteate, sometimes flowers solitary on pedicels originating from basal rosette. Sepals oblong or oblanceolate, 5–6.5 × 2–3 mm; claw 2.5–3.5 mm. Filaments white, median pairs 2.5–3 mm, lateral pair 1.5–2 mm; anthers oblong, 0.9–1.2 mm. Fruit linear, oblanceolate, 1.5–3(–3.5) cm × (2–) 2.7–4(–4.5) mm, subappressed to rachis, straight, flattened; valves constricted between seeds, glabrous or puberulent, base obtuse, apex acute or subacute; style obsolete or to 0.4 mm. Seeds brown, oblong, 1.8–2.3 × 0.9–1.5 mm, laterally oriented. Fl. Jun–Sep, fr. Jul–Oct. 2n = 14*.

Alpine steppe, rocky slopes, bare slopes; 3500–4700 m. Qinghai, Xinjiang, Xizang [Afghanistan, Kashmir, Nepal, Pakistan, Tajikistan].


扇叶芥属 shan ye jie shu

prominent midvein and distinct marginal veins, not torulose, apex persistently united with replum; replum rounded; septum complete, perforated, or reduced to a rim, translucent, or absent; style obsolete; stigma capitate, 2-lobed or rarely subentire. Seeds uniseriate or biseriate, wingless, oblong or ovate, often flattened; seed coat minutely reticulate, not mucilaginous when wetted; cotyledons accumbent.

Twelve species: Himalayas and adjacent C Asia; eight species (two endemic) in China.

1a. Sepals connate, persistent till or after fruit dehiscence; septum absent or reduced to a rim .......... 8. D. mirabilis
1b. Sepals free, caducous or rarely persistent till about fruit maturity; septum complete or rarely perforated apically.

2a. Pedicels solitary from a basal rosette.
3a. Fruit ovate or broadly lanceolate, 6–9 mm wide, prominently reticulate veined .......... 7. D. baiogoinensis
3b. Fruit linear to linear lanceolate, 2–5 mm wide, obscurely veined.

4a. Leaf trichomes forked and simple; replum retrorsely ciliate; valves glabrous; sepals 3–4 mm; petals 6–7 mm .......................................................................................................................................... 6. D. pumila
4b. Leaf trichomes exclusively simple; replum spreading ciliate; valves pubescent; sepals 6–7 mm; petals 11–14 mm ........................................................................................................................................... 5. D. prolifera

2b. Pedicels on a distinct rachis of (3–)6–30-flowered racemes.
5a. Racemes ebracteate ............................................................................................................................................. 4. D. flabellata
5b. Racemes bracteate throughout.

6a. Stem and pedicel trichomes forked ........................................................................................................... 2. D. stewartii
6b. Stem and pedicel trichomes exclusively simple or absent.

7a. Fruit lanceolate to linear-lanceolate, (3–)5–6 mm wide; petals (6–)6.5–8 × 3–4 mm; seeds biseriate, (1.5–)1.8–2(–2.3) × 1–1.4 mm .......... 1. D. himalayensis
7b. Fruit linear, (0.8–)1–0.7(–2) mm wide; petals 4–5(–5.5) × 1.5–2.5 mm; seeds uniseriate, 0.8–1.1 × 0.5–0.8 mm ................................................................. 3. D. linearis


须弥扇叶芥 xu mi shan ye jie

Cheiranthus himalayensis Cambessèdes in Jacquemont, Voy. Inde 4(Bot.): 14. 1844; Christolea himalayensis (Cambessèdes) Jafri; Ermania himalayensis (Cambessèdes) O. E. Schulz; Oreoblastus himalayensis (Cambessèdes) Suslova.

Plants 4–20 cm tall, subglabrous or densely pilose throughout. Trichomes simple, to 1.5 mm. Stems simple, pilose or glabrous. Basal leaves not fleshy, pilose or glabrous, persistent; petiole 0.4–1.6(–3) cm, not ciliate; leaf blade broadly obovate or spatulate, 4–14 × 3–9 mm, base cuneate or attenuate, margin (3–)5-toothed, apex acute. Cauline leaves similar to basal, or linear to lanceolate, 5–17 × 1–4 mm, often entire, shortly petiolate or subsessile. Racemes 6–25-flowered, bracteate throughout; bracts similar to cauline leaves but smaller, sometimes adnate to pedicel. Fruiting pedicels ascending, straight or curved, 3–10 mm, pilose or glabrous. Sepals free, oblanceolate, 3–4 × 1.2–1.5 mm, caducous, pilose or with a terminal tuft of trichomes, base not saccate, margin membranous. Petals purple or lilac with yellowish center, broadly spatulate, (6–)6.5–8 × 3–4 mm, apex subemarginate; claw 3–4 mm.

Filaments white, slightly dilated at base, median pairs 3–4 mm, lateral pair 2–4 mm; anthers ovate, ca. 0.6 mm. Ovules 14–24 per ovary. Fruit lanceolate to lanceolate-linear, (1.7–)2–3.5(–4) cm × (3–)4–6 mm, strongly flattened; valves pilose or glabrous, distinctly veined; septum complete, membranous; style obsolete; stigma 2-lobed. Seeds brown, ovate, (1.5–)1.8–2(–2.3) × 1–1.4 mm, biseriate, minutely reticulate. Fl. Jun–Aug, fr. Jul–Oct.

Alpine tundra, open hills, sandstone scree; 4300–5700 m. Qinghai, Xizang [India, Kashmir, Nepal].

This species was recorded from Xinjiang (Fl. Xinjiang. 2(2): 149. 1995, as Christolea himalayensis), but the present authors have seen no material from that autonomous region.


少花扇叶芥 shao hua shan ye jie


Plants 8–20 cm tall, densely pilose. Trichomes stalked, forked, rarely some simple near stem base. Stems simple, pilose or glabrous. Basal leaves subfleshy, pilose, persistent; petiole 2–10 mm, not ciliate; leaf blade broadly obovate or spatulate, 2–15 × 2–10 mm, base cuneate or attenuate, margin (3–)5-toothed or entire, apex acute. Cauline leaves similar to basal or linear to lanceolate, often entire. Racemes 8–15-flowered, bracteate throughout; bracts similar to cauline leaves but smaller, often adnate to pedicel. Fruiting pedicels ascending, straight or slightly curved, 4–12 mm, pilose. Flowers not seen. Ovules 14–24 per ovary. Fruit lanceolate to lanceolate-linear, 1.7–3.5 cm × 3–5 mm,
strongly flattened; valves pilose or glabrous, distinctly veined; septum complete, membranous; style obsolete; stigma 2-lobed. Seeds brown, ovate, 1.4–2.2 × 0.8–1.1 mm, biseriate, minutely reticulate. Fr. Aug.

Scree slopes; 4100–5300. Xizang [India, Kashmir].


Plants 4–15 cm tall, densely pilose throughout or subglabrous. Trichomes simple, to 1.5 mm. Stems simple, pilose or glabrous. Basal leaves not fleshy, pilose or glabrous, persistent; petiole 2–7(–12) mm, not ciliate; leaf blade broadly obovate or spatulate, 4–15 × 2–12 mm, base cuneate or attenuate, margin 3–5-toothed or rarely entire, apex acute. Cauline leaves similar to basal or linear to lanceolate, 5–10 × 1–3 mm, often entire, subpetiolate or sessile. Racemes 8–20-flowered, bracteate throughout; bracts similar to cauline leaves but smaller, often adnate to pedicel. Fruiting pedicels ascending, straight–2–8 (–12) mm, pilose or glabrous. Sepals free, oblong or ovate, 2–3 × 1.5–1.5 cm, caducous, pilose or with a terminal tuft of ciliate; petiole 2–2.5 mm. Filaments white, slightly dilated at base, median pairs 3.5–4 mm, lateral pair 3–4 mm; anthers oblong, 0.9–1.3 mm. Ovules 14–24 per ovary. Fruit lanceolate to lanceolate-linear, (1.7–)2.5–3.5 (–4.5) cm × 2.5–5 mm, strongly flattened; valves pilose, distinctly veined; sepalum complete, membranous; style obsolete; stigma 2-lobed. Seeds brown, ovate, 1.3–2 × 0.9–1.2 mm, uniseriate, minutely reticulate. Fl. Jul–Aug, fr. Jul–Sep.

Alpine gravelly slopes, moraine slopes; 3300–5100 m. Xizang


Plants scapose, villous or pilose. Trichomes simple, straight, to 1.5 mm. Stems absent. Basal leaves subfleshy; petiole (0.2–)0.8–2 (–3) cm, persistent, sparsely to densely pilose or villous, ciliate, somewhat papery at base; leaf blade broadly ovate, suborbicular, or spatulate, 2–10(–15) × 2–9 (–12) mm, villous or pilose, base obtuse or cuneate, margin (3–)5–9-toothed, rarely subentire, subapiculate, abaxial papery at base; leaf blade broadly ovate, suborbicular, ovate, or spatulate, 2–10(–15) × 2–9 (–12) mm, villous or pilose, base obtuse or cuneate, margin (3–)5–9-toothed, rarely subentire, abaxial papery at base; 2–2.5 mm. Filaments white, slightly dilated at base, median pairs 2.5–3.5 mm, lateral pair 1.8–2.5 mm; anthers oblong, 0.9–1.3 mm. Ovules 14–24 per ovary. Fruit lanceolate to lanceolate-linear, (1.7–)2.5–3.5 (–4.5) cm × 2.5–5 mm, strongly flattened; valves pilose, distinctly veined; sepalum complete, membranous; style obsolete; stigma 2-lobed. Seeds brown, ovate, 1.3–2 × 0.9–1.2 mm, uniseriate, minutely reticulate. Fl. Jul–Aug, fr. Jul–Sep.

Alpine gravelly slopes, moraine slopes; 3300–5100 m. Xizang


Plants 4–15 cm tall. Trichomes simple, straight, to 1.5 mm. Stems distinct, simple, densely pilose. Basal leaves subfleshy; petiole 2–7 mm, pilose; leaf blade flabellate or broadly obovate, rarely spatulate, 0.6–2.5 × 0.3–2.5 cm, pilose, base cuneate or attenuate, margin (3–)5–9(–11)-toothed, rarely lowermost leaves entire, apex acute; teeth to 10 × 3 mm. Cauline leaves similar to basal. Racemes 7–12-flowered, bracteate. Fruiting pedicels ascending, straight or curved, (0.5–)0.7–1.5 (–2.5) mm, spreading pilose. Sepals free, narrowly oblong, 5–8 × 1.5–2.5 mm, often persistent, pilose, base not saccate, margin membranous. Petals purple, broadly spatulate, 1.1–1.5 cm × 3.5–6 mm, apex subemarginate; claw 7–9 mm. Filaments white or mauve, slightly dilated at base, median pairs 4.5–6 mm, lateral pair 3–4 mm; anthers oblong, 0.9–1.3 mm. Ovules 14–24 per ovary. Fruit lanceolate to lanceolate-linear, (1.7–)2.5–3.5 (–4.5) cm × 2.5–5 mm, strongly flattened; valves pilose, distinctly veined; sepalum complete, membranous; style obsolete; stigma 2-lobed. Seeds brown, ovate, 1.3–2 × 0.9–1.2 mm, uniseriate, minutely reticulate. Fl. Jul–Aug, fr. Jul–Sep.

Alpine gravelly slopes, moraine slopes; 3300–5100 m. Xizang


Plants scapose, villous or pilose. Trichomes simple, straight, to 1.5 mm. Stems absent. Basal leaves subfleshy; petiole (0.2–)0.8–2 (–3) cm, persistent, sparsely to densely pilose or villous, ciliate, somewhat papery at base; leaf blade broadly ovate, suborbicular, or spatulate, 2–10(–15) × 2–9 (–12) mm, villous or pilose, base obtuse or cuneate, margin (3–)5–9-toothed, rarely subentire, abaxial papery at base; 2–2.5 mm. Filaments white, slightly dilated at base, median pairs 2.5–3.5 mm, lateral pair 1.8–2.5 mm; anthers oblong, 0.9–1.3 mm. Ovules 14–24 per ovary. Fruit lanceolate to lanceolate-linear, (1.7–)2.5–3.5 (–4.5) cm × 2.5–5 mm, strongly flattened; valves pilose, distinctly veined; sepalum complete, membranous; style obsolete; stigma 2-lobed. Seeds brown, ovate, 1.3–2 × 0.9–1.2 mm, uniseriate, minutely reticulate. Fl. Jul–Aug, fr. Jul–Sep.

Alpine gravelly slopes, moraine slopes; 3300–5100 m. Xizang

koelzii O. E. Schulz; Solms-laubachia pumila (Kurz) Dvorák; Vvedenskyella pumila (Kurz) Botschantzev.

Plants scapose, pilose or tomentose. Trichomes simple, straight, to 0.5 mm, mixed on leaves with short-stalked, forked ones. Stems absent. Basal leaves fleshy; petiole 2–10 mm, persistent, densely pilose with simple trichomes, ciliate, expanded and papery at base; leaf blade broadly ovate, suborbicular, obovate, or spatulate, 2–14 × 1–11 mm, densely tomentose or pilose, base obtuse, margin 3–7-toothed or repand, apex obtuse. Cauline leaves absent. Flowers solitary from basal rosette. Fruiting pedicels ascending-divaricate, straight, 3–10 mm, pilose. Sepals free, oblong, 3–4 × 1.5–2 mm, caducous, pilose, base not saccate, margin membranous. Petals creamy white or purplish green, broadly obovate, 6–8 × 3–4.5 mm, apex subemarginate; claw 3–4 mm. Filaments white, dilated at base, toothless, median pairs 3–4 mm, lateral pair 2–2.5 mm; anthers narrowly oblong, 0.9–1.2 mm. Ovules ca. 14 per ovary. Immature fruit oblong-linear or linear-lanceolate, 1–2 cm × 2–3 mm, flattened, sessile, straight, retrorsely pilose along replum; valves glabrous; septum complete; style obsolete; stigma capitate, 2-lobed. Seeds not seen. Fl. Jun–Jul.

Limestone, mica schist; 4200–5700 m. Xinjiang, Xizang [Kashmir].


藏北扇叶芥 zang bei shan ye jie


Plants scapose, villous. Trichomes simple and short-stalked, forked, straight, to 1 mm. Stems simple, densely pilose. Basal leaves subfleshy; petiole 0.4–1.6 cm, persistent, villous, ciliate, somewhat papery at base; leaf blade flabellate or spatulate-orbicular, (2–)5–15 × 3–9(–15) mm, pilose, base cuneate, margin 8–10-toothed, apex acute; teeth to 8 mm. Cauline leaves similar to basal. Racemes 8–20-flowered, ebracteate. Fruiting pedicels ascending, straight or curved, 5–10 mm, spreading pilose. Sepals united, (2.5–)3.5–5.5 × 1.5–2.5(–3) mm, persistent, densely pilose, base not saccate; calyx lobes ovate, unequal, 0.5–2 mm, margin membranous. Petals purple or purplish green with yellowish base, obovate, 5–8 × (1.5–)2.5–3 mm, apex obtuse; claw 2.5–4 mm. Filaments white, slightly dilated at base, median pairs (3–)4–5 mm, lateral pair (2–)2.5–3.5 mm; anthers oblong, 0.5–0.8 mm. Ovules 12–18 per ovary. Fruit linear, 1–2(–3) cm × ca. 2 mm, slightly flattened or subterete; valves pilose, distinctly veined; septum perforate or reduced to a narrow rim, membranous; style obsolete to 0.7 mm; stigma 2-lobed. Seeds oblong, 1.5–1.8 × 0.8–1 mm, papillate. Fl. Jul–Aug, fr. Aug–Sep.

Gravelly slopes; 4000–5000 m. Qinghai, Xizang.


扇叶芥 shan ye jie

Christolea karakorumensis Y. H. Wu & Z. X. An; C. mirabilis (Pampanini) Jafri; C. scaposa Jafri; C. suslovaeana Jafri; Desideria pamirica Suslova.

Plants 2–10 cm tall. Trichomes simple, to 1.5 mm, rarely mixed with forked ones. Stems simple, densely pilose. Basal leaves subfleshy; petiole 3–15 mm, densely pilose, not expanded or papery at base; leaf blade flabellate or spatulate-orbicular, (2–)5–15 × 3–9(–15) mm, pilose, base cuneate, margin 8–10-toothed, apex acute; teeth to 8 mm. Cauline leaves absent. Racemes 8–20-flowered, ebracteate. Fruiting pedicels ascending-divaricate, straight or curved, 5–10 mm, spreading pilose. Sepals united, (2.5–)3.5–5.5 × 1.5–2.5(–3) mm, persistent, densely pilose, base not saccate; calyx lobes ovate, unequal, 0.5–2 mm, margin membranous. Petals creamy white or purplish green, broadly obovate, 6–8 × 3–4.5 mm, apex subemarginate; claw 4–6 mm. Filaments white, dilated at base, toothless, median pairs 3.5–5 mm, lateral pair 2–2.5 mm; anthers 1–1.2 mm. Ovules 30–40 per ovary. Fruit ovate or lanceolate, 1–2.5 cm × 6–9 mm, flattened, sessile, straight; valves prominently reticulate veined; replum and valves villous; septum complete; style 0.5–1 mm; stigma capitate, 2-lobed. Seeds oblong, 1.5–2 × 0.8–1.1 mm. Fl. Jun–Jul, fr. Jul–Aug.

Open sand and gravel; 4700–5600 m. Xinjiang [Kashmir, Tajikistan].


宽果芥属 kuan guo jie shu

Herbs perennial, woolly or pilose; caudex slender, few branched. Trichomes simple, mixed with stalked, 1–3-forked ones. Stems erect, simple from rosette. Basal leaves petiolate, rosulate, simple, entire. Cauline leaves absent. Racemes several to many flowered, ebracteate, corymbose, elongated slightly in fruit. Fruiting pedicels slender, divaricate. Sepals oblong, caducous, base of lateral pair not saccate, margin membranous. Petals purple; blade spatulate, apex obtuse; claw subequaling sepals. Stamens 6, tetradynamous; filaments dilated at base; anthers oblong, obtuse at apex. Nectar glands confluent and subtending bases of all stamens; median glands present. Ovules 8–20
per ovary. Fruit dehiscent silicles, oblong, elliptic, ovate-oblong, or ovate-lanceolate, strongly latiseptate, subsessile; valves obscurely veined, glabrous, smooth; replum rounded; septum complete or reduced to a rim, membranous, translucent; style to 0.5 mm, conical or subconical; stigma capitulate, entire, minute. Seeds biseriate, wingless, oblong, plump or slightly flattened; seed coat minutely reticulate, not mucilaginous when wetted; cotyledons incumbent or accumbent.

Two species: China, Kashmir; two species (one endemic) in China.

1a. Leaves woolly; fruit oblong-obovate or ovate-lanceolate; septum reduced to a rim; cotyledons accumbent 1. *Eurycarpus lanuginosus*

1b. Leaves pilose; fruit elliptic or oblong, rarely ovate-elliptic; septum complete; cotyledons incumbent 2. *Eurycarpus marinellii*


**绒毛宽果芥**  rong mao kuan guo jie

*Parrya lanuginosa* J. D. Hooker & Thomson, J. Proc. Linn. Soc., Bot. 5: 136. 1861; *Christolea lanuginosa* (J. D. Hooker & Thomson) Ovczinnikov; *Draba lanjarica* O. E. Schulz; *Ermania lanuginosa* (J. D. Hooker & Thomson) O. E. Schulz.

Herbs 3–5 cm tall; caudex slender, few branched. Trichomes simple, to 1 mm, mixed with distinctly stalked 1-forked ones. Styles densely villous. Basal leaves rosulate, fleshy; petiole 2–7 mm, persistent, becoming papery; leaf blade suborbicular, spatulate, or oblanceolate, 5–10 × 2–6 mm, sublanate with forked trichomes, base cuneate, margin entire, apex obtuse or rounded. Cauline leaves absent. Racemes 8–15-flowered, ebracteate. Fruiting pedicels divaricate, straight, 4–7 mm, densely villous. Sepals oblong, 2–2.5 × 1–1.5 mm, pilose. Petals spatulate, ca. 5 × 2.5 mm, apex obtuse; claw ca. 2 mm. Median filament pairs ca. 3 mm, lateral pair ca. 2 mm; andthers oblong, ca. 0.6 mm. Ovules ca. 8 per ovary. Fruit oblong-obovate or ovate-lanceolate, 1.5–2.7 cm × 6–10 mm, strongly flattened; valves glabrous, smooth, with obscure midvein and marginal veins, obtuse at base, acute at apex; septum perforated, reduced to a rim; style 0.2–0.4 mm; stigma minute, entire. Seeds biseriate, narrowly oblong, flattened, 2.2–2.5 × 1–1.3 mm; cotyledons incumbent.

• Slopes; 5100–5300 m. Xizang.


**马氏宽果芥**  ma shi kuan guo jie


Herbs 3–10 cm tall, pilose; caudex slender, few branched. Trichomes simple, to 1 mm, mixed with distinctly stalked 1-forked ones. Styles pilose. Basal leaves rosulate, subfleshy; petiole (1–)3–10(–14) mm, persistent, becoming papery; leaf blade spatulate, oblanceolate, or rarely obovate, (2–)3–12(–15) × (1–)2–8 mm, pilose with simple and forked stalked trichomes, base cuneate, margin entire, apex obtuse or rounded. Cauline leaves absent. Racemes (5–)10–22-flowered, ebracteate. Fruiting pedicels divaricate, straight, 4–8(–10) mm, pilose. Sepals oblong, 2.2–3 × 1–1.5 mm, sparsely pilose. Petals purplish, spatulate, 5–6 × 2–2.5 mm, apex obtuse; claw ca. 2 mm. Median filament pairs 2.5–3.5 mm, lateral pair 1.5–2.5 mm; andthers oblong, 0.5–0.6 mm. Ovules 12–20 per ovary. Fruit elliptic or oblong, rarely ovate-elliptic, (0.7–)1–1.7(–2) cm × 5–7 mm, strongly flattened; valves often purplish, glabrous, smooth, with obscure midvein and marginal veins, subacute at both ends; septum complete; style 0.2–0.6 mm; stigma minute, entire. Seeds biseriate, narrowly oblong, not flattened, 2.2–2.5 × 0.8–0.9 mm; cotyledons incumbent.

Alpine areas; 5300–5700 m. Xizang [Kashmir].


**旗杆芥属**  qi gan jie shu

Herbs biennial, rarely short-lived perennial, glaucous above. Trichomes simple and/or stalked forked or substellate. Stems erect, simple or branched apically. Basal leaves petiolate, rosulate, simple, repand, dentate, or lobed, rarely entire. Cauline leaves sessile, auriculate, sagittate, or amplexicaul at base, entire. Racemes ebracteate, corymbose, elongated considerably in fruit. Fruiting pedicels slender, erect or divaricate. Sepals oblong or linear, erect, base of lateral pair not saccate, margin membranous. Petals yellowish, creamy white, pink, or purplish; blade spatulate, oblanceolate, or rarely linear, apex obtuse; claw undifferentiated from blade. Stamens 6, erect, tetradynamous; filaments not dilated at base; andthers oblong or linear, obtuse at apex. Nectar glands confluent and subtending bases of all stamens, median glands present, lateral ones anular. Ovules 130–200 per ovary. Fruit dehiscent siliques, linear, often subterete-quadrangular, sessile; valves leathery, with a prominent midvein, glabrous, smooth; replum rounded; septum complete, membranous, veinless; style short, stout; stigma capitate, subentire. Seeds biseriate, wingless or rarely narrowly winged, elliptic or orbicular, flattened; seed coat not mucilaginous when wetted; cotyledons incumbent.

Two species: N Africa, Asia, Europe, North America; one species in China.

旗杆芥 *qi gan jie*

*Arabis glabra* (Linnaeus) Bernhardi; *A. perfoliata* Lamarck; *A. pseudoturritis* Boissier & Heldreich; *Turritis glabra* var. *hilacina* O. E. Schulz; *T. pseudoturritis* (Boissier & Heldreich) Velenovsky.

Herbs biennial, rarely perennial, (30–)40–120 (–150) cm tall, sparsely to densely pilose basally with simple and short-stalked, forked trichomes, glabrous and glaucous above. Stems erect, simple basally, often branched above. Basal leaves rosulate, petiolate; leaf blade spatulate, oblanceolate, or oblong, (4–) 5–12 (–15) × 1–3 cm, pubescent or rarely glabrous, margin pinnatifid, sinuate, dentate, repand, or rarely entire, apex obtuse. Cauline leaves sessile, lanceolate, oblance-elliptic, or ovate, 2–9 (–12) × (0.5–)1–2.5 (–3.5) cm, base sagittate or auriculate, margin dentate or entire, apex acute.

Fruiting pedicels erect, (0.6–)0.7–1.6 (–2) cm, slender, appressed to rachis, glabrous. Sepals oblong or oblong-linear, (2.5–)3–5 × 0.5–1.2 mm, glabrous. Petals pale yellow, creamy white, or rarely pink, linear-oblanceolate, narrowly spatulate, or rarely linear, 5–8.5 × 1.3–1.7 mm. Filaments slender, lateral pair 2.5–4.5 mm, median pairs 3.5–6.5 mm; anthers narrowly oblong, 0.7–1.5 mm. Fruit linear, (3–)4–9 (–10) cm × 0.7–1.5 mm, erect, appressed to rachis, subterete-quadrangular; style 0.5–0.8 (–1) mm. Seeds brown, oblong or suborbicular, 0.6–1.2 × 0.5–0.9 mm. Fl. Apr–Jul, fr. May–Aug. 2n = 12, 16, 32.

Mountain slopes, forest margins, valleys, fields, meadows, woods, fields, river banks, roadsides; 100–3500 m. Jiangsu, Liaoning, Shan-dong, Xinjiang, Zhejiang [Afghanistan, India, Japan, Kashmir, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; N Africa, SW Asia, Europe, North America; naturalized in Australia].

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### 60. *Rorippa* Scopoli, Fl. Carniol. 520. 1760.

*半菜属* han cai shu

*Tetrapoma* Turczaninow ex Fischer & C. A. Meyer.

Herbs annual, biennial, or perennial, usually of wet or aquatic habitats. Trichomes absent or simple. Stems erect or prostrate, simple or branched, leafy. Basal leaves petiolate, rosulate or not, simple, entire, dentate, sinuate, pinnatifid, obovate or 1–3-pinnatisect. Cauline leaves petiolate or sessile, cuneate, attenuate, auriculate, or sagittate at base, entire, dentate, pinnatifid, or pinnatisect. Racemes ebracteate or rarely bracteate throughout, elongated in fruit. Sepals ovate or oblong, erect or spreading, base of lateral pair not saccate or rarely saccate, margin often membranous. Petals yellow, sometimes white or pink, rarely vestigial or absent; blade obovate, spatulate, oblong, or oblanceolate, apex obtuse or emarginate; claw sometimes distinct, often shorter than sepals. Stamens 6 and tetradyynamous, rarely 4 and equal in length; anthers ovate or oblong, obtuse or rarely apiculate at apex. Nectar glands confluent, often subtending bases of all stamens; median glands narrow; lateral glands semiannular and intrastaminal, or annular. Ovules 10–300 per ovary. Fruit dehiscent siliques or silicles, linear, oblong, ellipsoid, or oblong-ovoid, 0.7–1.5 mm. Fruit valves 2, papery; sepals (1–)1.3–1.8 (–2) mm; petals 0.7–1.3 (–1.5) × 0.3–0.8 mm. 7. *R. globosa*

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4b. Fruit linear, rarely linear-oblong, length more than 4 × width.

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### 60. *Rorippa* Scopoli, Fl. Carniol. 520. 1760.

*半菜属* han cai shu

*Tetrapoma* Turczaninow ex Fischer & C. A. Meyer.

Herbs annual, biennial, or perennial, usually of wet or aquatic habitats. Trichomes absent or simple. Stems erect or prostrate, simple or branched, leafy. Basal leaves petiolate, rosulate or not, simple, entire, dentate, sinuate, pinnatifid, obovate or 1–3-pinnatisect. Cauline leaves petiolate or sessile, cuneate, attenuate, auriculate, or sagittate at base, entire, dentate, pinnatifid, or pinnatisect. Racemes ebracteate or rarely bracteate throughout, elongated in fruit. Sepals ovate or oblong, erect or spreading, base of lateral pair not saccate or rarely saccate, margin often membranous. Petals yellow, sometimes white or pink, rarely vestigial or absent; blade obovate, spatulate, oblong, or oblanceolate, apex obtuse or emarginate; claw sometimes distinct, often shorter than sepals. Stamens 6 and tetradyynamous, rarely 4 and equal in length; anthers ovate or oblong, obtuse or rarely apiculate at apex. Nectar glands confluent, often subtending bases of all stamens; median glands narrow; lateral glands semiannular and intrastaminal, or annular. Ovules 10–300 per ovary. Fruit dehiscent siliques or silicles, linear, oblong, ovoid, ellipsoid, or globose, terete or slightly latiseptate, sessile or rarely shortly stiptitate; valves 2 (or 3–6), papery or leathery, veinless or obscurely veined, smooth or torulose; replum rounded; septum complete or rarely perforated, membranous, translucent, veinless; style obsolete or distinct; stigma capitata, entire or slightly 2-lobed. Seeds biseriate or rarely uniseriate, wingless or rarely winged, oblong, ovoid, or ellipsoid, plump; seed coat reticulate, colliculate, rugose, tuberculate, or foveolate, mucilaginous or not when wetted; cotyledons accumbent.

About 75 species: worldwide; nine species in China.

1a. Racemes bracteate throughout or rarely along lowermost third.

2a. Fruiting pedicels slender, 3–6, 5 (–8) mm; fruit linear, 7–17 (–21) × 1.2–1.6 mm; seeds colliculate 4. *R. benghalensis* 2b. Fruiting pedicels stout, (0.3–)0.7–2 (–3) mm; fruit oblong, (3–)4.5–8.5 (–10) × 1.5–2.5 mm; seeds foveolate .......................................................... 5. *R. cantoniensis*

1b. Racemes ebracteate, rarely lowermost 1 or 2 flowers bracteate.

3a. Fruiting pedicels erect to erect-ascending, subappressed to rachis; fruit valves with a distinct midvein; seeds 1.1–1.5 × 0.7–1.1 mm .......................................................... 6. *R. elata*

3b. Fruiting pedicels ascending, divaricate, or reflexed, not appressed to rachis; fruit valves not veined; seeds 0.4–0.9 × 0.3–0.6 mm. 4a. Fruit globose, oblong, ellipsoid, or oblong-ovoid, length less than 3 × width.

5a. Fruit oblong, ellipsoid, or oblong-ovoid, often slightly curved; seeds colliculate ........... 9. *R. palustris* 5b. Fruit globose or subglobose, not curved; seeds reticulate.

6a. Fruit valves 2, papery; sepals (1–)1.3–1.8 (–2) mm; petals 0.7–1.3 (–1.5) × 0.3–0.8 mm 7. *R. globosa*

6b. Fruit valves 3 or 4 (–6), leathery; sepals 1.6–2.8 mm; petals (1.5–)1.8–3 (–3.5) × 0.7–1.8 (–2) mm .......................................................... 8. *R. barbareifolia*

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About 75 species: worldwide; nine species in China.

1a. Racemes bracteate throughout or rarely along lowermost third.

2a. Fruiting pedicels slender, 3–6, 5 (–8) mm; fruit linear, 7–17 (–21) × 1.2–1.6 mm; seeds colliculate 4. *R. benghalensis* 2b. Fruiting pedicels stout, (0.3–)0.7–2 (–3) mm; fruit oblong, (3–)4.5–8.5 (–10) × 1.5–2.5 mm; seeds foveolate .......................................................... 5. *R. cantoniensis*

1b. Racemes ebracteate, rarely lowermost 1 or 2 flowers bracteate.

3a. Fruiting pedicels erect to erect-ascending, subappressed to rachis; fruit valves with a distinct midvein; seeds 1.1–1.5 × 0.7–1.1 mm .......................................................... 6. *R. elata*

3b. Fruiting pedicels ascending, divaricate, or reflexed, not appressed to rachis; fruit valves not veined; seeds 0.4–0.9 × 0.3–0.6 mm. 4a. Fruit globose, oblong, ellipsoid, or oblong-ovoid, length less than 3 × width.

5a. Fruit oblong, ellipsoid, or oblong-ovoid, often slightly curved; seeds colliculate ........... 9. *R. palustris* 5b. Fruit globose or subglobose, not curved; seeds reticulate.

6a. Fruit valves 2, papery; sepals (1–)1.3–1.8 (–2) mm; petals 0.7–1.3 (–1.5) × 0.3–0.8 mm 7. *R. globosa*

6b. Fruit valves 3 or 4 (–6), leathery; sepals 1.6–2.8 mm; petals (1.5–)1.8–3 (–3.5) × 0.7–1.8 (–2) mm .......................................................... 8. *R. barbareifolia*

4b. Fruit linear, rarely linear-oblong, length more than 4 × width.

7a. Perennials; middle cauline leaves deeply pinnatisect; fruit rarely producing seeds; seeds colliculate ................................................................. 1. *R. sylvestris*

7b. Annuals; middle cauline leaves lyrate-pinnatifid or undivided; fruit producing numerous seeds; seeds foveolate.

8a. Fruit often curved, (0.7–)1–2.4(–3) cm × 1–1.5(–2) mm; seeds biseriate or nearly so; petals longer than sepals, (2.5–)3–4(–4.5) × 1–1.5 mm, rarely absent ................. 2. *R. indica*

8b. Fruit straight, (1.5–)2.5–4 cm × 0.7–0.9(–1) mm; seeds uniseriate; petals mostly absent, if present then often shorter than sepals and 1.5–2.5 × 0.2–0.7(–1) ............................................. 3. *R. dubia*

**1. Rorippa sylvestris** (Linnaeus) Besser, Enum. Pl. 27. 1822.

欧亚 菜 ou ya han cai


Herbs perennial, (5–)15–80(–100) cm tall, glabrous or sparsely pubescent. Stems prostrate, decumbent, ascending, or suberect, branched mainly basally. Rosette leaves soon withered, similar to cauleine leaves. Middle cauleine leaves petiolate, deeply pinnatisect; petiole not auriculate, rarely minutely auriculate; leaf blade (2–)3.5–15(–20) × (0.7–)1–4.5(–6) cm; lateral lobes 3–6 on each side of midvein, sublinear, lanceolate, oblong, elliptic, or ovate, margin dentate or serrate, sometimes subentire; uppermost leaves with 1–3 lateral lobes or not lobed, often subsessile. Racemes ebracteate. Fruiting pedicels (3–)4–10(–12) mm, slender, divericate. Sepals green or yellow, oblong, 1.8–3(–3.5) × 0.7–1.5 mm, ascending or spreading. Petals yellow, spatulate or obovate, (2.2–)2.8–5.5(–6) × 1.5–2.5 mm, apex rounded. Filaments (1.5–)1.8–3.5(–4) mm; anthers oblong, 0.7–1 mm. Ovule number highly variable, mostly aborted. Fruit linear, very rarely oblong-linear, (0.4–)0.7–2(–2.5) cm × (0.7–)1–1.3(–1.6) mm, rarely producing seeds; style 0.5–1(–1.5) mm; stigma subentire or slightly 2-lobed. Seeds reddish brown, ovoid, colliculate, uniseriate or rarely subbiseriate, 0.6–0.9 × 0.4–0.5 mm. Fl. and fr. May–Sep. 2n = 32, 40, 48.

Along ditches, damp areas, meadows, waste grounds, fields; 100–2000 m. Xinjiang, Liaoning [India, Japan, Kashmir, Russia, Tajikistan, Uzbekistan; SW Asia, Europe; introduced in North and South America].

Although the present authors have not examined the type of *Rorippa liaotungensis*, the detailed description and illustration leave no doubt that it is a synonym of *R. sylvestris*, hundreds of specimens of which were examined from its native and naturalized ranges.


菜 han cai

*Sisymbrium indicum* Linnaeus, Sp. Pl., ed. 2, 2: 917. 1763; *Cardamine glandulosa* Blanco; *C. lamontii* Hance; *Nasturtium atrovirens* (Hornemann) de Candolle; *N. diffusum* de Candolle; *N. indicum* (Linnaeus) de Candolle (1821), not Garsault (1764); *N. montanum* Wallich ex J. D. Hooker & Thomson; *N. sinapis* (N. L. Burman) O. E. Schulz; *Radicula montana* (Wallich ex J. D. Hooker & Thomson) Hu ex C. Pei; *Rorippa atrovirens* (Hornemann) Ohwi & H. Har; *R. montana* (Wallich ex J. D. Hooker & Thomson) Small; *R. sinapis* (N. L. Burman) Ohwi & H. Har; *S. atrovirens* Hornemann; *S. sinapis* N. L. Burman.

Herbs annual, (6–)20–60(–75) cm tall, glabrous or rarely sparsely pubescent. Stems often branched basally and apically. Basal leaves withered by flowering. Lower and middle cauleine leaves auriculate or not; petiole absent or 1–4 cm; leaf blade lyrate-pinnatifid or undivided, ovate, oblong, or lanceolate, (2.5–)3.5–12(–16) × (0.8–)1.5–4(–5) cm, margin entire, irregularly crenate, or serrate, apex obtuse or subacute; terminal lobe oblong, elliptic, or oblong-lanceolate, to 10 × 5 cm; lateral lobes absent or 1–5 (or 6) on each side of midvein. Uppermost leaves usually sessile, auriculate or not; leaf blade lanceolate or oblong, margin entire, dentate, or serrate, apex acute or acuminate. Racemes ebracteate. Fruiting pedicels slender, ascending, divericate, or rarely slightly reflexed, straight, (2–)3–10(–15) mm. Sepals often green or pinkish, ascending, oblong-ovate, 2–3 × 0.8–1.5 mm, margin membranous. Petals yellow, obovate or spatulate, (2.5–)3–4(–4.5) × 1–1.5 mm, rarely absent. Filaments 1.5–3 mm; anthers oblong, 0.5–0.8 mm. Ovules (60–)70–110 per ovary. Fruit linear, (0.7–1–2.4(–3) cm × 1–1.5–2 (–2) mm, often curved upward; valves thin papery, not veined; style (0.5–)1–1.5(–2) mm, slender, narrower than fruit. Seeds reddish brown, ovate or ovate-elliptic, 0.5–0.9 × 0.4–0.6 mm, foveolate, biseriate or nearly so. Fl. and fr. throughout the year. 2n = 24*, 32*, 48*.

Roadsides, field margins, gardens, river banks; near sea level to 3200 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bangladesh, India, Indonesia, Japan, Korea, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sikkim, Thailand, Vietnam; naturalized in North and South America].

Although the type of *Cardamine lamontii* was collected from Hong Kong (Sep 1874, *J. Lamont s.n.* (holotype, BM)), that name was not listed in FRPS or any other provincial Chinese flora.
This species is used medicinally.


4. Rorippa benghalensis (de Candolle) J. D. Hooker & T. Anderson; Rorippa dubia (Persoon) H. Hara var. benghalensis (de Candolle) Mukerjee; R. indica (Linnaeus) Hiern subsp. benghalensis (de Candolle) Bennet; R. indica var. benghalensis (de Candolle) Debeaux.

Herbs annual, 15–65(–85) cm tall, glabrous or sparsely to densely hisrute, with spreading or retrorse trichomes. Stems simple at base, few to many branched above. Basal leaves soon withered. Lowermost cauline leaves auriculate; petioles to 3 cm; leaf blade oblong or oblong-obovate in outline, lyrate-pinnatipartite, (1.5–2.5–12(–15) × (0.5–)1–4(–6) cm; terminal lobe broadly ovate or oblong, 1–5 × 0.7–3 cm; lateral lobes 1–4, oblong or ovate, to 2 × 1 cm, margin serrate or dentate. Upper leaves sessile, progressively reduced in size upward into bracts. Racemes bracteate throughout or rarely only along proximal third; bracts lanceolatelinear or oblong-linear, subentire or denticulate, minutely auriculate or cuneate at base. Fruiting pedicels ascending or divaricate, slender, straight, 3–6.5(–8) mm. Sepals elliptic or oblong, 1.5–2 × 0.5–0.8 mm. Petals pale yellow, spatulate or oblanceolate, 2–2.5 × 0.5–0.9 mm, apex rounded. Filaments 2–2.5 mm; anthers oblong, 0.4–0.5 mm. Ovules 100–170 per ovary. Fruit linear, straight or curved, 0.7–1.7(–2.1) cm × 1.2–1.6 mm; style 0.3–0.8 mm. Seeds reddish brown, subglobose or broadly ovoid, biseriate, 0.5–0.6 × 0.4–0.5 mm, minutely colliculate. Fl. and fr. Mar-Jul. 2n = 24, 48.

Stems erect or decumbent, sometimes sparsely with semiglobose trichomes. Basal leaves withered by flowering. Lower and middle cauline leaves auriculate or not; petiole to 4 cm, rarely absent; leaf blade lyrate-pinnatipartite or undivided, obovate, oblong, or lanceolate, (2–3)–11(–15) × (0.5–)1–3(–5) cm, margin entire or irregularly crenate or serrate, apex obtuse or subacute; terminal lobe oblong, elliptic, or oblong-lanceolate, to 14 × 4 cm; lateral lobes absent or 1–4 on each side of midvein. Uppermost leaves usually sessile, auriculate or not; leaf blade lanceolate or oblong, margin entire or serrulate, apex acute or acuminate. Racemes ebracteate. Fruiting pedicels slender, divaricate, straight, (2–3)–8(–10) mm. Sepals often pinkish, ascending, oblong-linear, (2–)2.5–3 × 0.5–0.7 mm, margin membranous. Petals mostly absent, rarely present and linear or narrowly oblong-lanceolate, 1.5–2.5 × 0.2–0.7(–1) mm, often shorter than sepals. Filaments 1.5–2.8 mm; anthers oblong, 0.5–0.8 mm. Ovules 70–90 per ovary. Fruit linear, (1.5–)2.5–4 cm × 0.7–0.9(–1) mm, straight; valves thin papery, not veined; style 0.2–1(–1.5) mm, stout and about as wide as fruit, rarely slender and narrower. Seeds reddish brown, subquadrate or ovate-orbicular, 0.5–0.8 × 0.4–0.6 mm, foveolate, uniseriate. Fl. and fr. throughout the year. 2n = 32*, 48*.

Valleys, waste areas, slopes, roadsides, wet grounds, marshy places, field margins; near sea level to 3700 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Shaanxi, Shandong, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bangladesh, Bhutan, Cambodia, India, Laos, Malaysia, Myanmar, Nepal, Sikkim, Thailand, Vietnam].

Although Rorippa benghalensis was first recorded from China by Hooker and Thomson (J. Proc. Linn. Soc., Bot. 5: 139. 1861, as Nasturtium benghalense), that record was overlooked by subsequent botanists. The occurrence of the species in China is here confirmed based on Wang 74232 (A), China-Russia Team 156 (KUN), and Yunnan Team 9474 (KUN).


Ricottia cantoniensis Loureiro, Fl. Cochinch. 2: 482. 1793; Cardamine cryptantha (A. Richard) Kunze var. pinnatodentata Kunze; C. microsperma (de Candolle) Kunze; Nasturtium microspermum de Candolle; N. microspermum var. vegetis Bunge; N. microspermum var. macilentum Bunge; N. sikokianum Franchet & Savatier; N. sikokianum var. axillare Hayata; Rorippa microsperma (de Candolle) Handel-Mazzetti.

Herbs annual, (5–)10–35(–45) cm tall, glabrous throughout, sometimes sparsely with semiglobose papillae 0.05–0.1 mm. Stems erect or decumbent, branched basally and above, rarely simple. Basal leaves petiolate, rosulate, soon withered, lyrate, pinnatisect, or bipinnatisect, up to 10 × 3 cm, with up to 12 lateral lobes on each side of midvein. Cauline leaves and bracts sessile or rarely petiolate throughout, auriculate...
or sagittate at base, lyrate, pinnatisect, or bipinnatisect, rarely sinuate or toothed, (0.8–)1.5–5–7–(–)8 × (0.3–)0.8–2.3–(–)3 cm; lateral lobes 2–6(or 7) on each side of midvein, to 10 × 5 mm, incised, dentate, or entire. Racemes ebracteate throughout; bracts rarely adnate to pedicel. Fruiting pedicels stout, ascending, (0.3–)0.7–2–(–)3 mm. Sepals oblong or subelliptic, 1.5–2–(–)2.5 × 0.5–0.8 mm. Petals pale yellow, obovate or narrowly spatulate, 2–3 × (3–3.5) × 0.5–1 mm. Filaments 1.5–2 mm; anthers oblong, 0.3–0.4 mm. Ovules 100–230 per ovary. Fruit broadly or narrowly oblong, (3–)4.5–8.5(–10) × 1.5–2.5 mm; valves thin papery, veinless; style 0.1–0.5 mm. Seeds reddish brown, ovate or ovate-reniform, foveolate, biseriate, (0.3–)0.4–0.6 × (0.2–)0.3–0.4 mm. Fl. and fr. Feb–Nov.

Fields, roadsides, valleys, river banks, along irrigation ditches, waste places, damp areas; near sea level to 1800 m. Anhui, Fujian, Guangdong, Guangxi, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Shandong, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Korea, Russia (Far East), Vietnam].


Barbarea elata J. D. Hooker & Thomson, J. Proc. Linn. Soc., Bot. 5: 140. 1861; *Nasturtium barbareifolium* Franchet (1888), not Baker (1877), nor (de Candolle) B. Fedtschenko (1912); *N. elatum* (J. D. Hooker & Thomson) Kuntze ex O. E. Schulz.

Herbs annual or short-lived perennial, (20–)30–90(–120) cm tall, sparsely to rarely densely hirsute, glabrous or subglabrous above. Stems erect, simple at base, rarely glabrous above. Stems erect, simple at base, branch above. Lowermost and middle cauline leaves sessile, lanceolate, oblanceolate, or oblong, 2.5–10(–15) × 0.5–1 mm, reticulate. Fl. and fr. Apr–Nov.

River banks, moist areas, grasslands, railroad embankments; near sea level to 2500 m. Anhui, Fujian, Guangdong, Guangxi, Hubei, Heilongjiang, Hunan, Jiangsu, Jiangxi, Jinlin, Liaoning, Ningxia, Ningxia, Shandong, Shanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Japan, Korea, Mongolia, Russia, Vietnam].


**Feng hua cai**

Camelina barbareifolia de Candolle, Syst. Nat. 2: 517. 1821; *Nasturtium barbareifolium* (de Candolle) B. Fedtschenko (1912), not Baker (1877), nor Franchet (1888); *Rorippa hispida* (Desv.) Britton var. *barbareifolia* (de Candolle) Hultén; *Tetrapoma barbareifolium* (de Candolle) Turczaninow ex Fischer & C. A. Meyer; *T. kruhsianum* Fischer & C. A. Meyer; *T. pyriforme* Seemann.

Herbs annual or biennial, (20–)30–95(–110) cm tall, densely villous or hisurate at least near base, sparsely so or subglabrous above. Stems erect, simple at base, branch above. Lowermost and middle cauline leaves sessile, three-valved fruits are occasionally produced on misidentified plants with 2-valved fruit, as seen in *T. T. Yu 14587* (A, BM).
lanceolate, oblanceolate, or oblong, 2.5–10(–15) × 0.4–2.5(–4.5) cm, villous or hirsute, lyrate-pinnatifid, with 2–7 lateral lobes on each side of midvein, base auriculate or amplexicaul, margin laciniate, irregularly serrate, repand, or entire, apex acute; uppermost leaves undivided, entire or obscurely denticulate. Racemes ebracteate. Fruiting pedicels ascending, (2–)4–12(–14) mm, straight, slender, glabrous or hirsute. Sepals oblong, spreading, 1.6–2.8 × 0.6–1.2 mm. Petals yellow, obovate or spatulate, (1.5–)1.8–2.5(–3.5) × 0.7–1.8(–2) mm, apex obtuse. Filaments 1.5–2.5 mm; anthers narrowly oblong, 0.5–0.6 mm. Ovules 60–85 per ovary. Fruit globose or subglobose, (2.5–)3.5–4(–6.5) × (2.3–)2.8–4(–4.3) mm; valves (3 or)4(–6), leathery, glabrous, not veined; gynophore 0.3–0.8(–1) mm; style stout, 0.5–1(–1.4) mm. Seeds dark reddish brown, oblong-ovate, 0.5–0.7 × 0.3–0.4 mm, reticulate. Fl. & fr. Mar–Aug. 2n = 16.

Forest borders, roadsides, moist areas, river banks; 100–2100 m. Heilongjiang, Jilin, Nei Mongol [Mongolia, Russia; North America (Alaska, N Canada)].


沼生菜 zhao sheng han cai

Sisymbrium amphibium Linnaeus var. palustre Linnaeus, Sp. Pl. 2: 657; 1753; Cardamine palustre (Linnaeus) Kuntze; Nasturtium densiflorum Turczadinow; N. palustre (Linnaeus) de Candolle; N. palustre f. longipes Franchet; N. palustre f. stoloniferum Franchet.

Herbs annual or rarely short-lived perennial, (5–)10–100(–140) cm tall, glabrous, rarely hirsute. Stems erect, simple or often branched above, ribbed. Basal leaves rosulate, withered early; leaf blade lyrate-pinnatisect, (4–)6–20(–30) × 1–5(–8) cm. Cauline leaves petiolate or subsessile, auriculate or amplexicaul, lyrate-pinnatisect, (1.5–)2.5–8(–12) × (0.5–)0.8–2.5(–3) cm; lateral lobes oblong or ovate, smaller than terminal lobe, (1 or)2–6(–or ?) on each side of midvein, sometimes absent, margin subentire or irregularly dentate, sinuate, serrate, or crenate. Racemes ebracteate. Fruiting pedicels divaricate or slightly to strongly reflexed, (2.5–)3–8(–12) mm, slender, straight or curved. Sepals oblong, 1.5–2.4(–2.6) × 0.5–0.8 mm. Petals yellow or pale yellow, spatulate, (1.5–)1.8–2.6(–3) × 0.5–1.3(–1.5) mm. Filaments 1–2.5 mm; anthers ovate, 0.3–0.5 mm. Ovules 20–90 per ovary. Fruit oblong, ellipsoid, or oblong-ovoid, often slightly curved, (2.5–)4–10(–14) × (1.5–)1.7–3(–3.5) mm; valves not veined; style 0.2–1(–2) mm. Seeds brown to yellowish brown, ovoid or subglobose, collicolute, biseriate, 0.5–0.9 × 0.4–0.6 mm.


Marshlands, pastures, meadows, roadsides, shores of lakes and ponds, streamsides, thickets, grasslands; near sea level to 4000 m. Anhui, Gansu, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan [Afghanistan, Bhutan, India, Japan, Kazakhstan, Korea, Mongolia, Ne-pal, Pakistan, Russia, Sikkim, Tajikistan, Turkmenistan, Uzbekistan, Europe, North America; introduced in Australia, South America, and elsewhere].

All records of Rorippa islandica (Oeder ex Murray) Borbás from China are based on misidentified plants of R. palustris. Plants of the latter are prostrate diploids (2n = 16) restricted to Europe and W Russia; they have nonauriculate cauline leaves, sepals and petals 1–1.5 mm, and fruit often 2–3(–5) × longer than the pedicels. By contrast, plants of R. palustris are widespread, erect tetraploids (2n = 32) with auriculate cauline leaves, sepals and petals 1.5–2.6 mm, and fruit shorter than to 2 × longer than the pedicels.

Rorippa palustris is highly variable and has been divided into as many as four subspecies and seven varieties, all of which are indigenous to North America; only subsp. palustris is also indigenous in Eurasia.


豆瓣菜 dou ban cai

Cardaminum Moench, nom. rej.

Herbs perennial, aquatic, rhizomatous. Trichomes absent or simple. Stems prostrate or decumbent, erect in emergent plants, rooting at proximal nodes. Leaves all cauline, pinnately compound, often simple in deeply submersed plants; petiole sometimes auriculate at base; lateral leaflets 1–6(–12) pairs, petiolulate or sessile, entire, repand, or rarely dentate. Racemes many flowered, ebracteate. Fruiting pedicels usually divaricate. Sepals ovate or oblong, erect or ascending, glabrous, base of lateral pair subacute or not saccate. Petals white or rarely pink, longer than sepals; blade obovate or narrowly spatulate, apex obtuse; claw absent. Stamens 6, erect, tetradynamous; filaments base not dilated; anthers oblong, obtuse at apex. Median glands absent; lateral glands 2, annular or semimaniular. Ovules 25–50 per ovary. Fruit dehiscent silique, linear or rarely narrowly oblong, terete, sessile; valves obscurely veined, glabrous, smooth or slightly torulose; replum rounded; septum complete; style obsolete or to 2 mm; stigma capitate, entire. Seeds uniseriate or biseriate, wingless, oblong or ovoid, plump; seed coat minutely to coarsely reticulate, not mucilaginous when wetted; cotyledons accumbent.

Five species: one in NW Africa (Morocco), two in Asia and Europe, and two in North America (N Mexico and United States); one species (introduced) in China.


Sisymbrium nasturtium-aquaticum Linnaeus, Sp. Pl. 2: 657; 1753; Rorippa nasturtium-aquaticum (Linnaeus) Hayek.
Herbs perennial, rhizomatous, aquatic, 10–70(–200) cm tall, glabrous throughout or sparsely pubescent with simple trichomes. Stems decumbent or prostrate, erect in emergent plants, branched above, rooting at proximal nodes. Leaves all cauline, pinnately compound, 3–9(–13)-foliolate; petiole auriculate at base; terminal leaflet suborbicular or oblong, 1–4 cm, base obtuse, cuneate, or subcordate, margin entire or repand, apex obtuse; lateral leaflets smaller, usually sessile. Fruiting pedicels slender, divericate or recurved, 5–12(–20) mm. Sepals oblong, 2–3.5 mm, lateral pair slightly saccate. Petals white or pink, spatulate or obovate, 2.8–4.5(–6) × 1.5–25 mm, apex rounded; claw ca. 1 mm.

Filaments white, 2–3.5 mm; anthers oblong, ca. 0.6 mm.

Fruit cylindric, 1–1.5(–2) cm × (1.8–)2–2.5(–3) mm; valves with an obscure midvein; style 0.5–1(–1.5) mm.

Seeds biseriate, ovoid, 1–1.3 × 0.7–1 mm, reddish brown, coarsely reticulate, with 25–50(–60) areolae on each side. Fl. Apr–Sep, fr. May–Sep. 2n = 32*

Streams, ditches, lakes, swamps, marshes; near sea level to 3700 m.

Anhui, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jiangxi, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan [native to SW Asia and Europe; widely naturalized elsewhere].

Cultivated as a vegetable and used medicinally.


鳞蕊芥属 lin rui jie shu

Chrysobraya H. Har.

Herbs annual or cespitose perennial. Trichomes dendritic, forked, submalpighiaceous, or simple, often more than 1 kind present. Stems erect, simple from rosettes, leafy or leafless. Basal leaves petiolate, rosetulate, simple, entire or dentate. Cauline leaves similar to basal, sometimes pinnatifid, rarely absent. Racemes few to many flowered, ebracteate or rarely bracteate throughout, elongated or not elongated in fruit, sometimes flowers solitary on long pedicels originating from axils of rosette leaves. Fruiting pedicels slender, divericate or recurved. Sepals oblong, persistent or rarely caducous, base of lateral pair not saccate, margin membranous. Petals yellow, white, lavender, or purple; blade broadly obovate or rarely spatulate, apex rounded or emarginate; claw subequaling sepal. Stamens 6, tetradynamous; filaments winged or rarely wingless, toothed or rarely toothless; anthers reniform or rarely oblong, obtuse at apex. Nectar glands 4, lateral; median glands absent. Ovules 8–28 per ovary. Fruit dehiscence siliques, linear-oblong to linear, terete or latiseptate, sessile; valves papery, obscurely veined, rarely marginal veins prominent, pubescent, torulose or rarely smooth; replum rounded; septum complete or rarely perforated, membranous; style distinct, to 2 mm; stigma capitate, entire or rarely slightly 2-lobed. Seeds uniseriate, wingless, oblong or ovate, plum; seed coat minutely reticulate, not mucilaginous when wetted; cotyledons accumbent or rarely incipient.

Five species: Bhutan, China, Nepal, Sikkim; three species (two endemic) in China.

1a. Perennials; racemes bracteate throughout; trichomes almost exclusively simple; anthers oblong, 0.7–0.9 mm .......................................................................................................................................................................................... 2. L. everestianus

1b. Annuals; racemes ebracteate, rarely lowermost few flowers bracteate; trichomes dendritic, submalpighiaceous, or simple; anthers reniform, 0.3–0.5(–0.6) mm.

2a. Fruit strongly flattened, not torulose, 2.5–3 mm wide; valve margin thickened, with prominent marginal veins; median filaments toothless; flowers white; seeds ovate ........................................... 3. L. rosaliris

2b. Fruit terete, torulose, ca. 1 mm wide; valve margin not thickened, with obscure marginal veins; median filaments toothed; flowers yellow; seeds oblong ........................................................................ 1. L. pedunculosus


鳞蕊芥 lin rui jie

Herbs annual, 2–10 cm tall. Trichomes short-stalked and subdendritic or forked, subsessile and submalpighiaceous-stellate on leaves, stems, pedicels and fruit, rarely simple along leaf margin. Basal leaves rostrate, smaller than and somewhat similar to cauline ones, dry by flowering time. Cauline leaves few to many, often densely grouped below inflorescence; petiole 3–10(–25) mm, ciliate with simple subsetose trichomes; leaf blade spatulate or oblong-lanceolate, 3–12 × 2–7 mm, base attenuate, margin dentate or pinnatifid and with 1–4, oblong or linear lateral lobes 1–5 × 0.5–1 mm on each side, apex obtuse. Racemes 8– to many flowered, ebracteate or sometimes lowermost pedicels with adnate bracts, not elongated in fruit. Fruiting pedicels divericate, straight, 1–3.5 cm. Sepals oblong, 2–3.5 × 1–1.5 mm, spreading, sparsely pubescent, persistent. Petals yellow, broadly obovate or spatulate, 3–5.5 × 1.5–4 mm, persistent, apex emarginate or rounded; claw 1–2 mm. Filaments 2–3 mm, persistent; median pairs with oblong or obovate wing 0.5–0.9 mm wide, unexpanded portion of filament to 0.6 mm; lateral pair entire or winged; anthers reniform, 0.3–0.5 mm.

Nectar glands ovate, to 0.2 mm. Ovules 12–28 per
63. DONTOSTEMON Andrzejowski ex C. A. Meyer in Ledebour, Fl. Altaic. 3: 118. 1831, nom. cons.

花旗杆属 hua qi gan shu

Alaida Dvorák; Andreosokia de Candolle; Dimorphostemon Kitagawa; Hesperidopsis (de Candolle) Kuntze.

Herbs annual, biennial, or perennial. Trichomes unicellular, eglandular, simple, straight or crisped, sometimes mixed with multicellular, multisierate glandular ones. Stems erect or ascending, simple or branched. Basal leaves petiolate, rosulate or not, simple, entire, dentate, pinnatifid, or pectinate-pinnatifid. Cauline leaves petiolate or sessile, similar to basal. Racemes ebracteate, elongated in fruit. Fruiting pedicels ascending or divaricate. Sepals ovate, not saccate. Petals white, pink, or purple; blade broadly obovate, obcordate, spatulate, or oblanceolate, apex obtuse or emarginate; claw subequaling sepal or longer. Stamens 6, tetradynamous; median filament pairs united, sometimes free and toothed below anther or expanded to base, dilated at base; anthers ovate or oblone, often apiculate at apex. Nectar glands 4, lateral, 1 on each side of lateral stamen; median glands absent. Ovules 7–60 per ovary. Fruit dehiscent, linear, terete or latiseptate; valves with a prominent midvein and often distinct marginal veins, glabrous or glandular, torulose; gynophore obsolete, rarely to 1 mm; replum flattened; septum complete; style obsolete or to 3 mm; stigma capitately lobed, rarely prominently lobed and subdecurrent. Seeds uniseriate, winged, margined, or wingless, oblong or oval, plump or slightly flattened; seed coat reticulate, not mucilaginous when wetted; cotyledons accumbent or incumbent.

Lepidostemon everestianus, which is known only from the type gathering, Shipton s.n. (holotype, BM), grows at altitudes higher than those reached by any other species of the Brassicaceae.


珠峰鳞蕊芥 zhu feng lin rui jie

Herbs annual, 1–4 cm tall. Trichomes short-stalked and subdendritic or forked, simple ones to 1 mm on petioles and fruit. Basal leaves rosulate, smaller than cauline ones, entire, dry by flowering time. Cauline leaves several to many, often densely grouped below inflorescence; petiole 5–14 mm, ciliate with simple trichomes; leaf blade spatulate, oblanceolate, or ovate, 3–10 × 2–6 mm, sparsely pubescent, base cuneate, margin with 1–4 teeth on each side, apex obtuse. Racemes 10–12-flowered, ebracteate or rarely lowermost pedicels with adnate bracts, not elongated in fruit. Fruiting pedicels divaricate, straight, 0.5–2 cm. Sepals oblong, 2.3–5 × 1.5–1.6 mm, spreading, pubescent, persistent. Petals white, broadly obovate, 3.5 × 2–3 mm, persistent, apex rounded; claw 1–2 mm. Filaments 2–2.5 mm, persistent; median pairs narrowly lanceolate, winged, 0.4–0.5 mm wide; lateral pair slender, wingless; anthers reniform, 0.4–0.5 mm. Ovules 12–16 per ovary. Fruit oblone-linear, 1–2 cm × 2.5–3 mm, flattened; valves with obscure midvein and prominent marginal veins, somewhat indurated at margin and conate at base, dechiscing basipetally, not torulose, pilose with forked and/or simple trichomes; septum complete; style 0.5–1.5 mm; stigma subentire or 2-lobed. Seeds ovate, 1.2–1.6 × 0.8–1 mm; cotyledons accumbent. Fl. Jun–Jul, fr. Jul–Aug.

• Stony grounds, slopes, dry gullies, scree; 4200–5100 m. Xizang.
Dontostemon is separated from Dimorphostemon only by having united (vs. free) median staminal filaments. However, the union of filaments evolved independently within several other genera in the Brassicaceae, and the separation of these two genera is artificial.

1a. Leaves pectinate-pinnatifid, with up to 11 lobes on each side of midvein; stigma prominently 2-lobed, lobes subdecurrent .......................................................... 11. *D. tibeticus*

1b. Leaves entire, dentate, or serrate, if pinnatifid then with multicellular glands; stigmas slightly 2-lobed, lobes not decurrent.

2a. Plants sparsely to densely glandular.

3a. Petals (10–)12–18 × (4–)6–8 mm; fruit flattened; anthers apex obtuse, 1.5–2 mm ................ 1. *D. hispidus*

4a. All leaves entire; median filaments united; stems with minute twisted trichomes .... 3. *D. integrifolius*

4b. At least basal leaves dentate, serrate, or pinnatifid; median filaments free; stems glabrous or with straight trichomes.

5a. Petals obovate, (5–)6–8 mm; median filaments abruptly expanded and toothed below anther; seeds apically margined; anthers 0.6–0.8 mm .............................................. 9. *D. pinnatifidus*

5b. Petals spatulate, 2–4(–4.5) mm; median filaments gradually expanded to base, toothless; seeds not margined; anthers 0.2–0.4 mm ................................ 10. *D. glandulosus*

2b. Plants not glandular.

6a. At least some cauline leaves petiolate, dentate .......................................................... 2. *D. dentatus*

6b. Cauline leaves sessile, entire.

7a. Plants annual or biennial, never woody basally; stems with minute twisted trichomes.

8a. Petals broadly obovate, 5–7(–8) × 2–3 mm, apex subemarginate; anthers oblong, 0.7–0.8 mm; ovules 15–25 per locule .......................................................... 3. *D. integrifolius*

8b. Petals narrowly oblanceolate, 3–5 × 0.6–1 mm, apex obtuse; anthers ovate, 0.4–0.5 mm; ovules 30–50 per locule .......................................................... 4. *D. micranthus*

7b. Plants perennial with woody base; stems glabrous or with straight trichomes.

9a. Stems glabrous; leaves somewhat fleshy, subleathery; fruit strongly arcuate or twisted.

10a. Fruit terete, strongly arcuate, 1.5–2.5 cm × 1–1.7 mm; style 1.5–2.5 mm; plants 5–10 cm tall; sepals 3–4 mm; median filaments 3.5–4 mm ............................................ 7. *D. crassifolius*

10b. Fruit compressed, strongly twisted, 3–5 cm × 2–2.5 mm; style rarely to 0.5 mm; plants 15–50 cm tall; sepals 5–6 mm; median filaments 6–8 mm ............................................. 8. *D. elegans*

9b. Stems sparsely to densely pilose; leaves not fleshy, herbaceous; fruit straight or rarely slightly curved.

11a. Plants pilose with subappressed trichomes rarely to 1 mm; fruit 1–2.5 cm × 0.9–1.1 mm; seeds to 1.4 mm, not margined; cotyledons incumbent ...................................... 5. *D. perennis*

11b. Plants hirsute with spreading trichomes to 3 mm; fruit (2.5–)3–5 cm × 1.4–2 mm; seeds to 2.5 mm, margined or winged; cotyledons accumbent ........................................ 6. *D. senilis*


毛花旗杆 mao hua qi gan

*Clausia ussuriensis* N. Busch.

Herbs annual, (10–)15–50(–65) cm tall, sparsely to densely hispid with subsetose trichomes to 3.5 mm, these mixed with much shorter ones, glandular on all parts except petals and stamens, gland stalks to 0.4 mm. Stems erect, often simple. Middle cauline leaves with petioles 2–5 mm; leaf blade elliptic or elliptic-lanceolate, 15–3.5 cm × 5–10 mm, base cuneate, margin serrate-dentate, apex acute. Fruiting pedicels divaricate, straight, slender, 7–15 mm, glandular. Sepals narrowly oblong, (3.5–)5–6 × 1.5–2 mm, glandular and often also setose. Petals lavender or purplish, broadly obovate, (10–)12–18 × (4–)6–8 mm, apex subemarginate; claw 5–7 mm. Filaments of median stamens 5–7 mm, united; filaments of lateral stamens 3–5 mm; anthers narrowly oblong, 1.5–2 mm, apex obtuse. Ovules 30–60 per ovary. Fruit (2–)3–6(–8) cm × 1.5–2 mm, glandular, straight, divaricate or

ascending, subtorulose, flattened, midvein prominent; style (1–)2–3 mm; stigma slightly lobed. Seeds brown, obl-op ovate, 2–2.5 × 1.2–1.4 mm, with a narrow wing to 0.5 mm wide; cotyledons accumbent. Fl. and fr. Jun–Sep. 2n = 14.

Flood plains, sandy river banks; 200–400 m. ?Heilongjiang [Russia (Far East)].

Although the present authors have seen no material from China, this species was described from Manchuria and was recorded from China in Fl. Vasc. Orient. Extr. Sov. 3: 111. 1988. It is likely that the species occurs in SE Heilongjiang and/or NE Jilin.


花旗杆 hua qi gan

Andreoskia dentata Bunge, Enum. Pl. China Bor. 6. 1833; Dontostemon dentatus var. glandulosus Maximowicz ex Franchet & Savatier; D. intermedia Voroshilov; D. oblongifolius Ledebour.

Herbs annual, (9–)15–50(–60) cm tall, eglandular. Stems erect, often simple, branched above, pubescent distally with minute, twisted, simple trichomes, rarely glabrescent. Middle cauline leaves subsessile or petiole 2–10 mm; leaf blade lanceolate to lanceolate-linear, (1.5–)2–5.5(–7) cm × (2–)3–10(–13) mm, base attenuate or cuneate, margin minutely to coarsely dentate, rarely subentire, ciliate with simple, subsetose trichomes to 0.9 mm, apex acute. Fruiting pedicels ascending or divaricate, straight or curved upward, thick, (2–)3–7(–9) mm, glabrous or with twisted trichomes. Sepals oblong, 3–5 × 1–1.5 mm, often with straight simple trichomes. Petals lilac or purplish, obovate, (5–)6–9(–11) × 2.5–4.5 mm, apex subemarginate; claw 2.5–4 mm. Filaments of median stamens 3.5–5.5 mm, united; filaments of lateral stamens 2–4 mm; anthers oblong, 1.1–1.8 mm, apiculate. Ovules 20–60 per ovary. Fruit (1–)2–5(–6) cm × 0.9–1.1 mm, glabrous, straight, erect or slightly ascending, subtorulose, terete or slightly flattened, midvein prominent; style 0.4–1.5 mm; stigma slightly lobed. Seeds brown, obl-op ovate, 0.8–1.3 × 0.6–0.8 mm, narrowly margined distally; cotyledons accumbent. Fl. and fr. Jun–Sep.

Rocky slopes, sandy areas, roadsides; 200–1900 m. Anhui, Hebei, Heilongjiang, Henan, Jiangsu, Jilin, Liaoning, Ningxia, Shaanxi, Shandong, Shanxi, Xinjiang, Yunnan [Japan, Korea, Russia].


线叶花旗杆 xian ye hua qi gan

Sisymbrium integrifolium Linnaeus, Sp. Pl. 2: 660. 1753; Andreoskia eglandulosa (de Candolle) de Candolle; A. integrifolia (Linnaeus) de Candolle; Cheiranthus muricatus Weinmann; Dontostemon eglandulosus (de Candolle) Ledebour; D. integrifolius var. eglandulosus (de Candolle) Turczaninow; D. integrifolius var. glandulosus Turczaninow; Hesperis glandulosa Persoon; Sisymbrium eglandulosum de Candolle; Synstemon linearifolius Z. X. An.

Herbs annual, (2.5–)5–20(–25) cm tall, eglandular or glandular nearly throughout, pubescent, with minute, twisted, simple trichomes mixed with straight ones to 1.5 mm. Stems erect or ascending, simple several branched. Middle cauline leaves sessile, linear, (0.7–)1.5–3 cm × 0.5–1.5 mm, base attenuate, margin entire, ciliate and often pubescent with simple subappressed trichomes, apex subacu. Fruiting pedicels divaricate or rarely ascending, straight, slender, 3–8(–11) mm, pilose. Sepals oblong, 2.5–3.5 × 1–1.5 mm. Petals lilac, broadly obovate, 5–7(–8) × 2–3 mm, apex subemarginate; claw 2.5–4 mm. Filaments of median stamens 2.5–4 mm, united; filaments of lateral stamens 2–3 mm; anthers oblong, 0.7–0.8 mm, apiculate. Ovules 30–50 per ovary. Fruit (0.6–)1.5–2.8(–3.3) cm × 0.9–1.1 mm, glandular or glabrous, straight or slightly curved, divaricate or rarely ascending, torulose, terete, midvein prominent; style 0.5–1 mm; stigma slightly lobed. Seeds brown, oblong, 0.7–0.9 × 0.4–0.5 mm, not margined; cotyledons incubent or obliquely so. Fl. and fr. Jul–Oct. 2n = 14.

Open grasslands, meadows, pastures, sandy slopes, dunes; 200–1700 m. Heilongjiang, Liaoning, Ningxia, Shaanxi, Shanxi [Mongolia, Russia].

Glandular and eglandular forms of Dontostemon integrifolius, which are frequently found within the same population (see for example, Bunge 1831(43) and Liu 5430 (NAS)), have variously been treated as independent species or varieties. However, the present authors believe that these variants do not merit formal recognition.


小花花旗杆 xiao hua hua qi gan

Herbs annual, (7–)15–55(–75) cm tall, eglandular, pubescent, with minute, twisted, simple trichomes mixed with straight rigid ones to 0.5 mm. Stems erect, often simple, branched above. Middle cauline leaves sessile, linear or rarely lanceolate-linear, 1–4(–5) cm × 1–2(–3) mm, base attenuate, margin entire, ciliate and often pubescent with simple rigid trichomes, apex acute. Fruiting pedicels divaricate or rarely ascending, straight, slender, (4–)5–10(–12) mm, pubescent. Sepals narrowly oblong, 2.5–3.5 × 0.5–0.8 mm. Petals lilac or purplish, narrowly oblanceolate, 3–5 × 0.6–1 mm, attenuate to a claw-like base to 1.5 mm, apex obtuse. Filaments of median stamens 2.5–3.5 mm, united; filaments of lateral stamens 2–2.5 mm; anthers ovate, 0.4–0.5 mm, apiculate. Ovules 30–50 per ovary. Fruit (1.8–)2.5–4 × 0.6–0.8 mm, glabrous, straight, erect or slightly ascending, torulose, terete, midvein prominent; style 0.4–0.8(–1) mm; stigma slightly lobed. Seeds brown, ovate, 0.5–0.8 × 0.4–0.5 mm, not margined; cotyledons obliquely incumbent. Fl. Jun–Jul, fr. Jul–Aug.
Grassy slopes, river banks; 900–3300. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Qinghai, Shanxi, Xinjiang [Mongolia, Russia (Far East, Siberia)].

5. **Dontostemon perennis** C. A. Meyer in Ledebour, Fl. Altaic. 3: 121. 1831.

多年生花旗杆  duo nian sheng hua qi gan

Herbs perennial, 5–15 cm tall, eglanud, with a woody base, pilose, with simple, subpressed trichomes rarely to 1 mm. Stems erect or subdecumbent, branched basally and above, rarely simple, sparsely to densely pilose. Middle cauleine leaves sessile, linear, 0.4–3.5 cm × 0.5–1.5(–2.5) mm, base attenuate, margin entire, ciliate with subpressed trichomes, apex obtuse or subacute. Fruiting pedicels divaricate, straight, slender, 4–8 mm, glabrous or sparsely pilose. Sepals oblong, 2.5–3.5 × 1–1.5 mm, often sparsely pilose. Petals lilac or white, obovate, 6–8.5 × 2.5–4 mm, apex rounded; claw 2.5–3.5 mm. Filaments of median stamens 3–3.5 mm, united; filaments of lateral stamens 2–2.5 mm; anthers oblong, 0.6–0.9 mm, apiculate. Ovules 20–30 per ovary. Fruit 1–2.5 cm × 0.9–1.1 mm, glabrous or sparsely puberulent, straight, divaricate, somewhat torulose, slightly flattened, midvein prominent; style to 1 mm; stigma slightly lobed. Seeds 1.4 × 0.9 mm, not margined or winged; cotyledons incumbent. Fl. and fr. Jun–Sep.

Sandy areas, deserts. Nei Mongol [Mongolia, Russia]. The records of *Dontostemon perennis* in FRPS from Hebei, Heilongjiang, Liaoning, and Ningxia are based on eglanud plants of *D. integrifolius*. The present authors have seen no material of *D. perennis* from China, but, because of its common occurrence in neighboring Mongolia and Russia (Altai, Siberia), it is likely to be found in N Nei Mongol and NW Xinjiang. The illustrations in FRPS (33: 319. 1987) and Fl. Intramongol. (ed. 2, 2: 670. 1990) of *D. perennis* clearly represent plants of *D. integrifolius* because *D. perennis* has a strongly woody base and straight stem trichomes.


白花花旗杆  bai hua hua qi gan

Herbs perennial, 4–25(–35) cm tall, eglanud, with a woody base, hirsute with simple, spreading trichomes to 3 mm. Stems erect or ascending, branched basally and above, rarely simple, sparsely to densely hirsute. Middle cauleine leaves sessile, linear, (0.4–)1.5–3.5 cm × 0.5–3(–5) mm, sparsely to densely hirsute, base attenuate, margin entire, ciliate with spreading trichomes, apex obtuse or subacute. Fruiting pedicels divaricate, straight, stout, (2–3)–5 mm, glabrous or sparsely hirsute. Sepals oblong, 3–3.5 × 1–1.5 mm, often hirsute. Petals lilac, obovate, 6–8.5 × 1.5–2.5 mm, apex rounded; claw 3–3.5 mm. Filaments of median stamens 4–5 mm, united; filaments of lateral stamens 2–2.5 mm; anthers oblong, 1–1.3 mm, apiculate. Ovules 20–40 per ovary. Fruit (2.5–)3–5 cm × 0.9–1.1 mm, glabrous, straight, ascending or divaricate, torulose, flattened, midvein prominent; style 1–3 mm; stigma slightly lobed. Seeds oblong, 1.5–2.5 × 1–1.2 mm, margined or narrowly winged; cotyledons accumbent. Fl. Jun–Jul, fr. Jul–Sep. 2n = 28.

Gravelly areas; 300–1500 m. Gansu, Nei Mongol, Ningxia, Xinjiang [Mongolia].

7. **Dontostemon crassifolius** (Bunge) Maximowicz, Prim. Fl. Amur. 46. 1858.

厚叶花旗杆  hou ye hua qi gan


Herbs perennial, 5–10 cm tall, eglanud, with a woody base. Stems ascending, branched basally, glabrous. Middle cauleine leaves sessile, linear or lanceolate-linear, rarely ob lanceolate-linear, (1–)1.8–3.5(–4.5) cm × 1–3(–5) mm, somewhat fleshy, subleathery, glabrous or rarely sparsely covered with simple trichomes, base attenuate or cuneate, margin entire, apex acute. Fruiting pedicels divaricate, straight or slightly recurved, thick, 3–6 mm, glabrous. Sepals oblong, 3.4 × 1–1.5 mm, glabrous or subapically sparsely pubescent with simple trichomes. Petals lilac, obovate, (6–)7–10 × 2–3 mm, apex obtuse; claw 3–4 mm. Filaments of median stamens 3.5–4 mm, united; filaments of lateral stamens 2–3 mm; anthers oblong, 0.9–1.3 mm, apiculate. Ovules 20–30 per ovary. Fruit (1.5–)2–2.5 cm × 1–1.7 mm, glabrous, strongly arcuate with suberecot apex, torulose, terete, midvein obscure; style 1.5–2.5 mm; stigma slightly lobed. Seeds brown, oblong, ca. 1.5 × 1 mm. Fl. Jun–Aug, fr. Jul–Sep. 2n = 14.

Sandy or gravelly areas, grasslands. Nei Mongol [Mongolia, Russia].


扭果花旗杆  niu guo hua qi gan

*Dontostemon elegans var. semiamplexicaulis* (H. L. Yang) H. L. Yang & M. S. Yan; *D. semiamplexicaulis* H. L. Yang.

Herbs perennial, 15–50 cm tall, eglanud, with whitish woody base. Stems ascending, branched basally, glabrous. Middle cauleine leaves sessile, linear to ob lanceolate-linear, 2–5 cm × 3–5 mm, somewhat fleshy, subleathery, glabrous or sparsely pilose with simple trichomes to 1 mm, base attenuate, margin entire, apex obtuse to subacute. Fruiting pedicels divaricate, straight or slightly recurved, thick, 3–6 mm, glabrous. Sepals oblong or oblong-linear, 5–6 × 1–1.5 mm, sparsely pubescent with simple trichomes. Petals lilac, obovate, 9–12 × 2.5–4 mm, apex obtuse; claw 5–7 mm. Filaments of median stamens 6–8 mm, united; filaments of lateral stamens 4–6 mm; anthers oblong, 1.2–1.8 mm, apiculate. Ovules 32–60 per ovary. Fruit 3.5–2–2.5 cm, glabrous, strongly twisted, torulose, flattened, midvein prominent; style to 0.5 mm; stigma lobed. Seeds
Dontostemon pinnatifidus


**羽裂花旗杆** yu lie hua qi gan

Herbs annual or biennial, (5–)10–40(–60) cm tall, glandular. Stems erect, often simple, branched above. Basal and lowermost cauline leaves sparsely to densely pubescent, with simple trichomes to 2 mm, glabular; petiole 2–10(–15) mm; leaf blade lanceolate, elliptic, or oblong, (0.7–)1.5–4.5(–6) cm × (1.5–)3–10(–15) mm, base attenuate or cuneate, margin dentate, serrate, or pinnatifid, ciliate, apex acute; middle and upper leaves linear and entire, or elliptic or lanceolate and dentate. Fruiting pedicels ascending or divaricate, (0.3–)0.5–2.5(–4) cm, glandular. Sepals oblong, 2–3(–4) × (0.8–1)–1.5 mm, glabrous or sparsely pubescent apically. Petals white, broadly obovate, (5–)6–8 × (2.5–)3–4(–5) mm, apex emarginate; claw 1–3 mm. Filaments of median stamens 2–3 mm, free, abruptly expanded and toothed below anther; filaments of lateral stamens 1.5–2.5 mm, slender; anthers oblong-ovate, 0.6–0.8 mm, apiculate. Ovules 16–60 per ovary. Fruit (1.1–)1.5–4(–5) cm × (0.8–1)–1.3 mm, straight, torulose, terete; valves glandular, with prominent midvein and marginal veins; style 0.5–1.5 mm; stigma slightly lobed. Seeds brown, oblong-ovate or narrowly oblong, 1.1–2.3 × 0.7–1 mm, narrowly margined distally; cotyledons obliquely or obliquely incumbent. Fl. and fr. Jun–Aug.

Grassy plains, hillsides, rocky slopes, roadsides; 1100–4600 m. Gansu, Hebei, Heilongjiang, Nei Mongol, Qinghai, Shandong, Sichuan, Xinjiang, Xizang, Yunnan

[India, Mongolia, Nepal, Russia].


**线叶羽裂花旗杆** xian ye yu lie hua qi gan

Sisymbrium glandulosum (Karelin & Kirilov) Maximo-wicz var. linearifolius Maximowicz, Fl. Tangut. 61. 1889.

Plants glabrous, very sparsely glandular. Middle cauline leaves linear to filiform, entire, 0.5–1(–1.5) mm wide. Seeds narrowly oblong, 2–2.3 mm; cotyledons incumbent. Fl. and fr. Jul–Aug.

• Sand dunes, flood plains, grasslands; 3100–4500 m. Gansu, Qinghai, Xinjiang.


**腺花旗杆** xian hua qi gan

Arabis glandulosa Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 146. 1842; Alaida glandulosa (Karelin & Kirilov) Dvorak; Dimorphostemon glandulosus (Karelin & Kirilov) Golubkova; D. sergievskianus (Polozhij) S. V. Ovchinnikova; Neotorularia sergievskiana (Polozhij) Czerepanov; Sisymbrium glandulosum (Karelin & Kirilov) Maximonwicz; Stenophragma glandulosum (Karelin & Kirilov) B. Fedtschenko; Torularia glandulosum (Karelin & Kirilov) Vassilchenko; T. sergievskii Polozhij. Herbs annual or biennial, (1.5–)5–20(–30) cm tall, glandular. Stems erect or ascending, simple or many branched basally. Basal and lowermost cauline leaves pubescent, with simple trichomes to 1.5 mm, glandular; petiole 2–10(–25) mm; leaf blade lanceolate or oblong, (0.3–)0.5–2.5(–4) cm × 2–10(–15) mm, base attenuate or cuneate, margin dentate or pinnatifid, ciliate, apex acute. Fruiting pedicels ascending or divaricate, 2–8(–12) mm, glandular. Sepals oblong, 1–2(–3) × 0.5–1 mm, sparsely pubescent apically or glabrous. Petals lavender or white, spatulate, 2–4(–4.5) × (0.5–)1–1.5(–2) mm, apex obtuse or subemarginate; claw to 1.5 mm. Filaments of median stamens 1.5–2.5 mm, free, gradually expanded to broad base, toothless; filament
of lateral stamens 1–2 mm, slender; anthers broadly ovate, 0.2–0.4 mm, apiculate. Ovules 14–70 per ovary. Fruit (0.7–)1.3–3(–4) × 0.8–1.3 mm, straight, torulose, terete; valves glandular, with prominent midvein and marginal veins; style 0.5–1 mm; stigma slightly lobed. Seeds brown, ovate or oblong, 0.8–1.7 × 0.5–0.8 mm, not margined distally; cotyledons obliquely succulent or obliquely incumbent. Fl. and fr. Jun–Aug.

Alpine meadows and steppe, sandy river banks, rock crevices, gravelly plains, dry scrub, roadsides, scree slopes; 1900–5300 m. Gansu, Nei Mongol, Ningxia, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan [Kashmir, Kazakhstan, Nepal, Russia, Sikkim, Tajikistan].


西藏花旗杆 xi zang hua qi gan

Nasturtium tibeticum Maximowicz, Fl. Tangut. 54. 1889.

Herbs biennial, (1.5–)4–14(–20) cm tall, pilose with simple trichomes to 1.5 mm, with somewhat fleshy root. Stems often from base, simple above. Basal and lowermost cauline leaves eglantular; petiole (0.3–)1–2 cm; leaf blade lanceolate, oblanceolate, or oblanceolate in outline, somewhat fleshy, (0.7–)1.2–2.7(–3.5) cm × (3–)5–1(–14) mm, base attenuate or cuneate, margin pectinate-pinnatifid, apex acute; lateral lobes (4–)7–11, to 5 × 2.5 mm, sometimes imbricate, abaxially toothed or entire, adaxially entire, acute; uppermost cauline leaves sessile. Fruiting pedicels divaricate, (2–)3–7(–9) mm, eglantular, stout. Sepals ovate, 3–4 × 1.5–2 mm, glabrous or sparsely pubescent apically, lateral pair slightly saccate. Papillose with pink or purplish claws, obcordate, 5–8 × 2.5–3.5(–4) mm, apex emarginate; claw 3–4 mm. Filaments of median stamens 3–4 mm, free, flattened and sometimes minutely toothed on one side; filaments of lateral stamens 2–2.5 mm, slender; anthers oblong, 0.7–1 mm, apex obtuse. Ovules 12–20 per ovary. Fruit (0.8–)1–1.5(–1.7) cm × (0.8–)1–1.3 mm, straight, torulose, terete; valves with a prominent midvein and multilobular, glandlike warts; style 1–3 mm; stigma prominently 2-lobed, lobes subdecurrent. Seeds brown, oblong-ovate, 1.4–1.6 × 0.9–1 mm, wingless; cotyledons succulent. Fl. Jun–Jul, fr. Jul–Aug.

• Loose scree, disturbed alpine meadows, moist gravelly slopes, permafrost gravel and sandstone, steep rocky slopes; 3200–5200 m. Gansu, Qinghai, Xizang.


丛菔属 cong fu shu

Herbs perennial, sometimes pulvinate, with well-developed, thick caudex covered with petioles of previous years. Trichomes absent or simple. Stems absent or rarely present and few leaved. Basal leaves petiolate, rotate, simple, entire. Cauline leaves absent, if present then sessile, entire. Flowers solitary on long pedicels originating from center of rosette, rarely in few- to several-flowered, ebracteate racemes elongated slightly in fruit. Fruiting pedicels slender, erect or divaricate. Sepals oblong, free or rarely united, usually persistent, erect, equal, base of lateral pair not saccate, margin not membranous. Petals purple, blue, pink, or white, suborbicular, obovate, spatulate, or oblong-ovate, apex obtuse or emarginate; claw subequaling or longer than sepals. Stamens 6; filaments not dilated at base; anthers oblong-linear, obtuse at apex. Nectar glands 2, lateral, often annular; median glands absent. Ovules 5–10 per ovary. Fruit dehiscent siliques or silicles, linear, oblong, ovate, or lanceolate, latiseptate, sessile, readily detached from pedicel; valves papery, reticulate veined, with a prominent midvein and marginal veins, glabrous or pubescent, smooth, margin angled, apex persistently united with replum; replum rounded, concealed by connate valve margin; septum complete or rarely perforated, membranous, translucent; style absent, obsolete, rarely to 1 mm; stigma capitate, entire or slightly 2-lobed, lobes not decurrent. Seeds uniseriate or biseriate, wingless, broadly ovate or suborbicular, flattened; seed coat reticulate, rugose, or papillate, not mucilaginous when wetted; cotyledons succulent.

Nine species: Bhutan, China, Sikkim; nine species (eight endemic) in China.

1a. Flowers in racemes; stems often 1- or 2-leaved; seeds papillate .................................................. 1. S. platycarpa

1b. Flowers solitary from a basal rosette; scapes leafless; seeds rugose or reticulate.

2a. Leaves gray, densely lanate; seeds rugose.

3a. Leaf blade lanceolate-to oblanceolate-linear, rarely oblanceolate, retrorsely lanate, 1.5–5(–7) mm wide;

fruit valves obscurely veined .............................................................................................................. 2. S. retropilosa

3b. Leaf blade broadly spatulate, oblong, or obovate, spreading or antrorsely lanate, (5–)7–17 mm wide;

fruit valves prominently veined ......................................................................................................... 3. S. lanata

2b. Leaves green, glabrous or pilose; seeds reticulate.

4a. Leaf blade 0.3–1(–1.5) mm wide, often grooved adaxially, fleshy, filiform to narrowly linear.

5a. Petioles remaining thickened; longest leaf blades (1.5–)2–4.5(–5.5) cm; fruiting pedicles

(1–)1.5–3.5(–4.5) cm; petals (1.5–)1.7–2.2 cm; seeds 2–4 × 2–3 mm ................................................. 7. S. xerophyta


西藏花旗杆 xi zang hua qi gan

Nasturtium tibeticum Maximowicz, Fl. Tangut. 54. 1889.

Herbs biennial, (1.5–)4–14(–20) cm tall, pilose with simple trichomes to 1.5 mm, with somewhat fleshy root. Stems often from base, simple above. Basal and lowermost cauline leaves eglantular; petiole (0.3–)1–2 cm; leaf blade lanceolate, oblong, or oblanceolate in outline, somewhat fleshy, (0.7–)1.2–2.7(–3.5) cm × (3–)5–1(–14) mm, base attenuate or cuneate, margin pectinate-pinnatifid, apex acute; lateral lobes (4–)7–11, to 5 × 2.5 mm, sometimes imbricate, abaxially toothed or entire, adaxially entire, acute; uppermost cauline leaves sessile. Fruiting pedicels divaricate, (2–)3–7(–9) mm, eglantular, stout. Sepals ovate, 3–4 × 1.5–2 mm, glabrous or sparsely pubescent apically, lateral pair slightly saccate. Papillose with pink or purplish claws, obcordate, 5–8 × 2.5–3.5(–4) mm, apex emarginate; claw 3–4 mm. Filaments of median stamens 3–4 mm, free, flattened and sometimes minutely toothed on one side; filaments of lateral stamens 2–2.5 mm, slender; anthers oblong, 0.7–1 mm, apex obtuse. Ovules 12–20 per ovary. Fruit (0.8–)1–1.5(–1.7) cm × (0.8–)1–1.3 mm, straight, torulose, terete; valves with a prominent midvein and multilobular, glandlike warts; style 1–3 mm; stigma prominently 2-lobed, lobes subdecurrent. Seeds brown, oblong-ovate, 1.4–1.6 × 0.9–1 mm, wingless; cotyledons succulent. Fl. Jun–Jul, fr. Jul–Aug.

• Loose scree, disturbed alpine meadows, moist gravelly slopes, permafrost gravel and sandstone, steep rocky slopes; 3200–5200 m. Gansu, Qinghai, Xizang.
5b. Petioles often becoming papery; longest leaf blades rarely to 1 cm; fruiting pedicels 0.2–0.7(–1) cm; petals 1–1.2 cm; seeds 1–2 mm in diam. ................................................................. 8. S. minor
4b. Leaf blade (1.5–)2–16–23 mm wide, not grooved adaxially, not fleshy, variable in shape, never filiform, rarely narrowly linear.
6a. Leaf blade (7–)10–16–23 mm wide; petiole strongly thickened, subcorky, often purplish.
4. S. eurycarpa
6b. Leaf blade (1.5–)2–5–7 mm wide; petiole thin or rarely slightly thickened, papery, often not purplish.
7a. Sepals united, 2.5–3.5 mm; petals white, oblanceolate, 5–6 × 1.5–2 mm. .......... 9. S. gamosepala
7b. Sepals free, 5–10 mm; petals purple, pink, or deep to turquoise blue, obovate or broadly so.
12–25 × 4–12 mm.
8a. Leaves pilose with straight trichomes; petioles membranous, ciliate; fruit (3–)4.5–6.5(–8) cm; seeds 3.5–5 mm ................................................................. 6. S. linearifolia
8b. Leaves glabrous or sparsely pubescent with crisped trichomes; petioles usually slightly thickened, not ciliate; fruit 2.5–3.5(–4.5) cm; seeds 2.5–3.5 mm. ....... 5. S. pulcherrima

締总丛菔 zong zhuang cong fu
Herbs (2–)4–10(–15) cm tall, glabrous or densely pubescent with straight or crisped, retrose trichomes to 1.1 mm; caudex covered with petioles of previous years. Petioles of basal leaves (0.5–)1.5–3(–6) cm, ciliate, thickened and subcorky, persistent, often ciliate at least basally; leaf blade lanceolate, elliptic, oblanceolate, or spatulate, rarely broadly obovate, suborbicular, or linear-oblanceolate, (0.5–)1–3.5(–5) cm × 2–7(–10) mm, glabrous or densely pilose, sometimes only sparsely so at leaf apex and petiole base, base cuneate or attenuate, apex acute or rounded. Cauline leaves 1 or 2, much narrower than basal ones, sessile. Racemes 4–10-flowered. Fruiting pedicels divaricate-ascending, 3–10(–15) mm. Sepals oblong to oblong-linear, 4.5–6.5(–8 × 1.5–2 mm, glabrous or pilose. Petals pale blue or purplish, obovate, (1–)1.2–1.5(–1.7) cm × 4–5 mm; claw 6–9 mm. Filaments of median staminal pairs 3–4 mm, those of lateral pair 2–2.5 mm; anthers 1–1.5 mm. Ovules 10–20 per ovary. Fruit lanceolate, oblong, or broadly ovate, (1–)2–5.2(–6) × (0.6–)0.9–1.5(–2) cm; valves glabrous or lanate, obscurely reticulate veined; septum complete; style obsolete; stigma entire or slightly lobed. Seeds biseriate, broadly ovate or suborbicular, rugose, 3–4.5(–5) × (2–)2.5–3 mm. Fr. May–Jul, fr. Jul–Aug.
Rocky ravines, cliff ledges, beneath boulders, stony hillsides; 4200–5800 m. Xizang [Bhutan, Sikkim].
倒毛丛菔 dao mao cong fu
Herbs 2–8 cm tall, densely lanate with trichomes to 1.5 mm; caudex covered with petioles of previous years. Petioles of basal leaves 0.3–1(–3–4) cm, retrorsely lanate, papery, persistent, often ciliate at least basally; leaf blade linear-lanceolate, linear-oblanceolate, or rarely obovate, (0.6–)1.2–4.5(–6) cm × 1.5–5(–7) mm, retrorsely lanate, base attenuate, apex acute or obtuse. Cauline leaves absent. Flowers solitary. Fruiting pedicels erect or ascending, (1.5–)2.5–5(–7) cm. Sepals oblong to oblong-linear, 5–8 × 1.5–2.5 mm, lanate. Petals purplish, broadly obovate, (1–)1.2–1.8 cm × (5–)6–7(–9) mm; claw 5–9 mm. Filaments of median staminal pairs 3.5–5 mm, those of lateral pair 2–3 mm; anthers 1.2–1.5 mm. Ovules 10–20 per ovary. Fruit lanceolate, oblong, or broadly ovate, (1–)2–5.2(–6) × (0.6–)0.9–1.5(–2) cm; valves glabrous or lanate, obscurely reticulate veined; septum complete; style obsolete; stigma entire or slightly lobed. Seeds biseriate, broadly ovate or suborbicular, rugose, 3–4.5(–5) × (2–)2.5–3 mm. Fl. May–Jul, fr. Jul–Aug.
• Scree, open scrub; 4200–5100 m. Sichuan, Xizang, Yunnan.
締毛丛菔 mian mao cong fu
Herbs 2–8 cm tall, densely lanate, with trichomes to 1.5 mm; caudex with some petiolar remains of previous years. Petioles of basal leaves 0.5–2 cm, antrorsely lanate, papery, persistent, often ciliate at least basally; leaf blade broadly spatulate, oblong, or obovate, 1.2–4 × (0.5–)0.7–1.7 cm, antrorsely lanate, base cuneate or attenuate, apex rounded or obtuse. Cauline leaves absent. Flowers not seen. Fruiting pedicels solitary, erect or ascending, 1.5–3.5 cm. Ovules 10–20 per ovary. Fruit lanceolate to lanceolate-oblong, 1.8–3.2 × 0.7–1.5 cm; valves sparsely to densely lanate, prominently reticulate veined; septum complete; style 0.5–2 mm; stigma entire or slightly lobed. Seeds biseriate, broadly ovate or suborbicular, rugose, 2–3.5 × 1.5–3 mm. Fr. Aug–Oct.


• Grasslands, meadows; 4000–5000 m. Xizang.


• Scree slopes, gravelly areas, cliffs, rocky slopes, alpine meadows, glacier margins; 3800–4900 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan.

• Scree slopes, gravelly areas, cliffs, rocky slopes, alpine meadows, glacier margins; 3800–4900 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan.

• Scree slopes, gravelly areas, cliffs, rocky slopes, alpine meadows, glacier margins; 3800–4900 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan.

• Scree slopes, gravelly areas, cliffs, rocky slopes, alpine meadows, glacier margins; 3800–4900 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan.

• Scree slopes, gravely areas, cliffs, rocky slopes, alpine meadows, glacier margins; 3800–4900 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan.

• Scree slopes, gravelly areas, cliffs, rocky slopes, alpine meadows, glacier margins; 3800–4900 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan.

• Scree slopes, gravelly areas, cliffs, rocky slopes, alpine meadows, glacier margins; 3800–4900 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan.

• Scree slopes, gravelly areas, cliffs, rocky slopes, alpine meadows, glacier margins; 3800–4900 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan.

• Scree slopes, gravelly areas, cliffs, rocky slopes, alpine meadows, glacier margins; 3800–4900 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan.

• Scree slopes, gravelly areas, cliffs, rocky slopes, alpine meadows, glacier margins; 3800–4900 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan.

• Scree slopes, gravelly areas, cliffs, rocky slopes, alpine meadows, glacier margins; 3800–4900 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan.
(1–) 1.5–3.5(–4.5) cm. Sepals oblong to oblong-linear, 6–8 × 1.5–2.5 mm, united or free. Petals pink or blue, obovate, (1.5–) 1.7–2.2 cm × 5–8 mm; claw 7–12 mm. Filaments of median staminal pairs 3.5–5 mm, those of lateral pair 2–3 mm; anthers 1.5–1.8 mm. Ovules 12–20 per ovary. Fruit lanceolate to linear-lanceolate, (1.5–) 1.7–2.2 cm × 5–8 mm; valves glabrous or pilose, obscurely veined; septum complete; style obsolete; stigma entire or slightly lobed. Seeds biseriate, broadly ovate or suborbicular, minutely reticulate, 2–4 × 2–3 mm. Fl. Jun–Aug, fr. Jul–Oct.

• Among rocks, cliff ledges, stony meadows, scree; 3700–5200 m. Sichuan, Yunnan.


细叶丛菔 zi ye cong fu
Herbs 1–2.5 cm tall, densely subhirsute, with trichomes 1–2.5 mm; caudex covered with curling leaves of previous years. Petioles of basal leaves 2–5 mm, not thickened, persistent, ciliate; leaf blade filiform to narrowly linear, 2.5–10(–1.5) × 0.3–1 mm, long ciliate, often grooved adaxially, base attenuate, apex subacute. Cauline leaves absent. Flowers solitary. Fruiting pedicels erect or ascending, 2–7(–10) mm. Sepals oblong to oblong-linear, 4.5–5.5 × 1–1.5 mm, free. Petals pinkish mauve, pale lilac, or purple, obovate, 1–1.2 cm × 3.5–5 mm; claw 6–7 mm. Filaments of median staminal pairs 3–4 mm, those of lateral pair 2–2.5 mm; anthers 1.2–1.5 mm. Ovules 12–16 per ovary. Fruit lanceolate, 1.5–2 cm × 4–5 mm; valves densely subhirsute, obscurely veined; septum complete or perforated; style 0.5–1 mm; stigma 2-lobed. Seeds biseriate, suborbicular, minutely reticulate, 1–1.5 mm in diam. Fl. May–Jun, fr. Jul–Aug.

• Rocky crevices, cliff ledges, alpine meadows, scree, sandy areas; 2500–4600. Sichuan, Yunnan.


合萼丛菔 he e cong fu
Herbs perennial, forming woody cushions ca. 2 cm tall, very sparsely pilose with crisped trichomes to 0.5 mm; caudex covered with persistent leaves of previous years. Petioles of basal leaves 0.5–1.5 cm, becoming strongly thickened, persistent, ciliate; leaf blade spatulate or oblanceolate, 0.5–1.5 cm × 3–5 mm, subapically pilose, base cuneate, apex subacute. Cauline leaves absent. Flowers solitary. Fruiting pedicels erect ca. 7 mm. Sepals oblong, 2.5–3.5 × ca. 1 mm, united, membranous at apex, subapically sparsely pilose. Petals white, drying pink, oblanceolate, 5–6 × 1.5–2 mm; claw ca. 3 mm. Filaments of median staminal pairs 4 mm, those of lateral pair ca. 3 mm; anthers 0.7–0.9 mm. Fruit lanceolate, 2.5–3 cm × 4–5 mm; valves glabrous, obscurely veined; style 1 mm; stigma entire. Seeds uniseriate, oblong, minutely reticulate, ca. 3 × 1.5 mm. Fl. and fr. Jun.

• Limestone scree; ca. 4700 m. Yunnan.

Solms-laubachia gamosepala is at present known only from the type collection, ACE 855 (K).


四齿芥属 si chi jie shu
Tetracmidion Korshinsky.

Herbs annual, canescent. Trichomes stalked, stellate or dendritic, rarely mixed with fewer, simple or forked, subsetose ones. Stems often several branched basally. Basal leaves petiolate, not rosulate, simple, entire, sinuate-dentate, or pinnatifid. Cauline leaves similar to basal. Racemes ebracteate, corymbose, elongated in fruit. Fruiting pedicels slender or thickened and nearly as wide as fruit base, erect or ascending. Sepals ovate, ascending, base of lateral pair not saccate, margin membranous. Petals white, subequaling or much longer than sepals; blade obovate, spatulate, or oblanceolate, apex obtuse; claw distinct or undifferentiated from blade. Stamens 6, slightly tetradynamous; filaments dilated at base; anthers ovate, apiculate at apex. Nectar glands 4, lateral, 1 on each side of lateral filament; median glands absent. Ovules 2–14 per ovary. Fruit dehiscent siliques or indehiscent silicles, linear, oblong, or ovoid, strongly latiseptate, terete, or 4-angled, sessile; valves obscurely veined, tomentose, smooth or torulose, subapically 4-horned; replum flattened; septum complete, membranous; style absent, obsolete, or distinct; stigma capitate, entire. Seeds uniseriate, wingless, oblong, plump; seed coat smooth, not mucilaginous when wetted; cotyledons incumbent.

Eight species: primarily in C Asia; two species in China.

1a. Lower leaves entire or repand; fruit torulose, with stellate and subsetose simple trichomes; subapical horns 0.5–1.8(–2.2) mm, erect or divaricate-ascending, straight; valves not extended beyond horns into stylelike apex .................................................................................................................................................. 1. T. quadricornis

1b. Lower leaves pinnatifid, pinnatifid, or sinuate-dentate; fruit not torulose, with only stellate trichomes; subapical horns (2.5–)4–7(–8) mm, divaricate-reflexed, strongly recurved; valves extended beyond

四齿芥 *si chi jie*
*Erysimum quadricorne* Stephan in Willdenow, Sp. Pl. 3: 514. 1800; *Notoceras quadricornis* (Stephan) de Candolle; *Tetracme elongata* Kitamura; *T. quadricornis* var. *longicornis* Regel.

Herbs (3–)5–20(–25) cm tall, tomentose throughout. Stems ascending, branched at or near base. Basal and lowermost cauline leaves with petioles 2–6(–10) mm; leaf blade oblong-linear or narrowly oblanceolate, (1–)2–5 cm × (1–)2–6(–8) mm, base attenuate, margin entire or rarely repand-dentate, apex obtuse. Upper cauline leaves similar to basal, smaller, subseriise, entire. Fruiting pedicels 1–1.5 mm, subclavate, stout, about as wide as fruit base, appressed to rachis. Sepals ovate, 0.7–0.9(–1) mm, distally white and petaloid. Petals white, narrowly oblanceolate, 0.5–0.8(–0.9) × 0.2–0.3 mm, not clawed. Filaments white, 0.4–0.6 mm; anthers ovate, 0.2–0.3 mm. Ovules 8–14 per ovary.

Fruit linear, 5–8 × 0.7–1 mm, compressed, turulose, base appressed to rachis, distal half arcuate or recurved; valves tomentose, with stellate trichomes mixed with fewer, much larger, subsetose simple ones to 1.5 mm, apex not extended beyond horns; subapical horns 0.5–1.8(–2.2) mm, erect or divaricate-ascending, straight; style absent. Seeds yellow or light brown, oblong, 0.7–0.9 × 0.4–0.6 mm. Fl. and fr. May–Jun.

Deserts, sand dunes, field margins, roadsides, disturbed areas; 300–3800 m. Xinjiang [Kazakstan, Kyrgyzstan, Mongolia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].


弯角四齿芥 *wan jiao si zhi jie*

Herbs (4–)10–30(–40) cm tall, tomentose throughout. Stems ascending, several branched at or near base. Basal and lowermost cauline leaves with petioles 0.3–2 cm; leaf blade oblong-linear or linear-lanceolate, (1–)2–5(–6) cm × 3–8 mm, base attenuate, margin pinnatifid, pinnatifidate, or sinuate-dentate, apex obtuse. Upper cauline leaves similar to basal, smaller, subseriise, sometimes entire. Fruiting pedicels 1–2 mm, subclavate, stout, about as wide as fruit base, appressed to rachis. Sepals ovate, 0.6–1 mm, distally white and petaloid. Petals white, spatulate, 0.8–1(–1.2) × 0.4–0.5 mm, attenuate to clawlike base. Filaments white, 0.5–0.7 mm; anthers ovate, 0.2–0.3 mm. Ovules 4–8 per ovary.

Fruit linear, (4–)6–8(–10) × 0.8–1 mm, compressed, not torulose, base appressed to rachis, distal half arcuate or recurved; valves tomentose, exclusively with stellate trichomes, apex extend beyond horns into flattened, triangular, stylelike part 1–2 mm; subapical horns (2.5–)4–7(–8) mm, divaricate-reflexed, strongly recurved; style distinct, to 1 mm. Seeds yellow or light brown, oblong, 1.2–1.6 × 0.5–0.7 mm. Fl. and fr. Apr–Jun.

Sandy deserts, plains; 200–600 m. Xinjiang [Kazakstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].
**Matthiola flavida** Boissier var. **integriofolia** (Komarov)
O. E. Schulz; **M. integriofolia** Komarov; **M. tenera** K. H. Rechinger.

Herbs perennial, (10–)15–45(–53) cm tall, eglandular, tomentose throughout, with finely branched dendritic trichomes; cadex simple or branched. Stems erect, branched from caudex, sometimes also above. Basal leaves subosolate; petiole (0.5–)1–3(–5) cm; leaf blade ovate, narrowly oblong, or elliptic, (1–)2–4.5(–6) × (0.3–)0.5–1.8(–2.4) cm, base cuneate, margin entire, repand, or coarsely dentate, rarely sinuate or pinnatifid, apex acute or obtuse. Cauline leaves few to many, similar to basal, uppermost much narrower and subsessile. Fl. Petal linear, (6–)7–11 cm × (1.5–)1.8–2.7 mm, flattened, torulose; valvas tomentose, with a prominent midvein; style obsolete or to 1 mm; stigma conical, lobes broad. Seeds 2–2.5 × 1.7–2 mm; wing ca. 0.5 mm. Fl. Jun–Jul, fr. Jul–Aug. 2n = 12.

Rocky slopes; 900–3900 m. Xinjiang, Xizang [Afghanistan, Pakistan, Tajikistan, Uzbekistan; SW Asia].

The above first record from China is based on **Schlagintweit 1375 (P)**, **Schlagintweit 1485 (GH)**, **Winterbottom 712 (K)**, **Falconer 138 (GH, P)**, and **Thomson s.n. (E, K, P)**, all of which are from Xizang, as well as **Team P–041 (PE)** from Xijniang. The alleged differences between **M. chorassanica** and the synonyms listed above are based entirely on whether the cauline leaves are borne along the entire stem or are nearly basal, and whether they are entire, repand, or dentate. All of these characters show continuous variation, and there are no other differences that separate the taxa. **Jafri (Fl. West Pakistan 55: 202. 1973)** wrongly cited one of the above specimens, **Winterbottom 712**, as **M. flavida** Boissier, but that species has flat petals instead of the circinately involute ones that are characteristic of **M. chorassanica**.

The record from Xinjiang (Fl. Xinjiang. (2(2): 164. 1995) of **Matthiola odoratissima** (Pallas ex Marschall von Bieberstein) R. Brown, which is endemic to the Caucasus and neighboring areas, is based on unidentified plants of **M. chorassanica**.

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Herbs annual or perennial, tomentose. Trichomes stalked, dendritic, mixed with stalked glands, rarely glands absent. Stems simple or branched. Basal leaves petiolate, rosulate or not, simple, entire or dentate. Cauline leaves similar to basal. Racemes ebracteate, elongated in fruit. Fruiting pedicels thickened, strongly reflexed. Sepals oblong-linear or linear, connivent, base of lateral pair saccate, margin membranous. Petals yellow, creamy white, or purple-lilac; blade linear, narrowly oblong, or spatulate, apex obtuse or rounded; claw subequalling sepals. Stamens 6, strongly linear, connivent, base of lateral pair saccate, margin membranous. Male petals yellow, brown, or purplish; basal. Racemes ebracteate, elongated in fruit. Fruiting pedicels (1–)2–6(–10) mm, stout or slender, divaricate or ascending. Sepals linear, 8–12 × 1–1.5, tomentose. Petals greenish, brown, or purplish; blade ovate, or orbicular, strongly flattened; seed coat smooth, not mucilaginous when wetted; cotyledons complete, thickened, opaque, veinless; style stout, to 5 mm, pubescent; stigma capitate, 2-lobed. Seeds uniseriate, leathery, veinless, densely tomentose, glandular or eglandular, smooth or torulose; replum slightly flattened; septum narrowly ovoid, ellipsoid, or oblong-linear, 4-angled or latiseptate, sessile, reflexed; valves thickened, woody or leathery, veinless, densely tomentose, glandular or eglandular, smooth or torulose; replum slightly flattened; septum complete, thickened, opake, veinless; style stout, to 5 mm, pubescent; stigma capitate, 2-lobed. Seeds uniseriate, broadly winged, ovate or orbicular, strongly flattened; seed coat smooth, not mucilaginous when wetted; cotyledons accumbent.

Two species: China, Mongolia, Russia; one species in China.


2. **Microstigma junatovii** Grubov. Herbs annual, 7–25 cm tall, densely tomentose, glandular or rarely eglandular. Stems erect, simple or branched. Lower and middle cauline leaves with slightly broader cauline leaves. Median filament pairs 3.5–4 mm, lateral pair 2–2.5 mm; anthers linear-oblong, 1.3–1.6 mm. Ovules 4 per ovary. Fruit narrowly ovoid or ellipsoid, 0.9–1.6 cm × 3–4.5 mm, 4-angled, indehiscent; valves woody, not veined, densely covered with dendritic trichomes that are characteristic of **M. chorassanica** and the synonyms listed above are based entirely on whether the cauline leaves are borne along the entire stem or are nearly basal, and whether they are entire, repand, or dentate. All of these characters show continuous variation, and there are no other differences that separate the taxa. **Jafri (Fl. West Pakistan 55: 202. 1973)** wrongly cited one of the above specimens, **Winterbottom 712**, as **M. flavida** Boissier, but that species has flat petals instead of the circinately involute ones that are characteristic of **M. chorassanica**.

The record from Xinjiang (Fl. Xinjiang. (2(2): 164. 1995) of **Matthiola odoratissima** (Pallas ex Marschall von Bieberstein) R. Brown, which is endemic to the Caucasus and neighboring areas, is based on unidentified plants of **M. chorassanica**.
Herbs annual or perennial. Trichomes stalked, glandular, mixed with eglandular simple ones. Stems leafy or not. Basal leaves petiolate, rosulate or not, sinuate-dentate, pinnatifid, or pinnatisect, rarely entire. Cauline leaves absent or shortly petiolate, not auriculate, similar to basal ones. Racemes ebracteate, elongated in fruit, rarely flowers solitary on long pedicels from axils of rosette leaves. Sepals ovate, oblong, or linear, erect, base of lateral pair strongly saccate. Petals yellow or purple or lavender, much longer than sepals; blade broadly obovate, obcordate or rarely oblong-oblanceolate, apex emarginate or rarely obtuse; claws strongly differentiated from blade. Stamens 6, strongly tetradynamous; filaments not dilated at base; anthers narrowly oblong or linear, obtuse at apex. Nectar glands 2 or 4, lateral, intrastaminal or 1 on each side of lateral stamen; median glands absent. Ovules (5–)10–25(–30) per ovary. Fruit breaking into 1-seeded units, lomentaceous, linear, terete, sessile, slightly to strongly torulose or submoniliform; units indehiscent, with a thick corky or woody wall; replum flattened, persisting after segments fall off; septum becoming corky and splitting at middle; style 1.5–21 mm, beaklike; stigma conical, 2-lobed, lobes decurrent, strongly connivent. Seeds uniseriate, wingless, oblong; not mucilaginous when wetted; cotyledons accumbent.

Eleven species; primarily C and SW Asia; eight species (one endemic) in China.

1a. Plants annual; flowering stems leafy.
   2a. Flowers purple; fruit slightly torulose ................................................................. 3. C. tenella
   2b. Flowers yellow; fruit strongly torulose.
      3a. Petals narrowly oblong-oblanceolate, 3–4 × 0.7–1 mm, rounded at apex; anthers 0.5–0.9 mm; style 2–4 mm in fruit; flowering pedicels suberect or ascending, subappressed .......................... 2. C. tashkorganica
      3b. Petals broadly obovate, 6–20 × 3–7 mm, apex emarginate; anthers 1.5–2 mm; style 5–25 mm in fruit; flowering pedicels divaricate or recurved .......................................................... 1. C. sibirica

1b. Plants perennial with a caudex; flowering stems leafless or rarely 1-leaved, or flowers solitary.
   4a. All flowers borne on solitary pedicels arising from basal rosette ................................ 4. C. bungeana
   4b. Flowers always in racemes.
      5a. Flowers purple.
         6a. Sepals 3–4 mm; petals 6–10 mm; pedicel 0.3–1(–1.5) cm; fruiting style 1.5–3 mm ..... 6. C. sabulosa
         6b. Sepals 6–7 mm; petals 15–18 mm; pedicel (1.7–)2–3.5(–5.5) cm; fruiting style 5–7 mm .. 5. C. greigii
      5b. Flowers yellow.
         7a. Leaves pinnatisect; petals 12–15 × 5–7 mm; sepals oblong, 5.5–7 mm .................. 7. C. songarica
         7b. Leaves subentire, sinuate-dentate, or pinnatifid; petals 5–8(–10) × 2–4 mm; sepals ovate, 2–3(–3.5) mm ................................................................ 8. C. macropoda

西伯利亚离子芥 xi bo li ya li zi jie

Raphanus sibiricus Linnaeus, Sp. Pl. 2: 669. 1753; Chorispora gracilis A. Ernst.

Herbs annual, (3–)7–22(–35) cm tall, with multicellular glandular trichomes, these sometimes mixed with simple ones to 2 mm. Stems ascending, branched basally and above. Basal leaves not rosulate; petiole (0.5–)1–2(–3) cm, often ciliate; leaf blade oblong-oblanceolate or oblong, (1.5–)2–4(–6) cm × 4–10(–15) mm, glandular, base cuneate or attenuate, margin sinuate-dentate or pinnatisect, with oblong or lanceolate lobes, apex acute. Cauline leaves similar to basal ones, progressively reduced in size upward, uppermost often subsessile. Flowers in racemes. Fruit pedicels slender, (6–)7–10(–14) mm, divaricate, slightly recurved, glandular. Sepals narrowly oblong, 3–4(–5) × 1–2 mm. Petals bright yellow, broadly obovate, 7–9(–12) × 3–4(–5) mm, emarginate at apex; claw 4–5 mm. Filaments 3–5 mm; anthers narrowly oblong, ca. 1.5 mm. Fruit linear-cylindric, 1.4–2(–2.5) cm × 1.5–2 mm, slightly curved upward, strongly torulose and with 6–12 constrictions on each side, glandular or rarely glabrescent; style (3–)5–9 mm. Seeds brown, oblong, 1–1.2 × 0.6–0.9 mm. Fl. Apr–Aug, fr. Jun–Sep.
Roadsides, fields, river beaches, grassy slopes; 700–3800 m. Xinjiang, Xizang [India, Kashmir, Kazakstan, Kyrgyzstan, Mongolia, Pakistan, Russia].

塔什离子芥 ta shi li zi jie

Herbs annual, 12–20 cm tall, densely glandular throughout, apices of sepals and lobes of young leaves sparsely pubescent with simple trichomes to 1 mm, glabrous elsewhere. Stems several from base, decumbent, unbranched. Basal leaves rosulate; petiole 0.5–2.5 cm, not ciliate, expanded at base; leaf blade linear to linear-lanceolate in outline, 1–5 cm × 1–10 mm, densely glandular, base attenuate, margin pinnatisect or sinuate-dentate, apex acute; lateral lobes deltate, acute, smaller than terminal lobe. Cauline leaves few, similar to basal ones but with fewer lobes.

Racemes elongated considerably in fruit. Fruiting pedicels 1.5–3 mm, glandular, ascending to suberect, subapressed. Sepals yellowish, ovate, 2–3 × ca. 1 mm, glandular, margin membranous. Petals yellow, oblanceolate, 3–4 × 0.7–1 mm, rounded at apex; claw 2–2.5 mm. Filaments 2–3 mm; anthers oblong, 0.5–0.9 mm. Fruit linear-cylindric, 1.2–1.5 cm × 1.5–2 mm, corky, strongly torulose, with 5–8 constrictions on each side, glandular; style 2–4 mm. Seeds brown, oblong, ca. 1.4 × 1 mm. Fl. and fr. Jun–Jul.

- Rocky slopes; 4000–4200 m. SW Xinjiang (Taxkorgan Tajik Zizhiixian).


离子芥 li zi jie

Raphanus tenellus Pallas, Reise Russ. Reich. 3: 741. 1776; R. monnetii H. Léveillé.

Herbs annual, (5–)10–40(–56) cm tall, with slender, branched caudex, multicellular glandular trichomes, these sometimes mixed with simple ones. Stems erect, branched above. Basal leaves not rosulate, often withered by flowering; petiole (0.5–)1–2(–4) cm; leaf blade oblong or oblanceolate, 0.5–1 × 0.8–1.2 cm. Petals purple, linear-orbicular, 0.7–1 cm. Fruit linear-cylindric, 2–4 cm × 1.5–2 mm, corky, strongly torulose, with 8–12 constrictions on each side, glabrescent; style 4–7 mm. Seeds brown, oblong, 1.2–2 × 0.7–1 mm. Fl. Jun–Aug, fr. Jul–Sep.

- Grasslands, open slopes; (2200–)3000–4200 m. Xinjiang [Afghanistan, India, Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan, Uzbekistan]. Chorispora tianschanica was said to differ from C. bungeana in being completely glandular and with serrate leaf margins and rounded petal apices. However, these alleged differences do not hold, and C. bungeana is highly variable throughout most of its range, especially in leaf morphology and the density of glandular papillae.


具葶离子芥 ju ting li zi jie

Herbs perennial, 7–25 cm tall, with slender, often unbranched caudex, eglandular, glabrous throughout or rarely sparsely shortly pilose on sepals. Basal leaves rosulate; petiole 0.5–3 cm, glabrous, not expanded at base; leaf blade broadly oblanceolate, linear-oblanceolate, or oblong, 2–7 cm × 3–15 mm, glabrous, base cuneate or attenuate, margin pinnatifid, with 8–12 constrictions on each side, glandular or rarely glabrescent; style 1–1.7 × (2–)3.1 cm. Seeds brown, oblong, 1–1.4 × 0.8–1 mm. Fl. Apr–Jun, fr. May–Aug. 2n = 14.

- Pastures, roadsides, fields, waste areas; 100–2200 m. Anhui, Gansu, Hebei, Henan, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shandong, Shanxi, Xinjiang [Afghanistan, India, Kazakhstan, Kyrgyzstan, Korea, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; N Africa, SW Asia, Europe].


高山离子芥 gao shan li zi jie

Chorispora excapa Bunge ex Ledebour; C. tianschanica Z. X. An.

Herbs perennial, scapose, with well-developed branched caudex; multicellular glandular trichomes sometimes mixed with simple ones to 2 mm. Basal leaves rosulate, persistent; petiole (1–3)×1.5–3(–4) cm, ciliate, expanded at base; leaf blade oblanceolate or oblong, (0.8–)1.2–4(–5) cm × 3–10(–15) mm, sparsely to densely glandular, pilose or glabrous, base cuneate or attenuate, margin pinnatifid or pinnatisect, with up to 12, oblong or ovate lobes, or sinuate-dentate, dentate, repand, or entire, apex obtuse. Cauline leaves absent. Flowers solitary, arising from rosette. Fruiting pedicels (1–)1.5–3(–4) cm, densely glandular or subglabrous, sometimes also pilose. Sepals purplish, linear-oblanceolate, (6–)7–9(–10) × 1–1.5 mm. Petals purple, broadly obovate or obcordate, (1.5–)1.7–2(–2.3) cm × 6–8 mm, emarginate or subrounded at apex; claw 0.9–1.2 cm. Filaments 6–10 mm; anthers narrowly oblong, 1.5–2.5 mm. Fruit linear-cylindric, 2–3 cm × 1.5–2 mm, corky, strongly torulose, with 8–12 constrictions on each side, glabrescent; style 4–7 mm. Seeds brown, oblong, 1.2–1.5 × 0.7–1 mm. Fl. Jun–Aug, fr. Jul–Sep.

- Mountains, grassy areas; 1800–2200 m. Xinjiang [Kyrgyzstan].


砂生离子芥 sha sheng li zi jie

Chorispora elegans Cambessedes; C. elegans var. intergrifolia O. E. Schulz; C. elegans var. sabulosa (Cambessedes) O. E. Schulz; C. elegans var. stenophylla O. E. Schulz; C. sabulosa var. eglandulosa

Narayanswamy ex Naithani & Uniyal.

Herbs perennial, 3–15 cm tall, with slender, branched caudex, glandular, glabrous or sparsely shortly pilose. Basal leaves rosulate; petiole 1–4 cm, usually ciliate, expanded at base; leaf blade oblanceolate or oblong, (1–)2–5(–8) cm × 3–7(–10) mm, glabrous or glandular,

base cuneate, margin pinnatifid, sinuate-dentate or entire, apex acute or obtuse. Cauline leaves absent. Flowers in racemes. Fruiting pedicels 3–10(–15) mm, glabrous. Sepals purplish, ovate, 3–4 × 1.5–2 mm. Petals purple, broadly obovate, 6–10 × 3–5 mm, obtuse at apex; claw 3.5–5 mm. Filaments 3–5 mm; anthers oblong, 1–1.5 mm. Fruit linear-cylindric, 1–1.5(–1.7) cm × ca. 2 mm, corky, strongly torulose, with 2–6 constrictions on each side, glabrous or glandular; style 1.5–3 mm. Seeds brown, oblong, ca. 1.3 × 1 mm. Fl. and fr. Jun–Jul.

Mountain slopes; 2900–4800 m. Xizang [India, Kashmir, Kazakhstan, Pakistan, Tajikistan, Uzbekistan].

Chorispora sabulosa and C. elegans were simultaneously published by Cambessédès. Hooker and Thomson (J. Proc. Linn. Soc., Bot. 5: 181. 1861), who were the first to record the species from Xizang, listed the latter name as a synonym of C. sabulosa, which name therefore has priority under Art. 11.5 of the St. Louis Code. The species was not listed in FRPS or in Fl Xizang. (vol. 2. 1985), but the record from Xizang is here confirmed by the study of material cited by Hooker and Thomson (loc. cit.) and also by Jäschke s.n. (WU).


准噶尔离子芥 zhun ga er li zi jie Chorispora songarica (Linnaeus) de Candolle var. songarica (Schrenk) O. Fedtschenko; C. pamirica Pachomova.

Herbs perennial, (0.4–)0.7–1.8(–4) cm tall, with stout, branched or simple caudex, glandular throughout, sparsely covered with simple trichomes to 1 mm. Basal leaves rosulate; petiole 0.5–2.5(–4) cm, ciliate, expanded at base; leaf blade broadly obovate or linear-oblanceolate, 0.5–3(–4) cm × 2–7(–15) mm, glandular, base cuneate or attenuate, margin subentire, dentate, sinuate-dentate, or pinnatifid and with up to 8, oblong or ovate lobes, apex acute or obtuse. Cauline leaves absent. Flowers in racemes. Fruiting pedicels (6–)7–10(–15) mm, glandular. Sepals yellowish, ovate, 2–3(–3.5) × 1.5–2 mm. Petals yellow, 5–8(–10) × 2–4 mm; blade broadly obovate, emarginate at apex; claw 3–5 mm. Filaments 2–3 mm; anthers oblong, ca. 1.5 mm. Fruit linear-cylindric, 1–1.5(–2) cm × 2–2.3 mm, corky, strongly torulose, with 5–8 constrictions on each side, glandular; style 2–4 mm. Seeds brown, oblong, 1.1–1.3 × 0.6–0.8 mm. Fl. and fr. Jun–Jul.

Mountain slopes; 2900–4800 m. Xizang [India, Kashmir, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan].

Gravelly areas, slopes; (2200–)3000–4000(–4500) m. Xinjiang [Afghanistan, India, Kashmir, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan].


小花离子芥 xiao hua li zi jie Chorispora pectinata Hadac.

Herbs perennial, 4–15(–28) cm tall, with stout, branched or simple caudex, glandular throughout, sparsely covered with simple trichomes to 1 mm. Basal leaves rosulate; petiole 0.5–2.5(–4) cm, ciliate, expanded at base; leaf blade broadly obovate or linear-oblanceolate, 0.5–3(–4) cm × 2–7(–15) mm, glandular, base cuneate or attenuate, margin subentire, dentate, sinuate-dentate, or pinnatifid and with up to 8, oblong or ovate lobes, apex acute or obtuse. Cauline leaves absent. Flowers in racemes. Fruiting pedicels (6–)7–10(–15) mm, glandular. Sepals yellowish, ovate, 2–3(–3.5) × 1.5–2 mm. Petals yellow, 5–8(–10) × 2–4 mm; blade broadly obovate, emarginate at apex; claw 3–5 mm. Filaments 2–3 mm; anthers oblong, ca. 1.5 mm. Fruit linear-cylindric, 1–1.5(–2) cm × 2–2.3 mm, corky, strongly torulose, with 5–8 constrictions on each side, glandular; style 2–4 mm. Seeds brown, oblong, 1.1–1.3 × 0.6–0.8 mm. Fl. and fr. Jun–Jul.

Mountain slopes; 2900–4800 m. Xinjiang [Kazakstan, Tajikistan, Uzbekistan].

Chorispora songarica was first recorded from China in Fl. Xinjiang. (2(2): 168. 1995). The occurrence in China is here confirmed based on Xinjiang Expedition 2268 (WUK) and Xinjiang Expedition 9740 (KUN), as well as on Robrowski s.n., 25 Mar 1889 (LE).


One species: C and SW Asia, SE Europe.


异果芥 yi guo jie

*Raphanus strictus* Fischer ex Marschall von Bieberstein, Fl. Taur.-Caucas. 3: 452. 1819–1820; *Alloceratium strictum* (Fischer ex Marschall von Bieberstein) J. D. Hooker & Thomson; *Chorispora stenopetala* Regel & Schmalhausen; *C. stricta* (Fischer ex Marschall von Bieberstein) de Candolle; *Matthiola fischeri* Ledebour; *Orthorrhiza persica* Stapf.

Herbs annual, (8–)15–40(–50) cm tall, with multicellular glandular trichomes to 0.1 mm, these sometimes mixed with simple ones to 3 mm. Stems erect, branched above. Basal leaves often withered by flowering; petiole 3 –15 mm; leaf blade lanceolate to linear-lanceolate, 2.5–5 cm × 3–10 mm, densely glandular, sparsely pilose or glabrous, base cuneate or attenuate, margin sinuate-dentate, dentate, or rarely pinnatifid, apex acute. Cauline leaves similar to basal ones, progressively narrower upward, becoming linear or filiform, subsessile, entire. Fruiting pedicels (2–)3–5(–8) mm. Sepals 4–5 × ca. 1 mm. Petals purple or whitish, oblanceolate, 7–10 × 0.5–1.2 mm; claw 3.5–5 mm. Filaments 3–6 mm; anthers ovate, ca. 0.5 mm. Fruit linear, dimorphic, 2–3.5 mm wide; lowermost fruit terete, 2.5–4.5(–6) cm, corky, indehiscent; upper fruit flattened, (4–)5–8 cm, leathery, dehiscent; style (2.5–)3–8 mm, longer on upper fruit. Seeds brown, oblong or suborbicular, 2.5–4 × 2–2.5 mm; wing 0.3–1 mm. Fl. Apr–Jun, fr. May–Aug. 2n = 14.

Steppe, hillsides, wastelands; 500–1000 m. Gansu, Nei Mongol, Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia, SE Europe].

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70. **PARRYA** R. Brown, Chlor. Melvill. 10. 1823.

条果芥属 tiao guojie shu

*Achoriphragma* Soják; *Neuroloma* Andrzejowski ex de Candolle.

Herbs perennial, with well-developed caudex, rarely subshrubs or shrubs. Trichomes simple or absent, multicellular glands present or absent. Stems leafy or leafless. Basal leaves petiolate, rosulate, simple, entire, dentate, or pinnately dissected. Cauline leaves similar to basal, often absent. Racemes ebracteate, elongated in fruit. Fruiting pedicels erect, ascending, or divaricate. Sepals linear or oblong, caducous, erect, unequal, base of lateral pair saccate, margin membranous. Petals pink, purple, or white; blade obovate, apex rounded or emarginate; claw subequaling or longer than sepals. Stamens 6, tetradynamous; filaments dilated or not at base; anthers oblong or linear, obtuse at apex. Nectar glands 2, lateral, annular to semiannular; median glands absent. Ovules 10–50 per ovary. Fruit dehiscent siliques, linear, oblong, or lanceolate, strongly latiseptate or rarely subterete or 4-angled, sessile or subsessile, persistently attached to pedicel, unsegmented; valves leathery, with a prominent midvein and obscure to distinct lateral and marginal veins, smooth or torulose; replum almost always flattened; septum complete, membranous or thickened, translucent or opaque; style distinct, 0.5–7 mm; stigma conical or cylindric, 2-lobed, lobes prominent, connate, decurrent. Seeds uniseriate, often broadly winged, suborbicular or oblong, strongly flattened; seed coat smooth, not mucilaginous when wetted; cotyledons accumbent.

About 25 species: C Asia, Himalayas, two species in North America; four species in China.

1a. Fruit with terete replum concealed by thickened valve margin; plants eglandular, hirsute with subsetose straight trichomes; flowering stems mostly with 1 or few leaves ..................................................... 4. *P. beckovii*

1b. Fruit with visible, strongly flattened replum, valve margin not thickened; plants glandular or eglandular, glabrous or pubescent with soft, often crisped trichomes; flowering stems leafless.

2a. At least some leaves pinnatifid or pinnatisect; fruit 2–2.5(–3) mm wide; style (1.5–)2.5–6 mm; seeds broadly oblong ............................................................................................................. 3. *P. pinnatifida*

2b. Leaves entire, dentate to dentate-sinuate, rarely subpinnatifid or repand; fruit (3.5–)4–7 mm wide; style 0.5–1.5(–3) mm; seeds orbicular or suborbicular.

3a. Leaves entire; petals 2.5–3 × 0.8–1.5 cm, apex deeply emarginate; lowermost fruiting pedicels 1–2.5 cm ...................................................................................................................... 1. *P. lancifolia*

3b. Leaves dentate to dentate-sinuate, rarely subpinnatifid or repand; petals (1.4–)1.6–2(–2.2) × 0.6–1 cm, apex rounded or shallowly emarginate; lowermost fruiting pedicels (1.5–)2.2–7(–11) cm 2. *P. nudicaulis*


柳叶条果芥 liu ye tiao guo jie

*Achoriphragma lancifolium* (Popov) Soják; *Neuroloma lancifolium* (Popov) Botschantzov.
Plants 5–30 cm tall, cespitose, glandular or eglandular, pubescent with crisped, simple retrorse trichomes to 1.5 mm, or glabrous; caudex branched, covered with petiolar remains of previous years. Basal leaves rosulate; petiole broadened at base, often ciliate, 1–6 cm; leaf blade lanceolate to linear-lanceolate, 2–9 × 0.5–2 cm, pubescent or glabrous, base cuneate or attenuate, margin entire, apex acute to subacuminate. Cauline leaves absent. Racemes 2–10-flowered. Fruiting pedicels ascending to divaricate, glandular or eglandular, lowermost 1–2.5 cm. Sepals purple, linear to linear-oblong, 9–12 × 2–3 mm, glabrous, pubescent, or glabrous, white marginated. Petals purple, broadly obovate, 2.5–3 × 0.8–1.5 cm, apex deeply emarginate; claw 1–1.7 cm. Filaments purple, median pairs 6–10 mm, lateral pair 4–7 mm; anthers linear, 3–5 mm. Ovules 30–40 per ovary. Fruit linear to linear-lanceolate, 4–9(–11) cm × 4–6 mm; valve margin flat; replum flattened; style 0.5–1(–2.5) mm; stigma 0.5–1.5 mm. Seeds orbicular or suborbicular, 4–6 mm in diam., flattened, broadly winged; wing (0.5–)1–3 mm wide. Fl. Jun–Jul, fr. Jul–Aug.

Grassy slopes, 2300–3000 m. Xinjiang [Kazakhstan, Kyrgyzstan].

The records of Parrya pulvinata Popov in FRPS and Fl. Xinjiang. (2(2): 176. 1995) were based on misidentified plants of *P. lancifolia*. True *P. pulvinata* is distributed in Kazakhstan. The above record of *P. lancifolia* from Xinjiang is based on Wu 418 (KUN), Liston et al. 837–2 (MO), and Ludlow 689 (BM). The last specimen includes eight plants, of which three are densely glandular and five eglandular.


裸茎条芥 *luo jing tiao guo jie*

*Cardamine nudicaulis* Linnaeus, Sp. Pl. 2: 654. 1753; *Achoriphragma ajanense* (N. Busch) Sojak; *A. nudicaule* (Linnaeus) Sojak; *Arabis nudicaulis* (Linnaeus) de Candolle; *Cheiranthus scoparius* Adams; *Hesperis arabisiflora* de Candolle; *H. scapigera* (Adams) de Candolle; *Matthiola nudicaulis* (Linnaeus) Trautvetter; *Neurolema ajanense* (N. Busch) Botschantzev; *N. arabisiflorum* (de Candolle) van den Broek; *N. scapigerum* (Adams) de Candolle; *N. speciosum* Steudel; *Parrya ajanensis* N. Busch; *P. arabisiflora* (de Candolle) Nicholson; *P. integerrima* G. Don; *P. linnaea* Ledebour; *P. macrocarpa* R. Brown; *P. scapigera* (Adams) G. Don.

Plants (4–)10–35(–45) cm tall, cespitose, glandular throughout or eglandular, glabrous; caudex branched, covered with petiolar remains of previous years. Basal leaves rosulate; petiole often becoming thickened, (0.5–)2–10(–15) cm, glabrous or rarely sparsely ciliate; leaf blade lanceolate, linear, spatulate, or obovate, (1.2–)3–11(–14) cm × 4–10(–15) mm, base cuneate or attenuate, margin dentate to dentate-sinuate, rarely subpinatifid or reand, apex acute. Cauline leaves absent. Racemes 2–20-flowered. Fruiting pedicels erect-ascending or divaricate, lowermost (1.5–)2.2–7(–11) cm. Sepals linear to linear-oblong, 6–11 × 1.5–3 mm, glabrous or glandular, white marginated. Petals pink with a yellowish center, rarely white or purple, broadly obovate, (1.4–)1.6–2(–2.2) cm × 6–10 mm, apex rounded to shallowly emarginate; claw 0.8–1.2 cm. Filaments white, median pairs 6–8 mm, lateral pair 3–5 mm; anthers linear, 2.5–3 mm. Ovules 16–40 per ovary. Fruit linear to linear-lanceolate, (3–)4–7(–9) cm × (3.5–)4–7 mm; valve margin flat; replum flattened; style 0.5–1.5(–3) mm; stigma 0.5–1.5 mm. Seeds suborbicular, 3–8 mm in diam., flattened, broadly winged; wing (0.5–)1–3 mm wide. Fl. May–Aug, fr. Jul–Sep.

Dry stony hillsides, rocky crevices, among boulders, scree; 2200–5500 m. Qinghai, Xizang [Afghanistan, Bhutan, India, Kashmir, Russia, Sikkim; North America].

The records of *Parrya fruticalosa* Regel & Schmalhausen in FRPS and Fl. Xinjiang. (2(2): 175. 1995) were based on misidentified plants of the highly variable *P. nudicaulis*. The present authors have seen no Chinese material of *P. fruticalosa*, which is endemic to Tajikistan (Pamir Alai) and adjacent Uzbekistan. It is a shrub or subshrub with leafy, strongly woody stems and narrowly linear, entire leaves.


羽裂条芥 *yu lie tiao guo jie*

*Achoriphragma pinatifidum* (Karelin & Kirilov) Sojak; *A. stenocarpum* (Karelin & Kirilov) Sojak; *Neurolema minjanensis* (K. H. Reechinger) Botschantzev; *N. pinatifidum* (Karelin & Kirilov) Botschantzev; *N. stenocarpum* (Karelin & Kirilov) Botschantzev; *Parrya chitralsensis* Jafri; *P. chitralsensis* K. H. Reechinger (1959), not Jafri (1956); *P. minjanensis* K. H. Reechinger; *P. pinatifida* var. *kizylarti* Korshinsky; *P. stenocarpa* Karelin & Kirilov.

Plants (3–)8–20(–25) cm tall, cespitose, glandular or eglandular, sparsely to densely pubescent with simple trichomes to 1.5 mm; caudex branched, covered with petiolar remains of previous years. Basal leaves rosulate; petiole broadened at base, ciliate or not, (0.5–)1–4(–6) cm; leaf blade lanceolate or linear in outline, all or at least some pinatifid or pinnatisect and with 3–9 lobes on each side, 1.5–7 × (0.3–)0.6–2 cm, pubescent or glabrous, base cuneate or attenuate, apex acute; lateral lobes oblong, linear, or rarely ovate, 2–10 × 0.5–3 mm, entire. Cauline leaves absent. Racemes 2–10-flowered. Fruiting pedicels ascending or divaricate, glandular or eglandular, (0.4–)1–2.5 cm. Sepals purple, linear or linear-oblong, 6–10 × 1.5–3 mm, glabrous, pubescent, or glandular, white marginated. Petals purple or lavender, rarely white, broadly obovate, (1.3–)1.5–2(–2.2) cm × 4–8 mm, apex emarginate; claw 0.8–1.2 cm. Filaments purple or white, median pairs 6–8 mm, lateral pair 3–5 mm; anthers linear, 3–4 mm. Ovules 16–40 per ovary.
Fruit linear to linear-lanceolate, (2–)3–8(–10) cm × 2–2.5(–3) mm; valve margin flat; replum flattened; style (1.5–)2.5–6 mm; stigma 1–2 mm. Seeds broadly oblong, 3–5 × 2–3.5 mm, flattened, broadly winged; wing 0.5–1 mm wide. Fl. May–Jul, fr. Jul–Aug.

Marble scree, stony slopes, gravel; 1600–4400 m. Xinjiang [Afghanistan, Kashmir, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan]. The records of Parrya pinnatifida in FRPS and Fl. Xizang. (2: 384. 1985) were based on misidentified plants of P. nudicaulis. The records of P. subsiliquosa Popow in FRPS and Fl. Xinjiang. (2(2): 176. 1995) were based on misidentified plants of P. beketovii and P. pinnatifida. The present authors have seen no Chinese material of P. subsiliquosa, which is endemic to Kyrgyzstan and neighboring Kazakhstan. It is likely to be conspecific with P. longicarpa Krassnov, a species with fruit terete to subcircular, narrowly linear, and 1.5–2 mm wide and seeds oblong and narrowly winged. The occurrence of P. pinnatifida in China is here confirmed based on Cheo Taiyien 650883 (HNWP, NAS). Parrya pinnatifida var. hirsuta N. Busch and var. glabra N. Busch were accepted in FRPS, but both varieties are invalidly named (they are nomina nuda); they are anyway only minor variants and do not merit recognition.


天山条果芥

tian shan tiao guo jie

Achoriphragma beketovii (Krassnov) Sojak; Neuroloma beketovii (Krassnov) Botschantzev; Parrya michaelis Vassiljeva.

Plants (7–)15–30(–40) cm tall, eglandular, sparsely to densely hirsute with spreading, straight, subsetose simple trichomes 1–2 mm; caudex usually without petiolar remains of previous years. Basal leaves rosulate; petiole ciliate, 1.5–5 cm; leaf blade spatulate, subovate, or lanceolate, 2–6(–9) × (0.4–)1–2.5(–4) cm, hirsute, base cuneate, margin coarsely dentate or pinnate-sinuate, sometimes entire, apex acute. Cauleine leaves few, similar to basal ones, rarely absent. Racemes (3–)7–25-flowered. Fruiting pedicels ascending or divaricate, hirsute, (0.7–)1–2.5(–4) cm. Sepals purple, linear to linear-oblong, 6–9 × 1.5–2.5 mm, sparsely hirsute or glabrous, white margined. Petals purple, broadly obovate, (1.1–)1.5–2(–2.5) cm × 2.5–4 mm; valve margin prominently thickened; replum terete, concealed by valve margin; style 0.5–1(–1.5) mm; stigma 0.5–1 mm. Seeds suborbicular-oblong, 2.5–3.5 × 2–2.5 mm, flattened, with a broad wing 0.5–1 mm wide. Fl. May–Jul, fr. Jul–Aug.

Rocky and clayey slopes; 1600–2200 m. Xinjiang [Kazakstan, Kyrgyzstan].

Apparently all specimens of Parrya beketovii in the major Chinese herbaria were erroneously identified as other species. The occurrence of this species in China is here confirmed based on several collections, including Cheo Taiyien 650721 (IBSC, KUN, NAS, PE), Cheo Taiyien 651268 (KUN, PE), and Moysenko 35 (LE).


对枝菜属
dui zhi cai shu

Herbs annual. Trichomes eglandular, subsessile, stellate, with basally forked rays, sometimes mixed with long-stalked dendritic ones, rarely with a few simple ones on the stem. Stems erect, often with two opposite basal branches from axils of cotyledons, other branches alternate. Basal leaves soon withered. Cauleine leaves petiolate, dentate or entire. Racemes few flowered, ebracteate, elongated in fruit. Fruiting pedicels divaricate. Sepals narrowly oblong, connivent, erect, base of lateral pair strongly saccate. Petals purple, pink, or white, longer than sepals; blade dentate or entire. Racemes few flowered, ebracteate, elongated in fruit. Fruiting pedicels divaricate. Sepals narrowly oblong, 2.5–6 mm; stigma 1–2 mm. Seeds broadly oblong, 2.5–3.5 × 2–3 mm, flattened, with a broad wing 0.5–1 mm wide. Fl. May–Jul, fr. Jul–Aug.

Sandy areas, deserts. Gansu, Xinjiang [Kazakstan, Turkmenistan, Uzbekistan].

Two species: C and SW Asia; one species in China.


对枝菜
dui zhi cai

Herbs 6–20 cm tall. Stems pubescent with stellate subsessile trichomes sometimes mixed basally with much coarser, long-stalked subdendritic ones to 3 mm. Petiole of middle leaves 0.5–1.5 cm; leaf blade ovate to oblong-ovate, 2–5(–8) × 1–2(–3) cm, uniformly pubescent with subsessile stellate trichomes, base cuneate, margin sinuate-dentate, dentate, or reaped, apex obtuse. Fruiting pedicels 1.5–2.5(–3) mm, stout. Sepals 4–5 × 0.5–0.8 mm. Petals white or purple, 7–10 × ca. 1 mm; claw 4–5 mm. Filaments 2–4 mm; anthers 0.9–1.2 mm. Ovules (14–)18–24 per ovary. Fruit linear, (3–)3.5–4.5(–5) cm × 3–5(–6) mm; valves with subsessile stellate trichomes mixed with coarser, subdendritic ones on stalks (0.5–)1–7(–2) mm, strongly torulose; gynophore obsolete; style 2–5 mm. Seeds orbicular to ovate- orbicular, 3.5–5 mm in diam, wing 0.5–0.7 (–1) mm. Fl. Mar–May, fr. May–Jul.


Parrya

Herbs perennial, scapose, rhizomatous or with a caudex covered with petiolar remains of previous years. Trichomes simple or short-stalked, forked, sometimes absent. Plants with petiolate leaves. Basal leaves petiolate, rosulate, simple, entire or toothed. Cauline leaves absent. Racemes ebracteate, not elongated in fruit, or flowers solitary on pedicels originating from center of basal rosette. Fruiting pedicels erect-ascending. Separals oblong-linear, erect, unequal, base of lateral pair saccate, margin membranous. Petals pink or purple; blade obovate, apex rounded; claw strongly differentiated from blade, longer than sepals. Stamens 6, tetradynamous; filaments not dilated at base; anthers linear, obtuse at apex. Nectar glands 2, lateral; median glands absent. Ovules 18–50 per ovary. Fruit dehiscent siliques, linear to linear-lanceolate, strongly latiseptate, sessile, ready detached from pedicel; valves leathery, glabrous, obtuse at apex. Seeds uniseriate or biseriate, broadly winged, proximally margined, or wingless, oblong or orbicular, flattened; seed coat smooth, not mucilaginous when wetted; cotyledons acumenent. Panicles: leaf blade orbicular or orbicular-ovate, 2–3 mm in diam., uniseriate, occasionally biseriate; wing to 0.5 mm wide, strongly undulate, brown proximally, white distally. Plants 5–10 cm tall, rhizomatous, with few-branched caulicles covered with petiolar remains of previous years. Petiole 0.5–2 cm, broadened at base, often ciliate; leaf blade orbicular, spatulate, or obovate, 0.5–2 × 0.5–1.5 cm, subglabrous or pubescent with short simple trichomes, based rounded or cuneate, margin entire or few toothed, apex obtuse to rounded. Racemes (3–)7–22-flowered. Fruiting pedicels erect-ascending, glabrous, 1–3 cm. Separals oblong, 7–10 × 1.5–2 mm, glabrous or sparsely pubescent, white or purple marginated. Petals obovate, 1.7–2.3 cm × 4–7 mm, apex rounded; claw 1–1.3 cm. Filaments white, median pairs 4–7 mm, lateral pair 2–4 mm; anthers linear, 2.5–3.5 mm. Ovules 30–50 per ovary. Fruit linear to linear-lanceolate, 2.5–5.5 cm × 4–7 mm, margin straight. Seeds orbicular to orbicular-ovate, 2–3 mm in diam., uniseriate or biseriate, flattened; wing to 0.5 mm wide, strongly undulate, brown proximally, white distally. Fl. and Fr. Jun–Aug. Slopes; 3200–3300 m. SW Xinjiang [Tajikistan]. (TJ). This species was previously recorded from China in Fl. Tajikistan (5: 120. 1978). That record is here confirmed based on Duvnogorskaya s.n. (LE), collected from Kashi (Kashgar), SW Xinjiang.


雏菊叶光籽芥 chu jiu ye guang zi jie


Plants 5–10 cm tall, rhizomatous, with few-branched caulicles covered with petiolar remains of previous years. Petiole 0.5–2 cm, broadened at base, often ciliate; leaf blade orbicular, spatulate, or obovate, 0.5–2 × 0.5–1.5 cm, subglabrous or pubescent with short simple trichomes, based rounded or cuneate, margin entire or few toothed, apex obtuse to rounded. Racemes (3–)7–22-flowered. Fruiting pedicels erect-ascending, glabrous, 1–3 cm. Separals oblong, 7–10 × 1.5–2 mm, glabrous or sparsely pubescent, white or purple marginated. Petals obovate, 1.7–2.3 cm × 4–7 mm, apex rounded; claw 1–1.3 cm. Filaments white, median pairs 4–7 mm, lateral pair 2–4 mm; anthers linear, 2.5–3.5 mm. Ovules 30–50 per ovary. Fruit linear to linear-lanceolate, 2.5–5.5 cm × 4–7 mm, margin straight. Seeds orbicular to orbicular-ovate, 2–3 mm in diam., uniseriate or biseriate, flattened; wing to 0.5 mm wide, strongly undulate, brown proximally, white distally. Fl. and Fr. Jun–Aug. Slopes; 3200–3300 m. SW Xinjiang [Tajikistan]. (TJ). This species was previously recorded from China in Fl. Tajikistan (5: 120. 1978). That record is here confirmed based on Duvnogorskaya s.n. (LE), collected from Kashi (Kashgar), SW Xinjiang.


帕米尔光籽芥 pa mi er guang zi jie


Plants 5–10 (–15) cm tall, densely cespitose; caudex branched, densely covered with petiolar remains of previous years. Petiole broadened at base, ciliate, (0.5–)1–3 (–4.2) cm; leaf blade spatulate or oblanceolate, rarely obovate, elliptic, or oblong, (0.7–)1–4 (–5) cm × (0.3–)4–10 (–15) mm, sparsely to densely pubescent with simple and short-stalked, forked trichomes, base cuneate or attenuate, margin entire or rarely few toothed, apex subacute to rounded. Flowers 2–7 per rosette, on solitary pedicels from center of rosette.
Fruiting pedicels erect-ascending, glabrous, (1–)2–6–(–7) cm. Sepals oblong, 6–10 × 1.5–2 mm, glabrous or sparsely pubescent, white margined. Petals obovate, (1.3–)1.5–2.2–(–2.6) cm × (4–)6–8–(–9) mm, apex rounded; claw (6–)8–11 mm. Filaments white, median pairs (4.5–)6–8 mm, lateral pair (2.5–)4–6 mm; anthers linear, 2.5–3 mm. Ovules 24–40 per ovary. Fruit linear to linear-lanceolate, (2.5–)3.5–(–7) cm × 3–(–6)–7 mm, margin straight or undulate. Seeds orbicular, (2.5–)3–4 mm in diam., uni- or biseriate, flattened, broadly winged. Fl. and Fr. Jul–Sep.

Gravelly slopes; 3700–4400 m. Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan].


无茎光籽芥 无茎光籽芥

Parrya escapa C. A. Meyer in Ledebour, Fl. Altaic. 3: 28. 1831; Neurrolonta escapum (C. A. Meyer) Steudel. Plants 5–10 cm tall, cespitose; caudex thick, few branched, densely covered with petiolar remains of previous years. Petiole broadened at base, glabrous, 0.5–1.5 cm; leaf blade orbicular, obovate, or spatulate, rarely obovate, 1–3 × 0.6–1.5 cm, glabrous or rarely sparsely pubescent at margin with exclusively simple trichomes, base rounded or cuneate, margin obtusely dentate or repand, apex rounded or subacute. Flowers 1–4 per rosette, on solitary pedicels from center of rosette. Fruiting pedicels erect-ascending, glabrous, 1–2.5 cm. Sepals ob-long, 7–9 × 1.5–2 mm, glabrous, white or sometimes purple margined. Petals obovate, 1.4–2 cm × 6–10 mm, apex rounded; claw 7–9 mm. Filaments white, median pairs 6–8 mm, lateral pair 3.5–4.5 mm; anthers linear, 2.5–3 mm. Ovules 18–30 per ovary. Fruit linear to linear-lanceolate, 4–9 cm × 5–7 mm, margin straight or undulate. Seeds oblong, 2.7–3.5 × 1.5–2 mm, biseriate, flattened, wingless or narrowly margined proximally. Fl. and Fr. Jul–Sep. Mountain slopes. N Xinjiang (Altay Shan) [Kazakhstan, Mongolia, Russia].

Almost all of the specimens identified in Chinese herbaria as Leiospora escapa, as well as the account in FRPS (as Parrya escapa), are based on misidentified plants of L. pamirica. True L. escapa is very rare in China and appears to be restricted to Altay Shan in N Xinjiang. It is readily distinguished from L. pamirica by being totally glabrous, or exclusively with simple trichomes, and by having oblong and wingless (vs. orbicular and broadly winged) seeds. Records of L. escapa in the floras of India and Pakistan are also based on misidentified plants of L. pamirica.


丝叶芥属 丝叶芥属

Herbs annual, puberulent. Trichomes short-stalked or subsessile, 1–3-forked or submalpighiaceous, sometimes also simple. Stems decumbent or erect, branched basally and apically, rarely simple from base. Basal leaves petiolate, not roslulate, simple, entire or pinnatisect into filiform segments. Cauline leaves similar to basal ones. Racemes 2–4-flowered, ebracteate, axillary, not elongated in fruit, sometimes flowers solitary and axillary. Fruiting pedicels slender or thickened, erect or ascending. Sepals linear-oblong or linear, erect, base of lateral pair not saccate. Petals white or pink; blade linear to linear-oblong-lanceolate, apex obtuse; claw subequaling or shorter than sepals. Stamens 6, in 2 unequal pairs; filaments of median pairs connate to apex, rarely only basally, not dilated at base; anthers oblong, obtuse at apex, those of connate stamens sometimes 1-lobed. Nectar glands 4, 1 on each side of lateral filament; median glands absent. Ovules numerous per ovary. Fruit indehiscent or very tardily dehiscent siliques, linear, latiseptate, rarely subterete, often distinctly grooved at replum, sessile; valves thick leathery, with a prominent midvein and reticulate lateral veins, puberulent or glabrous, smooth; replum rounded; septicum complete, thickened;

style smooth or obtuse; stigma conical, 2-lobed. Seeds biseriate, wingless, ovoid or suboblong, plump; seed coat smooth, not mucilaginous when wetted; cotyledons incumbent.

One species: C and SW Asia.


Herbs annual, (0.5–)2–15(–20) cm tall, puberulent or rarely subglabrous. Stems branched basally and above, rarely simple from base, decumbent or erect. Basal leaves not rosulate, finely pinnatisect, rarely simple, withered early, 0.9–5(–8) cm; lateral lobes 1–3 on each side, filiform, to 3.5 cm × 0.2–1 mm, glabrous or sparsely puberulent, flat or margin incurved and lobes appear grooved. Cauline leaves similar to basal.

**74. MALCOLMIA** R. Brown in W. T. Aiton, Hortus Kew. 4: 121. 1812, nom. cons.

**sjie shu**

Fedtschenkoa Regel & Schmalhausen ex Regel; Strigosella Boissier; Wilckia Scopoli, nom. rej.

Herbs annual, biennial, or perennial with a woody caudex. Trichomes a mixture of simple, forked, or stellate, sometimes malpighiaceous. Stems erect or ascending. Basal leaves not rosulate, simple, entire or variously dentate or pinnatifid. Cauline leaves petiolate or subsessile, not auriculate, entire, dentate, or rarely lobed. Racemes few to many flowered, ebracteate or rarely bracteate. Fruiting pedicels slender or thickened, ascending or divaricate. Sepals ovate or narrowly oblong, erect, glabrous or pubescent, base of lateral pair saccate or not. Petals white, pink, or purple, longer than sepal; blade obovate, spatulate, oblong, or oblongate, apex obtuse or rounded; claw well developed. Stamens 6, erect, tetradynamous; filaments dilated or not at base, free or median 4 connate in 2 pairs; anthers ovate, oblong, or linear, apex apiculate or not. Median glands absent; lateral glands 1 on each side of lateral stamen, or lunar. Ovules 20–90 per ovary. Fruit dehiscent siliques, linear, terete, 4-angled, or latiseptate, suboblong; valves glabrous or pubescent, smooth or torulose; replum rounded; septum complete; style obsolete or to 1 mm or longer; stigma conical, 2-lobed, lobes connivent, often connate, opposite replum. Seeds uniseriate, wingless, oblong or ovate, plump or slightly flattened; seed coat reticulate, not mucilaginous when wetted; cotyledons incumbent or rarely accumbent. About 35 species: C and SW Asia, Mediterranean region; four species in China.

1a. Plants densely hirsute at least basally with exclusively simple subsetose trichomes to 3 mm; fruit strongly flattened straight ........................................................ 2. **M. hispida**
1b. Plants pubescent basally with forked or 3- or 4-rayed trichomes; fruit quadrangular or subterete, if flattened then strongly coiled

2a. Fruit quadrangular, not torulose, straight ................................................................. 1. **M. africana**
2b. Fruit flattened or subterete, torulose, curved or strongly coiled, rarely arcuate or straight.

3a. Fruit subterete, straight or curved near apex, rarely forming a loop, 0.5–0.8(–0.9) mm wide; petals 2–3.5(–4) mm ................................................................. 4. **M. karelinii**
3b. Fruit flattened, strongly coiled to from up to 5 loops, (0.9–)1–1.2 mm wide; petals (4.5–)6–8 mm ................................................................................. 3. **M. scorpoides**


**sjie**

Hesperis africana Linnaeus, Sp. Pl. 2: 663. 1753; Cheiranthus taraxacifolius Balbis (1814), not Stephan (1800); Fedtschenkoa africana (Linnaeus) Dvorchak; F. stenopetala (Bernhardt ex Fischer & C. A. Meyer) Dvorchak; F. taraxacifolia Dvorchak; Hesperis laxa Lamark; Malcolmia africana var. divaricata Fischer; M. africana var. korshinskyi Vassilczenko; M. africana var. stenopetala Bernhardt ex Fischer & C. A. Meyer; M. africana var. trichocarpa (Boissier & Buchse) Boissier; M. calycina Sennen; M. divaricata (Fischer) Fischer; M. laxa (Lamarck) de Candolle; M.
**Malcolmia hispida** (Bernhardt ex Fischer & C. A. Meyer) Bernhardt ex Ledebour; *M. taraxacifolia* de Candolle; *M. trichocarpa* Boissier & Buhse; *Strigosella africana* (Litvinov) Botschantzev; *S. africana* var. *laxa* (Lamarck) Botschantzev; *S. stenopetala* (Bernhardt ex Fischer & C. A. Meyer) Botschantzev; *S. trichocarpa* (Boissier & Buhse) Botschantzev; *Wilckia africana* (Litinovus) F. Mueller; *W. africana* var. *stenopetala* (Bernhardt ex Fischer & C. A. Meyer) Grossheim; *W. africana* var. *trichocarpa* (Boissier & Buhse) Grossheim; *W. stenopetala* (Bernhardt ex Fischer & C. A. Meyer) N. Busch.

Herbs annual, (4.5–)15–30(–45) cm tall, sparsely to densely pubescent with short-stalked, forked or subdendritic trichomes sometimes mixed with simple subsetose ones, rarely glabrescent. Basal leaves soon withered, not rosetulate. Middle and lower cauline leaves petiolate; petiole (0.1–)0.6–2(–3) cm; leaf blade elliptic, oblanceolate, or linear-lanceolate, (0.5–)1.5–6(–10) × (0.3–)1–2.5(–3.5) cm, base cuneate, margin entire or dentate, rarely sinuate, apex acute; uppermost leaves smaller and subsessile. Racemes few to many flowered, elongated considerably in fruit; rachis straight. Fruiting pedicels thickened, as wide as fruit, 0.5–2(–4) cm. Sepals (3.5–)4–5 × 0.5–0.7 mm, caducous or persistent. Petals pink or purple, rarely white, narrowly ob lanceolate, (6.5–)8–10(–12) × 1–2 mm. Filaments free, 2.5–5 mm; anthers narrowly oblong, 0.9–1.1 mm. Fruit linear, straight, quadrangular, not torulose, (2.5–)3.5–5.5 (–7) cm × 1–1.3 mm; valves not veined, pubescent with coarse, forked trichomes mixed with much smaller, forked and subdendritic ones or subsetose simple ones, rarely glabrous; style obsolete; stigma conical, to 1 mm. Seeds oblong, 1.2–1.5 × 0.6–0.8 mm. Fl. Apr–Jun, fr. May–Jul.

**Malcolmia scorpioides** (Bunge) Boissier, Fl. Orient. 1: 225. 1867. 卷果涩芥 *juan guo se jie*

*Dontostemon scorpioides* Bunge, Arbeiten Naturf. Vereins Riga 1: 150. 1847; *Fedtschenkoa multisiliqua* (Vassilczenko) Dvorák; *F. scorpioides* (Bunge) Dvorák; *Malcolmia contortuplicata* (Stephan) Boissier var. *curvata* Freyn & Sintenis; *M. humilis* Z. X. An; *M. multisiliqua* Vassilczenko; *M. scorpioides* var. *curvata* (Freyn & Sintenis) Vassilczenko; *Strigosella scorpioides* (Bunge) Botschantzev.

Herbs annual, (3–)10–30(–45) cm tall, sparsely pubescent with small, short-stalked, forked or 3-rayed trichomes sometimes mixed with fewer simple ones, rarely glabrescent. Basal leaves soon withered, not rosetulate. Middle and lower cauline leaves with petals 4–14(–22) mm; leaf blade elliptic, oblong, or lanceolate, 1–3(–4) cm × 2–10(–16) mm, base cuneate, margin entire or rarely dentate, apex acute; uppermost leaves smaller and subsessile. Racemes few flowered, elongated considerably in fruit; rachis straight. Fruiting pedicels thickened as wide as fruit, 0.5–2 mm. Sepals 2.5–4 × 0.6–1 mm, caducous. Petals pink or rarely white, ob lanceolate, (5–)6–8 × ca. 1 mm. Filaments 3.5–4.5 mm; anthers narrowly oblong, ca. 0.8 mm. Fruit linear, strongly coiled to 5 turns, compressed, torulose, (3–)4–6 (–7) cm × (0.9–)1–1.2 mm; valves not veined, glabrous or rarely sparsely pubescent with forked and simple trichomes; style obsolete; stigma conical, to 1 mm. Seeds oblong, 0.9–1.2 × 0.4–0.5 mm. Fl. and fr. Apr–Jun.

Sandy deserts, steppe, rocky areas; 400–1400 m. Gansu, Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

短梗涩芥 duan geng se jie


Herbs annual, (3–)10–30(–45) cm tall, sparsely pubescent with small, short-stalked, forked or 3-rayed trichomes sometimes mixed with few simple ones, rarely glabrescent. Basal leaves soon withered, not rosulate. Middle and lower cauline leaves petiolate; petiole 3–12(–20) mm; leaf blade elliptic, oblong, or lanceolate, 1–3(–4) cm × 2–10(–16) mm, base cuneate, margin coarsely dentate, apex acute; uppermost leaves smaller and subsessile. Racemes few flowered, elongated considerably in fruit; rachis straight. Fruiting pedicles thickened narrower than or as wide as fruit, 0.5–1 mm. Sepals 1–2(–2.5) × 0.5–0.7 mm, caducous.

Petals pink or rarely white, narrowly oblanceolate, 2–3.5(–4) × 0.3–0.7 mm. Filaments free, 1.5–2.5 mm; anthers narrowly oblong, 0.3–0.6 mm. Fruit linear, curved at least near apex, or straight, rarely coiled, subterete, torulose, (1.3–) 1.8–3.2(–5) cm × 0.5–0.8(–0.9) mm; valves not veined, glabrous or rarely sparsely pubescent with forked trichomes; style obsolete; stigma conical, to 1 mm. Seeds oblong, 0.9–1.2 × 0.4–0.5 mm. Fl. and fr. Apr.–Jun.

Steppes; deserts, hillsides; 800–2000 m. Nei Mongol, Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

The protologue of Sisymbrium brevipes included two elements, of which Karelin & Kirilov 106 (LE) is the type of the species name, and it definitely belongs to the taxon currently known as Neotorularia brevipes (see below). The other element, Karelin & Kirilov 1240 (LE), which is a Malcolmia with twisted fruit and convinent stigma, was cited by Karelin and Kirilov under an unnamed variety, which is the basis of the name M. karelinii.

75. HESPERIS Linnaeus, Sp. Pl. 2: 663. 1753.

香花芥属 xiang hua jie shu

Herbs biennial, or perennial. Trichomes unicellular, simple and/or forked, these often mixed with glandular ones with a unicellular gland on a few-celled, uniseriate stalk. Stems erect, often simple. Basal leaves petiolate, usually rosulate, entire, divided, or pinnately divided. Cauline leaves petiolate or sessile, similar to basal, sometimes auriculate or amplexicaul at base. Racemes bracteate or ebracteate, elongated in fruit. Fruiting pedicles slender or thickened, divaricate or reflexed. Sepals oblong or linear, erect, base of lateral pair strongly saccate. Petals white, lavender, purple, yellow, orange, brownish, or green, much longer than sepals; blade obovate or oblong, apex rounded or obtuse; claw strongly differentiated. Stamens 6, strongly tetradyynamous; anthers oblong or linear, obtuse at apex. Nectar glands 2, lateral, ringlike or linear; median glands absent. Ovules 4–40 per ovary. Fruit tardily dehiscent siliques, linear, terete, 4-angled, or slightly latiseptate, sessile; valves with a prominent midvein, torulose; replum rounded; septicum complete, membranous; style obsolete or short; stigma conical, 2-lobed, lobes prominent, connivent or free, connate. Seeds uniseriate, wingless, oblong, plump; seed coat reticulate, not mucilaginous when wetted; cotyledons incumbent.

About 25 species: primarily C and SW Asia and SE Europe; two species (one introduced) in China.

1a. Plants eglandular or sparsely glandular; upper leaves shortly petiolate; eglandular trichomes simple and forked

1b. Plants densely glandular; upper leaves sessile; eglandular trichomes exclusively simple


欧亚香花芥 ou ya xiang hua jie

Herbs biennial or rarely perennial, 40–80(–110) cm tall, pubescent with simple and forked trichomes. Stems erect, often simple basally, often branched above, eglandular and often glabrous distally. Basal leaves withered by flowering. Middle and upper cauline leaves narrowly oblong, lanceolate, or broadly ovate, (2–)4–15(–20) × (0.4–)0.8–4(–6) cm, shortly petiolate, pubescent with simple and forked trichomes, base cuneate, margin denticulate or entire, apex acute or acuminated. Fruiting pedicles divaricate or ascending, (0.5–)0.7–1.7(–2.5) cm, eglandular. Sepals narrowly oblong, 5–8 × 1.5–2 mm. Petals deep purple, lavender, or white, obovate, (1.1–)1.5–2(–2.2) cm × 3.5–9 mm, apex rounded; claw 6–12 mm. Filaments 2.5–6 mm; anthers linear, 2.5–4 mm. Fruit terete, (4–)6–10(–14) cm × 2–2.5 mm; valves glabrous, constricted between seeds. Seeds oblong, (2.5–)3–4 × 1–1.5 mm. Fl. and fr. May–Sep. 2n = 24. Xinjiang [native to Europe and SW Asia; cultivated and naturalized elsewhere].


北香花芥 bei xiang hua jie

Hesperis elata Hornemann; H. matronalis Linnaeus var. elata (Hornemann) Schmalhausen; H. matronalis subsp. sibirica (Linnaeus) G. V. Krylov; H. matronalis var. sibirica (Linnaeus) de Candolle; H. oreophila Kitagawa; H. pseudonivea Tzvelev; H. sibirica var. alba Georgi.
Herbs perennial or biennial, (25–)40–100(–140) cm tall, often densely glandular especially above, hirsute with simple trichomes to 3 mm. Stems erect, simple basally, often branched above, glandular and often also subsetose. Basal leaves withered by flowering. Middle and upper cauleine leaves narrowly to broadly lanceolate, (3–)5–10(–16) × (0.5–)1–3.5(–5.5) mm, sessile or subsessile, glandular and with simple trichomes, base cuneate, margin denticulate or subentire, apex acute or acuminate. Fruiting pedicels divaricate or ascending, 0.7–2.5(–3.2) cm, glandular. Sepals narrowly oblong, 5.5–7.5(–10) × 1.5–2 mm. Petals deep purple, lavender, or white, narrowly to broadly obovate, 1.5–2(–2.5) cm × 5–10 mm, apex rounded; claw 7–10 mm. Filaments 3–5.5(–6.5) mm; anthers linear, 2.5–4 mm. Fruit terete, (3–)4–10(–13) cm × 1.5–2 mm; valves sparsely to densely glandular, constricted between seeds. Seeds oblong, (1.5–)2–2.7(–3) × 1–1.3 mm. Fl. and fr. May–Sep. 2n = 14.

Mountains slopes, shrubby areas, plains, near rivers; 900–2900. Hebei, Liaoning, Xinjiang [Kazakstan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Uzbekistan].

The alleged differences between Hesperis sibirica (petals purple, 15–24 mm) and H. pseudonivea (petals white, 18–23 mm) do not support their recognition as independent taxa at any rank because white flowers can be found in many populations of H. sibirica, and there are no other characters that separate the two.

76. CLAUSIA Kornuch-Trotzky, Index Sem. Kasan. 1834.

Herbs annual, biennial, or perennial. Trichomes eglandular and simple, mixed with stalked multicellular, multiseriate glandular ones. Stems erect, simple basally, branched above. Basal leaves petiolate, not rosulate or rarely rosulate, simple, entire or dentate. Cauline leaves persist, simple below, divided above. Basal leaves petiolate, not rosulate or rarely rosulate, simple, entire or dentate. Cauline leaves sessile, not auriculate, entire, dentate, or serrate. Racemes ebracteate, elongated in fruit. Fruiting pedicels thickened, divaricate or ascending. Sepals oblong-linear, erect, glabrous or pubescent, base of lateral pair strongly saccate. Petals purple, lavender, or rarely white, much longer than sepals, not crisped; blade obovate, apex rounded; claw distinct. Stamens 6, strongly tetradynamous; filaments not dilated at base; anthers narrowly oblong, obtuse at apex. Nectar glands, 2, lateral, semilunar, intrastaminal; median glands absent. Ovules 25–45 per ovary. Fruit dehiscent siliques, narrowly linear, latiseptate, 2-valved, valves thin, not mucilaginous when wetted; cotyledons accumbent.

Five species: C and E Asia, SE Europe; two species in China.

1a. Perennial, densely glandular; cauline leaves sessile, entire or rarely dentate; pedicels glandular ....... 1. C. aprica

1b. Annual or biennial, almost eglandular; cauline leaves petiolate, coarsely serrate; pedicels glabrous 2. C. trichosepala


Herbs perennial with branched caudex, (5–)9–40(–45) cm tall, densely glandular. Stems erect, simple below and usually above, hirsute with simple trichomes 1–2 mm, with glands to 0.1 mm. Basal leaves congested; petiole 4–10(–15) mm; leaf blade oblanceolate or oblong, 1–3(–4) × 2–4(–6) mm, sparsely to densely hirsute, margin entire or rarely dentate, apex acute or obtuse. Middle cauleine leaves sessile, lanceolate or oblong, 1–3(–5) × 1–5(–8) mm, margin entire or dentate, apex acute or obtuse. Fruiting pedicels divaricate-ascending, 4–10(–18) mm, densely glandular. Sepals 5–7 × 1.3–1.7 mm, glabrous or sparsely hirsute. Petals purple, lavender, or white, broadly obovate, (1–)1.3–1.7 cm × 5–7 mm; claw 6–10 mm. Filaments 4–9 mm; anthers narrowly oblong, 1.6–2 mm. Fruit erect, (3–)4–7(–8) cm × 1.5–2 mm, sparsely glandular or glabrous; style 0.5–1.5 mm. Seeds 1.2–2 × 0.8–1.2 mm; wing distal, 0.2–0.4 mm wide. Fl. and fr. May–Jul.

Mountain slopes, steppe. Xinjiang [Kazakstan, Mongolia, Russia; SE Europe].


Herbs annual, biennial, (10–)25–60(–70) cm tall, with a few sparse glands and appearing eglandular, glabrous throughout except for sepals and sometimes stems. Stems erect, simple below, branched above, glabrous throughout or rarely sparsely hirsute with simple trichomes. Basal leaves withered by flow-ering. Middle cauleine leaves with petioles (2–)5–15(–30) cm; leaf blade elliptic, (0.9–)1.7–4.5(–8) × (0.2–)0.5–1.8(–3) cm, margin coarsely serrate, apex acute. Fruiting pedicels divaricate-ascending, 4–10 mm, glabrous. Sepals 4–6 ×
ca. 1.5 mm, densely hirsute distally. Petals purple, obovate, 1–1.7 cm × 4–5 mm; claw 6–8 mm. Filaments 4–8 mm; anthers narrowly oblong, 1.4–1.8 mm. Fruit erect, (3.5–)4.5–7–(8.5) cm × ca. 1.5 mm, glabrous; style 1–2 mm. Seeds 1.2–1.5 × 0.8–1 mm; wing distal, ca. 0.3 mm wide. Fl. and fr. May–Aug.


Herbs biennial or rarely perennial. Trichomes unicellular, eglandular, simple, along with stalked multicellular, multiseriate ones. Stems erect, simple basally, branched above. Basal leaves petiolate, rosulate, pinnatisect or pinnatifid, rarely subentire. Cauline leaves shortly petiolate or sessile, not auriculate, pinnatisect, pinnatifid, dentate, or rarely entire. Racemes ebracteate, elongated considerably in fruit. Fruiting pedicels thickened, divaricate or ascending. Sepals oblong-linear, erect, base of lateral pair strongly saccate. Petals purple, lavender, or rarely brownish, much longer than sepals, crisped; blade linear, narrowly oblancoceleolate, or rarely oblongate, apex rounded; claw distinct. Stamens 6, erect, strongly tetradynamous; filaments not dilated at base; anthers linear to linear-oblong. Nectar glands 2, lateral; median glands absent. Ovules 10–45 per ovary. Fruit dehiscent siliques, narrowly linear, latiseptate, sessile; valves with a prominent midvein and distinct lateral veins, torulose; replum flattened; septum complete; style conical; stigma linear, 2-lobed, lobes strongly decurrent, connate. Seeds uniseriate, narrowly winged, oblong, flattened; seed coat minutely reticulate, not mucilaginous when wetted; cotyledons accumbent.

Ten species; C and SW Asia; one species in China.

### 1. **Pseudoclausia turkestanica** (Lipsky) A. N. Vassilevjeva, Fl. Kazakstn. 4: 244. 1961.

**Clausia turkestanica** Lipsky, Trudy Imp. S.-Peterburgsk. Bot. Sada 23: 41. 1904; *C. glandulosissima* Lipsky; *C. turkestanica* var. *subintegrofolia* Lipsky.

Herbs (27–)40–70(–120) cm tall. Stems unbranched below, hirsute with simple trichomes 1.5–2.5 mm, these mixed with glandular ones 0.2–0.3 mm. Basal leaves congested; petiole 0.5–1.5 cm; leaf blade oblancoceleolate or oblong, 1.5–5(–8) × 0.7–1.5 cm, sparsely to densely hirsute, pinnatifid, sinuate, or rarely subentire. Cauline leaves sessile, oblong-lanceolate or ovate-oblong, 2.5–5 cm × 3–5(–8) mm, entire or dentate. Fruiting pedicels divaricate, 5–10(–18) mm, glandular. Sepals (5–)6–8(–9) × ca. 1.5 mm. Petals purplish, linear or linear-oblancoceleolate, 10–16 × 1.5–3 mm; claw 7–10 mm, broader distally. Filaments 4–6 mm; anthers linear-oblong, 2.5–3 mm. Fruit (3–)6–9(–12) cm × 1.5–2 mm, sparsely glandular or glabrous; style subconical, 1.5–4 mm; stigma linear, 1.5–2 mm. Seeds 1.2–2 × 1–1.4 mm; wing 0.1–0.4 mm wide. Fl. Jun–Jul. Mountain slopes; 800–3000 m. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].


Herbs annual. Trichomes malphigiaeous. Stems erect or ascending, simple basally, branched above. Basal leaves not formed; cotyledons persistent, simple, entire. Cauline leaves sessile, cuneate or attenuate, not auriculate, linear, entire. Racemes few flowered, ebracteate or rarely lowermost flowers bracteate; rachis slightly flexuous. Fruiting pedicels slender, ascending or divaricate. Sepals oblong, caducous, erect, sparsely pubescent with malphigiaeous trichomes, base of lateral pair not saccate. Petals white becoming purplish, longer than sepals; blade narrowly spatulate, apex retuse; claws well developed. Stamens 6, erect, strongly tetradynamous; filaments filiform, not dilated at base; anthers narrowly oblong, apiculate at apex, median pairs 1-lobed, lateral pair 2-lobed, sagittate. Median glands absent; lateral glands 1 on each side of lateral stamen. Ovules 10–25 per ovary. Fruit dehiscent siliques, narrowly linear, terete or slightly flattened and latiseptate; valves papery, with an obscure midvein, pubescent with malphigiaeous trichomes, smooth; gynophore absent; replum rounded; septum complete, membranous; style to 1 mm; stigma capitate, subentire. Seeds uniseriate, wingless, oblong, plump; seed coat minutely reticulate, not mucilaginous when wetted; cotyledons accumbent, long persistent.

*Atelanthera* is the only genus in the Brassicaceae in which the median stamens have 1-lobed anthers.


Herbs annual, slender, (1–)3–10 cm tall. Stems erect, usually simple at base, branched above, sparsely to
densely pubescent, usually glabrescent above. Basal 2 leaves represent persistent cotyledons. Cauline leaves linear or narrowly oblong, sessile, (0.5–)1–2(–3) cm × (0.5–)1–3 mm, pubescent with malpighaceous trichomes, base cuneate, margin entire, apex obtuse. Racemes 2–5-flowered, lax. Fruiting pedicels 1–4(–6) mm, slender, narrower than fruit. Sepals 2–3 × 0.7–1 mm, densely pubescent with malpighaceous trichomes, membranous margin to 0.1 mm wide, apex obtuse, membranous. Petals white becoming purplish, narrowly spatulate, 3–4.5 × 0.7–1 mm; claw to 2 mm. Filaments white, 2–3 mm; anthers narrowly oblong, 0.4–0.5 mm. Fruit linear, terete or slightly compressed, 1.3–2.5 cm × 0.6–1 mm; valves densely pubescent with malpighaceous trichomes; style 0.5–1 mm. Seeds brownish, ovoid, somewhat plump, 0.7–1 × ca. 0.5 mm. Gravelly or sandy beds, among stones, sandy slopes; 2400–3100 m. Xizang [Afghanistan, Kashmir, Pakistan, Tajikistan].


隐子芥属 yin zi jie shu

Herbs annual. Trichomes often a mixture of simple, forked, stellate, or malpighaceous. Stems erect or ascending. Basal leaves subsessile, not rostrate, simple, entire. Cauline leaves sessile, cuneate and not auriculate at base, entire or denticulate. Racemes several flowered, ebracteate. Fruiting pedicels nearly as wide as fruit, ascending and subappressed to rachis or rarely divericate. Sepals oblong, erect, pubescent, base of lateral pair not saccate. Petals white, longer than sepals; blade spatulate, apex obtuse or emarginate; claw obscurely differentiated from blade. Stamens 6, erect, tetradynamous; filaments dilated at base; anthers ovate or oblong, apiculate. Median glands absent; lateral ones annular. Ovules 3–7 per ovary. Fruit indehiscent silicles, cylindric, sessile, usually breaking into 1-seeded units; valves somewhat woody, veinless or obscurely veined, often with dense malpighaceous trichomes sometimes mixed with larger, simple or stalked, 2-forked ones on tuberculate base, torulose; replum rounded; septum absent; style obsolete; stigma capitate, 2-lobed. Seeds uniseriate, wingless, narrowly oblong, plump; seed coat minutely reticulate, not mucilaginous when wetted; cotyledons incumbent.

Three species: C and SW Asia; one species in China.


隐子芥 yin zi jie

Cryptospora omissa Botschantzev.

Herbs annual, (6–)10–40(–60) cm tall. Stems erect, simple or few branched at base, hispid with simple and/or forked or stellate trichomes. Basal leaves not rostrate, sessile, soon withered. Middle cauline leaves narrowly oblong to oblong-lanceolate, sessile, (1–)1.5–3.5(–5) cm × 2–7(–12) mm, abaxially primarly with 3-forked stalked stellate trichomes, adaxially with simple and stalked forked trichomes, base cuneate or subobtuse, not auriculate, margin entire or sparsely denticulate, apex acute. Fruiting pedicels stout, stalked pubescent, erect or ascending, appressed or subappressed to rachis, 3.5(–5) cm × 2–7(–12) mm, densely pubescent, usually glabrescent above. Basal 2 leaves represent persistent cotyledons. Cauline leaves linear or narrowly oblong, sessile, (0.5–)1–2(–3) cm × (0.5–)1–3 mm, pubescent with malpighaceous trichomes, base cuneate, margin entire, apex obtuse. Racemes 2–5-flowered, lax. Fruiting pedicels 1–4(–6) mm, slender, narrower than fruit. Sepals 2–3 × 0.7–1 mm, densely pubescent with malpighaceous trichomes, membranous margin to 0.1 mm wide, apex obtuse, membranous. Petals white becoming purplish, narrowly spatulate, 3–4.5 × 0.7–1 mm; claw to 2 mm. Filaments white, 2–3 mm; anthers narrowly oblong, 0.4–0.5 mm. Fruit linear, terete or slightly compressed, 1.3–2.5 cm × 0.6–1 mm; valves densely pubescent with malpighaceous trichomes; style 0.5–1 mm. Seeds brownish, ovoid, somewhat plump, 0.7–1 × ca. 0.5 mm. Gravelly or sandy beds, among stones, sandy slopes; 2400–3100 m. Xizang [Afghanistan, Kashmir, Pakistan, Tajikistan].


棒果芥属 bang guo jie shu

Sterigma de Candolle.

Herbs annual, biennial, or perennial, or subshrubs. Trichomes dendritic, sometimes mixed with fewer simple and stalked forked ones; glandular trichomes multicellular, multiseriate. Stems erect, simple or branched. Basal leaves petiolate, rosulate, simple, pinnatifid, pinnatisect, or runcinate, rarely sinuate or subentire. Cauline leaves petiolate, similar to basal, often less divided upward. Racemes ebracteate, elongated in fruit. Fruiting pedicels slender, rarely thickened, divaricate or erect-ascending. Sepals oblong, ascending, equal, base of lateral pair not saccate. Petals yellow or orange, rarely white or purplish; blade broadly obovate, apex rounded; claw not differentiated from blade. Stamens 6, strongly tetradynamous; filaments of median pairs connate or rarely free, dilated at base; anthers oblong, obtuse at apex. Nectar glands 2, lateral, annular; median glands absent. Ovules 10–40 per ovary. Fruit indehiscent or tardily dehiscent, often lomentaceous silicles, breaking transversely into 1(or 2)-seeded units, linear or oblong, terete, sessile; valves thickened, obscurely veined, glabrous or with glandular and/or dendritic trichomes, torulose or rarely moniliform; replum rounded; septum complete, thickened, opaque, veinless; style prominent or short or obsolete; stigma capitate, strongly 2-lobed, lobes spreading, free, not decurrent. Seeds uniseriate, wingless, oblong, slightly flattened; seed coat not mucilaginous when wetted; cotyledons incumbent.


Seven species: C and SW Asia; one species in China.


**Oreoloma caspicum** Lamarck in Pallas, Voy. [Reise Russ. Reich., French Transl.] 2: 8: 348. 1794; C. tomentosum Willdenow; Sterigmostemum tomentosum (Willdenow) Marschall von Bieberstein.

Plants perennial, (6–)10–25 cm tall, tomentose, with wooly caudex. Trichomes dendritic; glandular trichomes absent. Stems several from base. Basal leaves green or canescient; petiole 0.5–2 cm; leaf blade linear, lanceolate, or obovate, (3–) 4–8 cm × 5–10 mm, base attenuate, margin entire, obtusely sinuate-dentate, pinnatifid, or pinnatisect and with entire, dentate, or lobed lateral segments, apex subacute. Uppermost cauline leaves subsessile, smaller, often undivided. Fruiting pedicels thickened, divaricate, (2–) 5–12 cm, lateral pair broader. Petals yellow, (5–) 6–8 cm × 2.5–3.5 mm, base attenuate into a claw. Median filament 5–6 mm, united to middle or slightly above; lateral filaments 3.5–4 mm; anthers 2–2.5 mm. Ovules 20–40 per ovary. Fruit linear, (2–) 3.5–5.5 cm × 1.5–2.2 mm, divaricate to divaricate-ascending, straight or curved; valves thickened, tomentose; style 1–3 mm, thickened; stigma lobes erect to subconnivent. Seeds brown, oblong, 2–2.5 × 0.6–0.8 mm. Fl. Apr–Jun, fr. May–Jul.

Steppe, deserts, arid areas; 500–1200 m. Xinjiang [Kazakhstan, Russia].

The record in FRPS of Sterigmostemum incanum Marschall von Bieberstein is based on misidentified plants of Oreoloma violaceum. The former species is restricted to SW Asia and adjacent Caucasus. The records of *S. tomentosum* in FRPS and Fl. Xinjiang. (2(2): 184. 1995) from Xinjiang are likely based on misidentified plants of *O. eglandulosum* or perhaps refer to *S. caspium*. The last species is common in Kazakhstan but is very rare in China. The only Chinese collection of *S. caspium* examined by the present authors is Anonymous 1840 (K, LE), collected from “Songaria Chin. ad lacum Saisang-Nor.” It represents the easternmost known range of the species.

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爪花芥属 zhi hua jie shu

Herbs perennial, with a distinct caudex. Trichomes dendritic, mixed with stalked glandular ones. Stems erect, simple or branched basally and/or apically. Basal leaves petiolate, rosulate, simple, pinnatifid, pinnatisect, sinuate-dentate, repand, or entire. Cauline leaves few to many. Racemes ebracteate, elongated in fruit. Fruiting pedicels thickened, nearly as wide as fruit, divaricate. Sepals oblong-linear, erect, unequal, base of lateral pair saccate, margin membranous. Petals purple, pink, yellow, or rarely white; blade broadly obovate or spatulate, apex rounded; claw well differentiated from blade, longer than sepals. Stamens 6, strongly tetradynamous; median filaments connate into 2 pair, dilated at base; anthers narrowly oblong, obtuse at apex. Nectar glands 2, lateral, annular or semiannular; median glands absent. Ovules 8–50 per ovary. Fruit tardily dehiscent siliques opening basipetally, not breaking transversely into segments, linear or oblong, terete, sessile; valves corky, not veined, with glandular and/or dendritic trichomes, not torulose or moniliform; replum flattened; septum complete, thickened; style prominent, short, or obsolete; stigma capitate or linear, obscurely to strongly 2-lobed, lobes spreading, free, not decurrent. Seeds uniseriate, wingless, oblong, slightly flattened; seed coat not mucilaginous when wetted; cotyledons incumbent.

Three species: China, Mongolia; three species (two endemic) in China.

**Oreoloma**, which is almost exclusively Chinese, is most closely related to Sterigmostemum, a genus distributed primarily in SW Asia. It consists of perennials with erect, unequal, basally saccate sepals, large petals, (1–) 1.3–2.2 cm, strongly differentiated into a blade and claw, and fruit not breaking transversely into segments. Sterigmostemum comprises mostly annuals with ascending, equal, nonsaccate sepals, smaller petals, 0.5–1 cm, undifferentiated into a blade and claw, and fruit generally breaking transversely into segments.

1a. Stigma capitate, subentire or obscurely with lobes as long as wide; cauline leaves more than 10; median filaments 5–6 cm; ovules 8–14 per ovary .................................................. 1. *O. matthioloides*

1b. Stigma linear, with 2 prominent lobes much longer than wide; cauline leaves absent or 1–3 cm; median filaments (8–) 9–15 cm; ovules 20–50 per ovary.

2a. Leaves pinnatisect, pinnatifid, or rarely sinuate-dentate; plants densely glandular throughout; fruiting pedicels 2–4 cm; ovules 20–30 per ovary ................................................................. 2. *O. violaceum*

2b. Leaves entire or repand; plants sparsely glandular on sepals subapically and pedicels, very rarely throughout; fruiting pedicels (4–) 6–12 cm; ovules 40–50 per ovary ........................................ 3. *O. eglandulosum*

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紫爪芥 zi hua jie jie

Dontostemon matthioloides Franchet, Pl. David. 1: 35. 1883; Sterigmostemum matthioloides (Franchet) Botschantzev.

Herbs 15–45 cm tall, densely tomentose and glandular throughout; caudex slender, often branched. Stems simple from caudex, often branched above. Basal leaves with petioles (0.5–) 1–3 cm; leaf blade lanceolate in outline, 2–7 × 0.8–3 cm, margin pinnatifid or pinnatisect, rarely sinuate-dentate, apex subacute;
articulate at base or both ends. Sepals ovate or oblong, suberect, base of lateral pair not saccate or subsaccate. Petals entire, repand, or dentate. Racemes ebracteate, elongated in fruit. Fruiting pedicels filiform, recurved or reflexed, articulate at base or both ends. Sepals ovate or oblong, suberect, base of lateral pair not saccate or subsaccate. Petals pink, creamy white, or yellowish, (1–)1.5–2 cm × 1–1.3 mm. Fl. Apr–Jun, fr. Jun–Jul. Mountain slopes; 1000–2200 m. Xinjiang [Mongolia].

A highly variable species in leaf margin, flower color and size, and degree of connation of median filaments. An examination of the type collections of the three “species” united here reveals that the alleged differences in the length of united portions of median filaments, which were used by Botschantzev (loc. cit.) and Yang (Fl. Desert. Reipubl. Popularis Sin. 2: 64. 1987) to separate species, are totally unreliable as is the shape of nectar glands. Yang (loc. cit.) reduced Oreoloma sulphureum to the synonymy of Sterigmostemum sulphureum (Banks & Solander) Bornmüller, but the latter is an entirely different species restricted to SW Asia.


爪花芥 shao xian zhao hua jie

Oreoloma eglandulosum Botschantzev; Sterigmostemum fuhaiense H. L. Yang; S. violaceum (Botschantzev) H. L. Yang.

Herbs (6–)10–22(–30) cm tall, densely tomentose, sparsely glandular on sepals and sometimes on pedicels and leaf blades, eglandular elsewhere, rarely densely glandular throughout; caudex woody, branched, covered with petiolar remains of previous years. Stems simple from caudex, simple or branched above. Basal leaves with petioles (1–)2–5(–7) cm; leaf blade broadly oblong or broadly oblanceolate, (1–)2–8(–10) × (0.5–)1.5–3(–4) cm, margin entire or repand, apex rounded or obtuse. Cauline leaves absent or few, shortly petiolate, entire. Fruiting pedicels stout, slightly narrower than fruit base, (4–)6–12(–15) mm, divaricate. Sepals narrowly oblong, (0.8–)1–1.5 cm × 2–3 mm. Petals pink, creamy white, or yellowish, (1–)1.5–2.2 cm × 4–6 mm; claw 1–1.5 cm. Median filaments 1.1–1.5 cm, connate along 0.5–0.9 of their length; lateral filaments 0.8–1.2 cm; anthers narrowly oblong, 3–4 mm. Ovules 40–50 per ovary. Fruit cylindric, (3–)4–7(–8) cm × 2–3 mm, straight or curved, attenuate to apex; style 2.5–6(–8) mm; stigma lobes linear, 2.5–4.5 mm. Seeds oblong, 2–3 × 1.3 mm. Fl. Jun–Aug, fr. Jul–Aug.

Slopes, dry gravelly valleys, sandy roadsides; 3000–4300 m. Gansu, Qinghai, Xinjiang.

Both Oreoloma eglandulosum and Sterigmostemum grandiflorum were published in 1980, the former in March (thus taking priority) and the latter in August. In his protologue of O. eglandulosum, Botschantzev indicated that the plants are eglandular. However, the holotype and other collections annotated by him all have the sepals subapically sparsely glandular. The holotype of S. grandiflorum has sparsely glandular leaves, pedicels, and sepals. Evidently the density of glands is not a reliable character for the separation of species.


四棱荠属 si leng qi shu

Herbs annual. Trichomes absent or eglandular, simple. Stems erect, branched. Basal leaves petiolate, rosulate or not, entire, dentate, or lyrate-pinnatifid. Cauline leaves sessile, auriculate or amplexicaul at base, rarely not auriculate, entire, repand, or dentate. Racemes ebracteate, elongated in fruit. Fruiting pedicels filiform, recurved or reflexed, articulate at base or both ends. Sepals ovate or oblong, suberect, base of lateral pair not saccate or subsaccate. Petals...
white, pink, or purplish, longer than sepals; blade spatulate, apex obtuse; claw subequalling sepals. Stamens 6, slightly tetrodynamous; median filament pairs flattened at base, lateral pair filiform; anthers ovate, obtuse at apex. Nectar glands 4, minute; median glands free or confluent with laterals; lateral glands semiannular, intrastaminal. Ovules 1–3 per ovary, subapical. Fruit indehiscent nutletlike silicle, often breaking into 1-seeded units, oblong, ovoid, or ellipsoid, 1-loculed or transversely 2- or 3-loculed, terete or 4-angled, sessile, woody, often prominently veined, glabrous or papillate, smooth or torulose, sometimes verrucose-reticulate; replum rounded; septum absent; style absent, obsolete, or distinct, thickened and subconical; stigma capitate, entire. Seeds uniseriate, wingless, oblong, plump; seed coat smooth, not mucilaginous when wetted; cotyledons incumbent.

Six species: C and SW Asia, E Europe; three species in China.

1a. Cauline leaves widest at base, amplexicaul; sepals densely pubescent with crisped trichomes; fruit pointed upward, fruit and pedicels form a distinct angle 30–120 degrees .......................... 1. G. laevigata

1b. Cauline leaves widest at middle, auriculate or sagittate, or sessile and not auriculate; sepals glabrous or sparsely pubescent with straight trichomes; fruit pointed downward, fruit and pedicels form a straight line.

2a. Cauline leaves often denticulate, sparsely ciliate; mature fruit terete or slightly 4-angled, abruptly constricted to beaklike apex 0.5–1.5 mm; fruiting pedicels (4–)6–10(–12) mm, slightly shorter or slightly longer than fruit .......................................................... 2. G. pendula

2b. Cauline leaves subentire or entire, not ciliate; mature fruit distinctly 4-angled, attenuate to beaklike apex (2–)2.5–3 mm; fruiting pedicels 1.5–3(–4.5) mm, much shorter than fruit .......................... 3. G. ikonnikovii


**四棱荠** 闭果四棱荠

*Raphanus laevigatus* Marschall von Bieberstein, Fl. Taur.-Caucas. 2: 129. 1808; *Goldbachia hispida* Blatter & Hallberg; *G. laevigata* var. *ascendens* Boissier; *G. laevigata* var. *ascendens f. reticulata* Kuntze; *G. reticulata* (Kuntze) Vassilczenko.

Herbs annual, (10–)15–40 cm tall. Stems branched basally and above. Basal leaves not rosulate; petiole 1–3 cm; leaf blade often oblong, 2.5–4.5 × 0.8–3 cm, margin sinuate-dentate to dentate. Middle cauline leaves sessile, amplexicaul, cordate-ovate or ovate-lanceolate, (0.8–)1.3–4.5(–5.5) cm × 2–15(–17) mm, widest at base, margin entire. Fruiting pedicels slender, 0.5–1.5 cm, reflexed, forming with fruit a distinct angle 30–120 degrees, articulate at base. Sepals oblong, 2.5–4 × ca. 1 mm, densely pubescent with crisped trichomes, base of lateral pair slightly saccate. Petals pale purplish or pink, spatulate, 5–8 × ca. 1.5 mm. Filaments 3–4 mm; anthers ovate, 0.4–0.6 mm. Fruit narrowly oblong, 0.8–1.3 cm × 3–4 mm, pointed upward, 4-angled, rugose, constricted at middle when more than 1-seeded, base subrounded, beaklike apex (1–)1.5–2(–2.5) mm. Seeds yellow-brown, oblong, 1.6–2.4 × 0.9–1.3 mm. Fl. Apr–Jun.

**Fields, roadsides, hillsides; 400–1300 m. Xinjiang [Afghanistan, India, Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].**

Records and illustrations in FRPS (3: 375. 1987), Fl. Qinghai. (1: 483. 1997), and Fl. Xinjiang. (2(2):189. 1995) of *Goldbachia laevigata* are based on misidentified plants of *G. pendula*. The former species has pedicels that form a distinct angle with the fruit and sepals densely pubescent with crisped trichomes. *Goldbachia pendula* and *G. ikonnikovii* have pedicels and fruit that form a straight line and their sepals are either glabrous or sparsely pubescent with few straight trichomes (see the above key). The occurrence of *G. laevigata* in China is here confirmed based on Regel s.n., May 1877 (LE), collected from Xinjiang. Records of the species from India and Pakistan are questionable, and they are likely based on misidentified plants of *G. tetragona* Ledebour or *G. torulosa* de Candolle.


**垂果四棱荠** 垂果四棱荠

*Herbs annual, (10–)14–40(–50) cm tall. Stems branched basally and above. Basal leaves not rosulate; petiole 1–2.5 cm; leaf blade obovate or oblanceolate, (1.3–)2–5(–8) × 0.4–2(–3) cm, margin sinuate-dentate or dentate, often ciliate, apex obtuse or acute. Middle cauline leaves sessile, auriculate, oblong, narrowly lanceolate, or oblanceolate, (0.8–)1.3–4.5(–5.5) cm × 2–15(–17) mm, widest at middle, margin denticulate, ciliate with straight trichomes to 0.3 mm. Fruiting pedicels slender, (4–)6–10(–12) mm, reflexed, forming a straight line with fruit, articulate at both ends. Sepals oblong, 1.5–2(–2.5) × 0.5–0.7 mm, glabrous or sparsely pubescent subapically with straight trichomes, base of lateral pair slightly saccate. Petals pale purple, narrowly oblanceolate, 3–4 × 0.8–1.2 mm. Filaments 1–2 mm; anthers ovate, 0.3–0.4 mm. Fruit ovoid or narrowly oblanceolate, 5–9(–11) × 1.5–2.3(–3) mm, pointed downward, terete or slightly 4-angled, constricted at middle when more than 1-seeded, base subrounded, abruptly narrowed into a beaklike apex 0.5–1.5 mm. Seeds yellow, oblong, 1.6–2.4 × 0.9–1.3 mm. Fl. May–Jun, fr. Jun–Aug.

**Deserts, high plateaus, rocky hillsides; 400–4200 m. Gansu, Nei Mongol, Ningxia, Qinghai, Xinjiang, Xizang [Kazakhstan, Kyrgyzstan, Russia, Tajikistan, Turkmenistan].**
Goldbachia pendula is recorded here for the first time from China. The record from Gansu is based on Przewalski 282 (LE), that from Nei Mongol on Przewalski s.n., 10–22 May 1879 (LE), that from Qinghai on Boubard et al. 26892 (A, MO) and Ladynin 164 (LE), that from Xinjiang on Anonymous 1–170 (PE 1394154), and that from Xizang on Ladynin 350 (LE).


短梗四棱荠 duan geng si leng qi

Goldbachia laevigata (Marschall von Bieberstein) de Candolle var. ikonnikovii (Vassilczenko) Kuan & Ma.

Herbs annual or biennial, 15–40 cm tall. Stems branched basally and above. Basal leaves not roslolate; petiole 1–2 cm; leaf blade oblanceolate, 2–6 × 0.8–2 cm, margin dentate, not ciliate, apex obtuse or acute. Middle cauline leaves sessile, auriculate, linear-oblanceolate or narrowly lanceolate, 0.8–4.5 cm × 1–7(–10) mm.


糖芥属 tang jie shu

Zhou Taiyan (周太炎 Cheo Tai-yien), Lu Lianli (陆莲立 Lou Lian-li), Yang Guang (杨光); Vladimir I. Dorofeyev3, Ihsan A. Al-Shehbaz

Cheiranthus Linnaeus; Cheirinia Link; Cuspidaria (de Candolle) Besser; Syrena Andrzejowski ex Besser.

Herbs annual, biennial, or perennial, rarely subshrubs or shrubs. Trichomes sessile, medifixed, appressed, malpighiaceous or 3–5–(8)-rayed stellate. Stems simple or branched basally and/or apically. Basal leaves petiolate, rosulate, simple, entire or dentate, rarely pinnatifid or pinnatisect. Cauline leaves petiolate or sessile, cuneate or attenuate at base, rarely auriculate, entire or dentate. Racemes ebracteate or basally bracteate, rarely bracteate throughout, corymbose, elongated or not in fruit. Fruiting pedicels slender or thickened and nearly as wide as fruit, erect, ascending, divaricate, or reflexed. Sepals oblong or linear, erect, pubescent, base of lateral pair saccate or not. Petals yellow or orange, rarely white, pink, purple, or violet; blade suborbicular, obovate, spatulate, or oblong, apex rounded or emarginate; claw differentiated from blade, subequalling or longer than sepals. Stamens 6, erect, tetradynamous; anthers oblong or linear. Nectar glands 1, 2, or 4, distinct or confluent and subtending bases of all stamens; median glands present or absent. Ovules 15–100 per ovary. Fruit dehiscent siliques or rarely silicles, linear or rarely oblong, terete, 4-angled, latisectate, or angustiseptate, sessile or rarely shortly stipitate; valves with an obscure to prominent midvein, pubescent on outside, rarely also on inside, keeled or not, smooth or torulose; replum rounded; septum complete, membranous, translucent or opaque, veinless; style obsolete or short, rarely half as long as or subequalling fruit, often pubescent; stigma capitulate, entire or 2-lobed. Seeds uniseriate or rarely biseriate, winged, margined, or wingless, oblong, plum or flattened; seed coat minutely reticulate, mucilaginous when wetted; cotyledons incipient or rarely accumbent.

About 150 species: N hemisphere, primarily in Asia and Europe, with 14 species in Central and North America and eight species in N Africa and Macaronesia; 17 species (five endemic) in China. Erysimum cheiri (Linnaeus) Crantz (as Cheiranthus cheiri Linnaeus in FRPS) is a widely cultivated ornamental plant, but it is not known if it has become naturalized in China or elsewhere in Asia.

1a. Sepals united, persistent well after fruit maturity; fruit oblong, slightly angustiseptate, with transversely oriented malpighiaceous trichomes; styles (4–)5–10(–12) mm ..................................................... 17. E. siliculosum

1b. Sepals free, caducous shortly after anthesis; fruit linear or rarely linear-oblong, terete, 4-angled, or latisectate; with longitudinally oriented, malpighiaceous and/or 3–5-fid stellate trichomes; styles 0.5–3(–4) mm.

2a. Annuals or biennials.

3a. Fruiting pedicels nearly as thick as fruit.

4a. Trichomes malpighiaceous mixed with 3-forked ones; fruiting pedicels 2–4 mm; petals 6–8 × 1.5–2 mm; fruit 4-angled, (2–)3–8(–10) cm ..................................................... 16. E. repandum

4b. Trichomes exclusively malpighiaceous; fruiting pedicels 0.5–1.5(–2) mm; petals 3–4(–5) × 0.3–0.6 mm; fruit terete, (1.3–)1.7–2.2(–2.5) cm ..................................................... 15. E. sisymbrioides

3 Herbarium: Higher Plants, V. L. Komarov Botanical Institute, Russian Academy of Sciences, Prof. Popov Street 2, St. Petersburg 197376, Russia.
3b. Fruiting pedicels distinctly narrower than fruit.

5a. Petals spatulate, well differentiated into claw and limb, 1.5–2 mm wide; fruiting pedicels
5–13(–16) mm; seeds 1–1.3 mm ................................................................. 13. E. cheiranthoides

6a. Petals linear to linear-oblong, undifferentiated into a claw and limb, 0.3–0.5(–0.7)
mm wide; fruiting pedicels 3–7(–9) mm; seeds (0.6–)0.7–0.9 ......................... 14. E. macilentum

5b. Fruit valves glabrous inside, if sparsely pubescent (rarely in E. hieraciifolium), then petals
more
than 6 × 2 mm.

7a. Trichomes exclusively malpighiaceous, rarely 3-fid ones on style; fruit smooth, with 4
bands
of white trichomes separated by glabrous replum and valve midveins .................... 9. E. canescens

7b. Trichomes 3- or 4-fid mixed with malpighiaceous ones on leaves and fruit; fruit torulose,
without
4 white bands of trichomes.

8a. Fruit (6–)7–11(–13) cm; racemes bracteate at base .................................. 10. E. benthamii

8b. Fruit (1–)1.5–3.5(–4) cm; racemes ebracteate.

9a. Plants (10–)30–90(–110) cm tall; fruiting pedicels suberect or ascending,
subappressed to rachis; leaves entire or obscurely denticulate ............. 11. E. hieraciifolium

9b. Plants 3–10 cm tall; fruiting pedicels divaricate; leaves sinuate-dentate or
dentate ................................................................. 12. E. schlachtense

2b. Perennials.

10a. Petals pink or purple.

11a. Petals narrowly spatulate, 7–9(–10) × 1.7–2(–2.5) mm; plants (1.5–)2–6(–8) cm tall  5. E. funiculosum

11b. Petals broadly obovate or broadly spatulate, (14–)16–22(–25) × (3–)4–6(–8) mm; plants
(6–)10–28(–36) cm tall ................................................................. 4. E. roseum

10b. Petals yellow or orange.

12a. Plants stemless; raceme subumbellate and often without a rachis ............ 2. E. handel-mazzettii

12b. Plants with a distinct stem; raceme short or long, with a distinct rachis.

13a. Racemes bracteate throughout; fruit 4–5 mm wide; seeds 3–4.5 mm ............... 1. E. forrestii

13b. Racemes ebracteate or only lowermost few flowers bracteate; fruit 1–2 mm wide;
seeds 0.8–3 mm.

14a. Leaf blade mostly filiform to narrowly linear, folded .......................... 7. E. flavum

14b. Leaves lanceolate, oblong, lanceolate-linear, or very rarely linear, not folded.

15a. Fruit smooth, strongly 4-angled, with 4 bands of white trichomes separated
by glabrous replum and valve midveins ................................................ 9. E. canescens

15b. Fruit torulose, flattened, suberete, or slightly 4-angled, without 4 bands of
white trichomes.

16a. Plants 2–10(–15) cm tall; petals yellow, 0.6–1(–1.2) cm; sepals 4–6
mm; raceme usually deflexed in fruit .................................................. 8. E. deflexum

16b. Plants (12–)20–100 cm tall; petals often orange-yellow, (1.2–)1.5–2(–
2.3)
cm; sepals (6–)7–10(–11) mm; racemes erect.

17a. Basal and lowermost leaves coarsely dentate; stigma subentire;
fruit
(5–)8–11 cm; Sichuan, Xizang, and Yunnan ....................... 3. E. wardii

17b. Basal and lowermost leaves entire or obscurely denticulate;
stigma prominently 2-lobed; fruit (1.1–)2.5–5(–8) cm; N and E
China,
Russia, and Korea ................................................................. 6. E. amurense


匍匐糖芥 pu fu tang jie

Edinburgh 38: 195. 1914; Cheiranthus forrestii (W. W. Smith) Handel-Mazzetti; Erysimum schneideri O. E.
Schulz.

Herbs perennial, (4–)10–20(–30) cm tall; caudex
several branched, covered with petiolar remains of
previous years. Trichomes malpighiaceous, rarely a few
3-fid on leaves adaxially. Stems 1 to several from base, leafy. Basal leaves rosulate; petiole (1–)2–5(–8) cm; leaf blade elliptic, oblong, oblong-ovate, spatulate, or oblanceolate-linear, (0.6–)1.5–6(–10) × 0.5–1.5 (–2) cm, base attenuate, margin coarsely dentate or rarely dentate, apex acute. Racemes corymbose, slightly elongated in fruit, bracteate throughout. Fruiting pedicels divaricate, 3–7 (–20) mm, stout, narrower than fruit, straight. Sepals oblong-linear, 7–10(–12) mm, caducous, lateral pair strongly saccate. Petals yellow, broadly obovate or suborbicular, (1.4–)1.7–2 (–2.5) cm × (6–)7–9 mm; claw usually longer than sepals. Filaments 0.8–1.3 cm; anthers oblong-linear, 2.5–3.5 mm. Ovules 14–24 per ovary. Fruit linear, flattened, (3.2–)4–8(–9) cm × 4–5 mm, not torulose, slightly curved; valves not keeled, with a distinct midvein, outside with malpighiaceous trichomes, inside glabrous; style 1–2 mm; stigma capitate, entire. Seeds oblong, 3.5–5.5 cm × 2–3.5 mm, not torulose, slightly curved; style slender, 1–3 mm, cylindric, base attenuate, margin entire or denticulate, apex acute. Racemes subumbellate and often without a rachis, not elongated in fruit, bracteate. Fruiting pedicels erect, (0.7–)1.5–4(–5) cm, slender, narrower than fruit, straight. Sepals oblong-linear, 7–10 mm, caducous, lateral pair saccate. Petals yellow, broadly obovate or spatulate, (1.5–)2.1–2.3 cm × (4–)5–8 mm; claw longer than sepals. Filaments 6–8 mm; anthers oblong, 1.5–2.5 mm. Ovules 12–24 per ovary. Fruit linear or rarely linear-oblong, slightly 4-angled, (1.5–)2.5–4.5–5.5 cm × 2–3.5 mm, not torulose, slightly curved; valves not keeled, with a distinct midvein, outside with malpighiaceous trichomes, inside glabrous; gynophore 0.5–3 mm; style 0.7–2 mm; stigma capitate, slightly 2-lobed. Seeds oblong, 2.5–3.5 × 1–2 mm, on filiform funicles to 7 mm. Fl. May–Jul, fr. Jul–Oct.


Herbs perennial, (2–)3–7(–10) cm tall; caudex several branched, covered with petiolar remains of previous years. Trichomes malpighiaceous, rarely a few 3-fid on leaves adaxially. Stems absent. Basal leaves rosulate; petiole (0.7–)1.5–4.5–6 cm; leaf blade oblong or lanceolate, (0.9–)1.5–4(–5.5) cm × (1.5–)2.5–8(–10) mm, base attenuate, margin entire or denticulate, apex acute. Racemes subumbellate and often without a rachis, not elongated in fruit, bracteate. Fruiting pedicels erect, (0.7–)1.5–4(–5) cm, slender, narrower than fruit, straight. Sepals oblong-linear, 7–10 mm, caducous, lateral pair saccate. Petals yellow, broadly obovate or spatulate, (1.5–)2.1–2.3 cm × (4–)5–8 mm; claw longer than sepals. Filaments 6–8 mm; anthers oblong, 1.5–2.5 mm. Ovules 12–24 per ovary. Fruit linear or rarely linear-oblong, slightly 4-angled, (1.5–)2.5–4.5–5.5 cm × 2–3.5 mm, not torulose, slightly curved; valves not keeled, with a distinct midvein, outside with malpighiaceous trichomes, inside glabrous; gynophore 0.5–3 mm; style 0.7–2 mm; stigma capitate, slightly 2-lobed. Seeds oblong, 2.5–3.5 × 1–2 mm, on filiform funicles to 7 mm. Fl. May–Jul, fr. Jul–Oct.


Herbs perennial, 20–90 cm tall. Trichomes almost exclusively malpighiaceous, rarely mixed with few 3- or 4-forked ones on leaves. Stems erect, simple or rarely branched basally. Basal leaves rosulate; petiole 1–4(–8) cm; leaf blade lanceolate to linear-lanceolate, (1.5–)3–10(–15) cm × (2–)3–7(–12) mm, base attenuate or cuneate, margin coarsely dentate, apex acute or acuminate. Upper cauline leaves sessile or subsessile, subentire. Racemes corymbose, densely flowered, bracteate basally, elongated considerably in fruit. Fruiting pedicels divaricate, ascending, or erect, (3–)5–11(–18) mm, stout, narrower than fruit, straight. Sepals lanceolate-linear, (6–)7–10 × 2–2.5 mm, lateral pair saccate. Petals orange-yellow to yellow, obovate, (1.2–)1.5–2(–2.3) cm × (4–)5–6(–7) mm, apex rounded; claw distinct, subequalling or longer than sepals. Filaments yellow, 8–11(–13) mm; anthers linear, 2–3(–3.5) mm. Ovules 50–80 per ovary. Fruit linear, slightly 4-angled or flattened, (5–)8–11 cm × 1.5–2 mm, slightly torulose, erect and subappressed to rachis or ascending to divaricate, straight; valves with a prominent midvein, outside with malpighiaceous trichomes, inside glabrous; style slender, 1–3 mm, cylindric, narrower than fruit; stigma capitate, subentire. Seeds oblong, 1.5–2 × 0.8–1.2 mm. Fl. May–Aug, fr. Jul–Sep.


Herbs perennial, (6–)10–28(–36) cm tall; caudex few branched, covered with petiolar remains of previous years. Trichomes malpighiaceous, rarely a few 3-fid on leaves adaxially. Stems single from base, leafy. Basal leaves rosulate; petiole (0.5–)1–4.5(–7) cm; leaf blade oblong, oblong-ovate, oblanceolate-linear, or linear, (0.6–)1.5–7(–10) cm × (1.5)–2.5–8(–10) mm, base attenuate, margin entire or denticulate, apex acute or obtuse. Upper cauline leaves sessile, entire, similar to basal ones in size. Racemes corymbose, elongated in fruit, only lowermost flowers bracteate. Fruiting pedicels divaricate, (3–)4–10(–12) mm, stout, narrower than fruit, straight. Sepals oblong-linear, 6–9 × 1.5–2 mm, often persistent to early fruit maturity, lateral pair strongly saccate. Petals pink or purple, broadly obovate or broadly spatulate, (1.4–)1.6–2.2(–2.5) cm × (3–)4–6(–8) mm; claw longer than sepals. Filaments 6–8 mm; anthers oblong, 1.5–2.5 mm. Ovules 18–26 per ovary. Fruit linear or rarely linear-
Erysimum amurense

5. 1833; Cheiranthus aurantiacus Bunge, Enum. Pl. China Bor. 5. 1833; Erysimum amurense subsp. bungei Kitagawa; E. amurense var. bungei (Kitagawa) Kitagawa; E. aurantiacum (Bunge) Maximowicz (1889), not Leybold (1855); E. bungei (Kitagawa) Kitagawa.

Herbs perennial, (12–)25–90(–100) cm tall. Trichomes malpighiaceous throughout, mixed mainly on leaves with much fewer 3-fid ones. Stems erect, simple or branched basally, slightly ribbed. Basal and lowermost cauline leaves with petioles (0.5–)1–3 cm; leaf blade narrowly linear to linear-lanceolate, (2.5–)4–12(–15) cm × (2–)4–15(–17) mm, canescent or green, base attenuate, margin entire or obscurely denticulate, apex acuminate or acute. Upper cauline leaves sessile or subsessile. Racemes corymbose, densely flowered, ebracteate or lowermost few flowers bracteate, elongated considerably in fruit. Fruiting pedicels divaricate, (4–)5–9(–10) mm, slender, narrower than fruit, straight. Sepals oblong-linear, (6–)7–10(–11) × 2–3 mm, lateral pair strongly saccate. Petals orange-yellow, broadly obovate or spatulate, (1.2–)1.5–2 cm × (3–)4.5–7(–8) mm, apex rounded; claw distinct, subequaling sepals. Filaments yellow, (6.5–)8–11 mm; anthers linear, 3–4 mm. Ovules (24–)30–60 per ovary. Fruit linear, subterete or flattened, (1.1–)2.5–5(–8) cm × 1.2–2 mm, slightly torulose, erect to ascending, straight or curved; valves obscurely veined, outside with malpighiaceous trichomes, inside glabrous; style slender, (1.5–)2–4 mm, cylindric, much narrower than fruit; stigmacapitate, prominently 2-lobed. Seeds oblong, (1.5–)2–3 × 0.8–1.3 mm. Fl. May–Aug, fr. Jun–Oct.

Plains, valleys, dry sandy or stony slopes, roadsides, thickets, disturbed secondary forests, gravelly ledges, hillside, dry river banks; 100–2800 m. Hebei, Jiangsu, Liaoning, Nei Mongol, Shaanxi, Shanxi [Korea, Russia].

The records in FRPS and Fl. Sichuan. (14: 146. 1999) of Erysimum amurense (as E. bungei) from Sichuan are based on misidentified plants of E. benthamii.


Meng gu tang jie

Herbs perennial, 10–60(–100) cm tall; caudex with petiolar remains of previous years. Trichomes exclusively malpighiaceous. Stems erect, simple or several from caudex. Basal leaves rosetulate; petiole (0.3–)0.8–2(--4) cm, often grooved adaxially; leaf blade filiform to narrowly linear, rarely linear-lanceolate, (0.7–)1–6(–9) cm × (0.5–)1–4(--8) mm, foldless, base attenuate, margin entire or rarely denticulate, apex acute. Upper cauline leaves sessile, linear to filiform, entire or rarely denticulate. Racemes corymbose, densely flowered, ebracteate, elongated considerably in fruit. Fruiting pedicels divaricate or ascending, 4–15 mm, stout, narrower than fruit, straight. Sepals lanceolate-linear, 5–14 × 1.5–2 mm, lateral pair strongly saccate. Petals yellow, obovate, 0.9–2.6 cm × 3–8 mm, apex rounded; claw distinct, subequaling or longer than sepals. Filaments yellow, 0.5–1.5 cm;

E. roseum [Korea, Russia].
anthers linear, 2–4 mm. Ovules 60–130 per ovary. Fruit linear, slightly 4-angled or flattened, (3.5–)5–8 (–12) cm × 1–2 mm, slightly torulose, erect-ascending, straight or slightly curved; valves with a distinct midvein, outside with malpighiaceous trichomes, inside glabrous; style slender, (0.5–)1–3 (–4) mm, cylindric, narrower than fruit; stigma capitate, 2-lobed. Seeds oblong, 1.5–2.5 × 0.8–1.2 mm. Fl. May–Jun, fr. Jul–Sep.

Forest clearings, mountain slopes, dry meadows, steppes, alpine or subalpine areas, tundra; 900–4600 m. Heilongjiang, Nei Mongol, Xinjiang, Xizang [Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia (Siberia), Tajikistan].

A highly variable species that can be divided into two infraspecific taxa separable only by quantitative characters. These are recognized here at subspecific rank, and it is likely that their limits become blurred in parts of Siberia and adjacent Mongolia and Xinjiang.

1a. Plants (10–)20–60(–100) cm tall; sepals (0.8–)0.9–1.2 (–1.4) cm; petals (1.6–)1.7–2.4 (–2.6) cm × 5–8 mm; anthers (2.5–)3–4 mm

1b. Plants (3–)10–30(–50) cm tall; sepals 5–7 mm; petals (0.9–)1–1.4 (–1.6) cm × 3–5 mm; anthers 1.5–2 mm

7a. *Erysimum flavum* subsp. *flavum*  
蒙糖芥 meng gu tang jie (yuán yá zhòng)


Plants (10–)20–60 (–100) cm tall. Sepals (0.8–)0.9–1.2 (–1.4) cm. Petals (1.6–)1.7–2.4 (–2.6) cm × 5–8 mm. Anthers (2.5–)3–4 mm.

Forest clearings, dry meadows, mountain slopes; 1500–4500 m. Heilongjiang, Nei Mongol [Mongolia, Russia (Siberia)].

7b. *Erysimum flavum* subsp. *altaicum*  
蒙古糖芥 meng gu tang jie (yuán yá zhòng)


Plants (3–)10–30 (–50) cm tall. Sepals 5–7 mm. Petals (0.9–)1–1.4 (–1.6) cm × 3–5 mm. Fruit linear, 3.5–4.5 cm × 1.5–2 mm; style 2–3 mm, slender; stigma 2-lobed. Fl. Jun, fr. Jul.

Steppes, alpine or subalpine areas, tundra; 900–4600 m. Xinjiang, Xizang [Kashmir, Kazakhstan, Kyrgyzstan, Pakistan, Russia (Siberia), Tajikistan].


外折芥 wài zhe tang jie

Herbs perennial, 2–10 (–15) cm tall. Trichomes malpighiaceous throughout, rarely 3-fid ones on leaves. Stems decumbent or erect, often more than 1 from caudex. Basal leaves rosulate; petiole 4–10 (–20) mm, often persistent; leaf blade linear-lanceolate or oblong, (1–)1.5–4 (–6) cm × 1–4 (–7) mm, base attenuate, margin entire or denticulate, apex acute. Cauline leaves few or absent, subsessile. Racemes corymbose, densely flowered, ebracteate, elongated and often deflexed in fruit. Fruiting pedicels divaricate, (2–)4–7 (–8) mm, stout, narrower than fruit. Sepals linear-oblong, 4–6 × 1–1.5 mm, lateral pair saccate at base. Petals yellow, spathulate or obovate, 6–10 (–12) × 2–4 mm, apex rounded; claw subequaling sepal. Filaments yellow, 4–6.5 mm; anthers linear-oblong, 1.5–2 mm. Ovules 40–50 per ovary. Fruit narrowly linear, subterete, (2.5–)3–5 cm × 1–1.5 mm, torulose, divaricate or ascending, straight or curved; valves pubescent outside with malpighiaceous and rarely 3-forked trichomes, glabrous inside; style stout, 1–3 mm, cylindric, sparingly pubescent; stigma entire or slightly 2-lobed. Seeds oblong, 1.2–1.5 (–1.9) × 0.7–1 mm. Fl. May–Aug, fr. Jul–Aug.

Gravelly areas, slope; 3700–5200 m. SW Xinjiang (Taxkorgan Tajik Zizhixian), Xizang [India, Sikkim].

The above first record from Xinjiang is based on Northwest Plateau Institute Team 3266 (PE).


灰毛糖芥 huí mào tang jie

Herbs biennial or perennial, 20–90 cm tall. Trichomes almost exclusively malpighiaceous, rarely mixed with few 3-forked ones especially on style. Stems erect, simple or branched basally, angled. Basal leaves rosulate; petiole 1–6 cm; leaf blade linear to linear-lanceolate, (1–)2–6 (–8) mm × 2–5 (–10) mm, flat, base attenuate, margin entire, apex acute. Upper cauline leaves sessile, entire. Racemes corymbose, densely flowered, ebracteate, elongated considerably in fruit. Fruiting pedicels divaricate or suberect, (3–)4–8 (–10) mm, stout, narrower than fruit, straight or curved upward. Sepals oblong-linear, 6–8 (–9) × 1–1.5 mm, lateral pair slightly saccate. Petals yellow, spathulate, 1–1.5 (–1.7) cm × (1.5–)2.5–3.5 mm, apex rounded; claw distinct, subequaling or longer than sepals. Filaments yellow, 6–9 mm; anthers linear, 2–3 mm. Ovules 70–110 per ovary. Fruit linear, strongly 4-angled, (3.5–)5–8 (–10) cm × 1–1.5 mm, not torulose, erect and subappressed to rachis, or ascending to divaricate, straight or slightly curved; valves outside with four bands of trichomes separated by glabrous replum and valve midveins, inside glabrous; style slender, 1–3 mm, cylindric, narrower than fruit; stigma capitate, entire. Seeds oblong, 1–1.3 × 0.4–0.6 mm. Fl. May–Aug, fr. Jul–Sep.

Mountain slopes; 700–3800 m. Xinjiang [Kazakhstan, Mongolia, Russia, Tajikistan, Uzbekistan].

*Erysimum canescens* was recognized in FRPS as a synonym *E. diffusum* Ehrhart. The latter species is restricted to C and S Europe.

四川糖芥  花川糖芥

Erysimum benthamii var. grandiflorum Monnet; Erysimum longisiliquum J. D. Hooker & Thomson (1861), not Schlechtendal (1830–1832); E. szechuanense O. E. Schulz; E. sikkimense Polatschek.

Herbs annual or biennial, (15–)30–80(–100) cm tall. Trichomes 3(or 4)-forked, mixed with fewer malpighiaceous ones. Stems erect, simple or branched basally, often angled, primarily with malpighiaceous trichomes. Basal leaves petiolate, rosulate, withered by flowering. Lower cauleine leaves with petioles 1–3 (–5) cm; leaf blade narrowly linear to linear-lanceolate, (2–)3–8(–11) cm × (2–)4–10(–14) mm, base attenuate or cuneate, margin coarsely dentate, apex acute or acuminate. Upper cauleine leaves sessile or subsessile, denticulate or subentire. Racemes corymbose, densely flowered, elongated considerably in fruit. Fruiting pedicels divaricate or ascending, (0.5–)1–2 mm, slender, narrower than fruit, subappressed to rachis. Fruits oblong, 4–7 × 1–1.5 mm, not saccate. Petals yellow, obovate, (6–)7–9(–10) × 2–3 mm, apex round; claw distinct, subequalling sepals. Filaments yellow, 4–6 mm; anthers oblong, 1.5–2 mm. Ovules 40–60 per ovary. Fruit linear, 4-angled, (1–)1.5–2.5(–4) cm × 1–1.3 mm, somewhat torulose, erect and often appressed to rachis, straight; valves with a distinct midvein, outside with 3- or 4-forked trichomes and fewer malpighiaceous ones, inside glabrous or rarely sparsely pubescent; style slender, 0.5–2 mm, cylindric; stigma capitate, entire. Seeds oblong, 1.5–2 × 0.4–0.6 mm. Fl. May–Aug, fr. Jun–Sep. 2n = 16.

Moist areas, grasslands; 2100–3800 m. Heilongjiang, Liaoning, Nei Mongol, Xinjiang, Xizang [Kashmir, Kazakhstan, Mongolia, Pakistan, Russia, Tajikistan, Uzbekistan; Europe; introduced in North America].

This is a highly variable species, and many of the Himalayan records, including those from Bhutan, Nepal, and Sikkim, belong to Erysimum benthamii. The record of E. odoratum Ehrlhart in FRPS is likely based on misidentified plants of E. hieraciifolium. The present authors have seen no material of the strictly European E. odoratum from China.


矮糖芥  花川糖芥

Herbs annual or biennial, 3–10 cm tall. Trichomes malpighiaceous mixed with 3(or 4)-forked ones. Stems erect, simple at base. Basal and lowermost cauleine leaves subrosulate; petiole 2–7 mm; leaf blade narrowly obovate, 0.7–3 cm × 2–7 mm, base attenuate, margin sinuate-dentate or dentate, apex acute. Upper leaves subsessile, usually smaller than basal, predominantly with 3-forked trichomes adaxially, entire or dentate. Racemes corymbose, densely flowered, ebracteate, elongated in fruit. Fruiting pedicels divaricate, 2–6 mm, stout, narrower than fruit. Sepals linear-oblong, 4–6 × 0.8–1 cm. Petals yellow, 1.5–2 mm, cylindric; stigma capitate, entire. Seeds oblong, 4.5–6.5 mm; anthers linear-oblong, 1.5–2 mm. Ovules 30–40 per ovary. Fruit narrowly linear, 2.5–7 × 0.8–1 mm, not saccate; style slender, 2–3.5 mm × ca. 1 mm, somewhat torulose, divericate-ascending, straight or curved upward; valves pubescent outside with malpighiaceous and 3(or 4)-forked trichomes, glabrous inside; style stout, 1–2 mm, cylindric, sparsely pubescent; stigma entire or slightly 2-lobed. Mature seeds not seen. Fl. Jun–Jul, fr. Jul–Aug.

Plains, gravelly gorges; 3400–4700 m. W Xizang [Pakistan].


小花糖芥  小花糖芥

Herbs annual, (7–)15–100(–150) cm tall. Trichomes primarily 3- or 4-fid, sometimes mixed with 5-fid ones, malpighiaceous trichomes primarily on stem and pedicels. Stems erect, often branched above, ribbed.
Basal leaves rosulate, withered by fruiting. Middle and upper cauline leaves shortly petiolate or sessile; leaf blade lanceolate, linear, or elliptic-oblong, (1–)2–7(–11) cm × (2–)3–5(–10)–20 mm, base cuneate, margin sub-entire or denticate, rarely sinuate-dentate, apex acute or obtuse. Racemes corymbose, densely flowered, ebracteate, elongated considerably in fruit. Fruiting pedicels divaricate or ascending, 5–13(–16) mm, slender, much narrower than fruit. Sepals narrowly oblong, 2–3.5 × 0.4–0.7 mm, not ascending, 3–7(–9) mm, slender, much narrower than fruit. Fruiting pedicels divaricate or corymbose, densely flowered, ebracteate, elongated considerably in fruit. Fruiting pedicels divaricate or ascending, 5–13(–16) mm, slender, much narrower than fruit. Sepals oblong, 1.8–3 × 0.5–1 mm, not saccate. Petals yellow, narrowly spatulate, 3–5 × 1.5–2 mm, apex rounded; claw distinct, subequaling sepals. Filaments yellow, 2–3.5 mm; anthers oblong, 0.5–0.7 mm. Ovules (20–)30–55 per ovary. Fruit linear, 4-angled, (1–)1.5–2.5(–4) cm × 1–1.3 mm, somewhat torulose, suberect or divaricate-ascending, straight; valves with a distinct midvein, outside with 3–5-forked trichomes, inside densely pubescent; style slender, 0.5–1.5 mm, cylindric; stigma slightly 2-lobed. Seeds oblong, 1–1.5 × 0.4–0.6 mm. Fl. May–Aug. fr. Jun–Sep. 2n = 16.

Dry beds, moist areas; 800–3000 m. Heilongjiang, Jilin, Nei Mongol, Xinjiang [Japan, Korea, Mongolia, Russia; N Africa, Europe, North America]. Records in FRPS of *Erysimum cheiranthoides* from provinces and autonomous regions other than the ones listed above are likely based on misidentified plants of *E. macilentum*. The two species are quite distinct and are easily distinguished by the characters in the above key. Although the present authors have not examined the type of *Erysimum brevifolium*, it is almost certain that the species is a synonym of either *E. cheiranthoides* or *E. macilentum* because in the protologue the interior of the fruit valves was described as densely stellate. It is here placed in the synonymy of *E. cheiranthoides* based on the shape of the petals, which were said to be narrowly obovate; in *E. macilentum* the petals are linear to linear-oblongate.


波齿糖芥 bo chi tang jie

*Erysimum cheiranthoides* Linnaeus var. *sinuatum* Franchet; *E. sinuatum* (Franchet) Handel-Mazzetti; *E. yunnanense* Franchet.

Herbs annual, (9–)20–70(–100) cm tall. Trichomes mainly 3- or 4-fid, sometimes mixed with 5-fid ones, malpighiaceous trichomes primarily on stem and pedicels. Stems erect, often branched above, ribbed. Basal leaves rosulate, withered by fruiting. Lowermost and middle cauline leaves shortly petiolate or sessile; leaf blade linear, lanceolate, or oblong, (1–)2–7(–8) cm × (1.5–)2.5–10(–15) mm, mostly with 3- or 4-fid trichomes, base cuneate, margin sinuate-dentate, dentate, or subentire, apex acute or obtuse; uppermost leaves sessile and often entire. Racemes corymbose, densely flowered, ebracteate, elongated considerably in fruit. Fruiting pedicels divaricate or ascending, 3–7(–9) mm, slender, much narrower than fruit. Sepals narrowly oblong, 2–3.5 × 0.4–0.7 mm, not saccate. Petals bright yellow, linear to linear-oblongate, 3.5–5(–5.5) × 0.3–0.5(–0.7) mm, apex obtuse; claw undifferentiated from limb. Filaments yellow, 2–4 mm; anthers oblong, 0.4–0.7 mm. Ovules (20–)30–60(–70) per ovary. Fruit linear, terete or slightly 4-angled, (1–)2–3.5(–4) cm × 1–1.3 mm, somewhat torulose, suberect or divaricate-ascending, straight; valves with a distinct midvein, outside with 3–5-forked trichomes, inside densely pubescent; style slender, 0.5–1.5 mm, cylindric; stigma slightly 2-lobed. Seeds oblong, (0.6–)0.7–0.9(–1) × 0.4–0.5 mm. Fl. and fr. Mar–Jul.

- Wastelands, roadsides, mountain slopes, fields; 100–2500 m. Anhui, Gansu, Hebei, Henan, Hunan, Jiangsu, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan.

An examination of the types of *Erysimum cheiranthoides*, *E. sinuatum*, and *E. yunnanense* readily reveals that they are conspecific. Both *E. sinuatum* and *E. yunnanense* were recognized in FRPS as distinct species, whereas *E. macilentum* was reduced to the synonymy of *E. cheiranthoides*.


小糖芥 xiao tang jie

Herbs annual, (2–)8–25(–40) cm tall. Trichomes malpighiaceous throughout. Stems erect, simple or branched above. Basal leaves not rosulate, soon withered; lowermost and middle cauline leaves with petioles 3–10(–15) mm, rarely subsessile; leaf blade oblongate-oblong, oblong, or oblong-spatulate, (0.8–)1–4(–5) cm × (1–)2–5(–8) mm, base attenuate or cuneate, margin entire, apex obtuse. Upper cauline leaves sessile, usually smaller than basal. Racemes corymbose, densely flowered, ebracteate, elongated considerably in fruit. Fruiting pedicels erect, 0.5–1.5(–2) mm, stout, about as wide as fruit. Sepals linear-oblong, 2.2–3 × ca. 0.5 mm, not saccate. Petals yellow, linear, 3–4(–5) × 0.3–0.6 mm, apex obtuse; claw not differentiated from limb. Filaments yellow, 1.5–2.5(–3) mm; anthers oblong, ca. 0.5 mm. Ovules 16–40 per ovary. Fruit narrowly linear, terete, (1.3–)1.7–2.2(–2.5) cm × 0.7–0.9 mm, somewhat torulose, erect or ascending, straight; valves with obscure midvein, outside with malpighiaceous trichomes, inside glabrous; style stout, 0.5–1(–1.5) mm, cylindric, sparsely pubescent; stigma entire. Seeds oblong, 0.8–0.9 × 0.4–0.5 mm. Fl. May–Jun, fr. Jun–Jul. 2n = 18.

Grasslands; 700–4000 m. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].


粗梗糖芥 cu geng tang jie

*Erysimum rigi dul de Candolle.

Herbs annual, (4–)15–45(–70) cm tall. Trichomes malpighiaceous, mixed with fewer 3-forked ones. Stems erect, simple or branched at base. Basal and lowermost cauline leaves subrosulate, often withered by fruiting; petiole (0.3–)0.5–2(–3) cm; leaf blade linear,
narrowly oblanceolate, elliptic, or oblong, flat, (1–)2–8(–11) cm, (2–)5–10(–15) mm, base attenuate, margin sinuate, coarsely dentate, denticulate, or repand, apex acute. Upper leaves sessile, usually smaller than basal, entire or denticulate. Racemes corymbose, densely flowered, ebracteate, elongated considerably in fruit. Fruiting pedicels divaricate, 2–4 mm, stout, about as wide as fruit. Sepals linear-oblong, 4–6 × 0.7–1 mm.

Petals yellow, narrowly spatulate, 6–8 × 1.5–2 mm, apex rounded; claw subequaling sepals. Filaments yellow, 4–6 mm; anthers linear, 0.8–1.3 mm. Ovules (40–)50–80(–90) per ovary. Fruit narrowly linear, 4-angled, (2–3)–8(–10) cm × 1.5–2 mm, somewhat torulose, widely spreading or divaricate-ascending, straight or curved upward; valves with a distinct midvein, outside with malpighiaceous and fewer 3-forked trichomes on the outside, inside pubescent; style stout, 1–4 mm, cylindrical or subclavate, sparsely pubescent; stigma slightly 2-lobed. Seeds oblong, 1.1–1.5 × 0.6–0.7 mm. Fl. Apr–Jul. fr. May–Sep. 2n = 14.

Disturbed sites, roadsides, fields, waste places, pastures; 200–1400 m. Liaoning, Xinjiang [Afghanistan, Kashmir, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; N Africa, SW Asia, Europe].


棱果糖芥  lèng guǒ táng jiè
Cheiranthus siliculosus Marschall von Bieberstein, Fl. Taur.-Caucas. 2: 121. 1808; Syrenia siliculosa (Marschall von Bieberstein) Andrzewski.

Herbs biennial or perennial, 30–90(–100) cm tall. Trichomes malpighiaceous throughout, mixed with 3-forked ones on calyx. Stems erect, often branched at base and above. Basal leaves rosulate, often persisting, petiolate; leaf blade filiform to linear, rarely linear-oblanceolate, 1.5–8 cm × 1–2(–5) mm, longitudinally folded, base narrowly attenuate, margin entire, apex acute. Cauline leaves similar to basal. Racemes corymbose, densely flowered, ebracteate or rarely lowermost few flowers bracteate, elongated considerably in fruit. Fruiting pedicels ascending or divaricate-ascending, (2–)4–6 mm, stout, narrower than fruit. Sepals oblong-linear, (6–)7–9(–10) × 1–2 mm, united, persistent well after fruit maturity, strongly saccate. Petals bright yellow, obovate or broadly spatulate, (1.1–)1.4–1.8(–2) cm × 5–8 mm, apex rounded; claw distinct, subequaling sepals. Filaments yellow, 6–10 mm; anthers linear, 2–3 mm. Ovules 50–100 per ovary. Fruit oblong to oblong-linear, strongly 4-angled, slightly angustiseptate, (5–)7–10(–14) × 2–3 mm, smooth, erect and often appressed to rachis, straight; valves with a prominent midvein and slightly winged keel, outside with transversely oriented malpighiaceous trichomes, inside glabrous; style slender, (4–)5–10(–12) mm, cylindrical; stigma strongly 2-lobed, with lobes often divergent. Seeds oblong, 1.1–1.4 × 0.7–0.9 mm. Fl. May–Jun. fr. Jun–Jul. 2n = 14.

Sandy areas, dunes; 400–1400 m. Xinjiang [Kazakstan, Russia, Turkmenistan].

The record of Erysimum vassilczewkii Polatschek in FRPS (as Syrenia macrocarpa Vassilczenko, not E. macrocarpum (Ruprecht) Stevens & Trautvetter (1883)) is very likely based on misidentified plants of E. siliculosum. The record of E. sessiliflorum R. Brown in Fl. Xinjiang. (2(2): 199. 1995, as Syrenia sessiliflora (R. Brown) Ledebour) is based on misidentified plants of E. siliculosum with slightly shorter fruiting pedicels.

84. PYCNOPLINTHOPSIS Jafri, Pakistan J. Bot. 4: 73. 1972.

假簇芥属  jiā cù jiè shū
Herbs perennial, cespitose, scapose, with simple or many-branched caudex. Trichomes denticrict or forked, occasionally with few simple ones. Basal leaves petiolate, not fleshy, forming well-defined rosettes; petiole caducous, thin; leaf blade simple, distally coarsely dentate or incised. Cauline leaves absent. Flowers solitary on slender to stout, apically branched or rarely unbranched caudex to 2 cm in diam. Petiole (0.2–)0.5–3(–5) cm, thin, flattened, not persistent; leaf blade spatulate or oblanceolate, rarely obovate, (0.5–)1–4(–4.5) × 0.4–1.6 cm, thin, glabrous or distal half densely pubescent adaxially with forked or denticrict, often crisped trichomes to 0.6 mm, base subattenuate or cuneate, margin subincised or deeply dentate distally


假簇芥  jiā cù jiè
Pegaeophytion bhutanicum H. Hara; Pycnoplinthopsis minor Jafri.

Herbs with slender to stout, apically branched or rarely unbranched caudex to 2 cm in diam. Petiole (0.2–)0.5–3(–5) cm, thin, flattened, not persistent; leaf blade spatulate or oblanceolate, rarely obovate, (0.5–)1–4(–4.5) × 0.4–1.6 cm, thin, glabrous or distal half densely pubescent adaxially with forked or denticrict, often crisped trichomes to 0.6 mm, base subattenuate or cuneate, margin subincised or deeply dentate distally
and with (3–)4–8(–12) teeth on each side, apex acute. Fruiting pedicels slender, (0.5–)1–2.5(–4) cm, strongly recurved, much shorter than leaves. Calyx (2.5–)3.5–5 mm, membranous, persisting with fruit, sometimes splitting as fruit develops; lobes deltoid-ovate, 1.5–3.5 × 1–2.5 mm. Petals white, broadly obovate, (0.6–)0.8–1.3 cm × (4–)2.5–8 mm, apex subemarginate; claw obscure, rarely to 1 mm. Filaments slender, median pairs 2–3.5 mm, lateral pair 1.5–2 mm; anthers ovate, ca. 0.4 mm. Fruit linear or oblong, 5–11 × 2–3 mm; valves not veined, papery; style 0.5–1 mm. Seeds oblong, light brown, 1–1.4 × 0.6–8 mm. Fl. May–Jul, fr. Aug–Sep.

Stony areas at streamsides, wet rocky crevice, open scree, mossy areas below waterfalls, wet rocky ledges; 3000–4500 m. Xizang [Bhutan, India, Nepal, Sikkim].

The above first record of *Pycnoplinthopsis bhutanica* from China is based on Ludlow & Sherriff 2735 (BM). Another collection, Ludlow & Sherriff 20312 (BM, TI), was collected in Bhutan near the border with Xizang.

**85. PYCNOPLINTHUS** O. E. Schulz in Engler, Pflanzenr. 86(IV. 105): 198. 1924.

*cu jie shu*

Herbs perennial, cespitose, scapose, pulvinate; caudex simple or many branched. Trichomes absent. Stems reduced to tiny portions added annually to caudex apex. Basal leaves petiolate, somewhat fleshy, rosulate; petiole persistent, subcorky; leaf blade simple, entire. Cauline leaves absent. Flowers solitary borne on long pedicels originating from center of rosette. Fruiting pedicels slender, terete, ascending, straight or reflexed. Sepals united into campanulate calyx, persistent, not saccate; lobes ovate or deltoid. Petals white or pink, longer than sepals; blade broadly obovate, rounded at apex; claw nearly as long as calyx. Stamens 6, tetradynamous; filaments not dilated at base; anthers oblong, obtuse at apex. Nectar glands 4, lateral, 1 on each side of lateral stamen, or 2, semiannular, intrastaminal; median glands absent. Ovules 6–12 per ovary. Fruit dehiscent siliques, oblong or linear, latiseptate, sessile; valves papery, navicular, smooth, with a prominent midvein and marginal veins; replum rounded; septum complete, membranous, with a central band and two longitudinal veins; style less than 1 mm; stigma capititate, entire. Seeds uniseriate, wingless, oblong, plump; seed coat obscurely reticulate, not mucilaginous when wetted; cotyledons incumbent.

One species: China, Kashmir.


*cu jie*

*Braya uniflora* J. D. Hooker & Thomson, J. Proc. Linn. Soc., Bot. 5: 168. 1861; *Hesperis uniflora* (J. D. Hooker & Thomson) Kuntze; *Sisymbrium uniflorum* (J. D. Hooker & Thomson) Fournier.

Herbs with slender to stout, apically branched or rarely unbranched caudex to 1.5 cm in diam., glabrous throughout. Petiole (0.3–)0.6–1.7(–2.5) cm, expanded at base, to 4 mm wide, persistent, stramineous, covering caudex and its branches; leaf blade linear, linear-oblancoate, or linear-lanceolate, rarely oblancoate, (0.5–)1–2(–2.5) cm × (0.5–)1–2.5 mm, somewhat fleshy, base subattenuate, margin entire, apex obtuse or acute. Fruiting pedicels slender, 1.5–3.5(–4) cm, ascending or strongly recurved, longer than leaves. Calyx 3–4 mm; lobes deltoid-ovate, 1–1.5 × 1–1.5 mm, subacute. Petals white or pink, obovate, 6–8 × 1.8–2.2 mm, apex rounded; claw 2.5–4 mm. Filaments slender, median pairs 2.5–3.5 mm, lateral pair 2–2.5 mm; anthers oblong, 0.6–1.1 mm. Fruit linear or narrowly oblong, (4–)7–11(–13) × 1.5–2.5(–3) mm; valves prominently veined, papery; style 0.3–0.6(–1) mm. Seeds oblong, light brown, 1.2–1.7 × 0.6–1 mm. Fl. Jun-Jul, fr. Jul–Aug.

Wet places, sandy river beds, sandy areas among gravel, wet grassy areas; 3600–5200 m. Gansu, Qinghai, Xinjiang, Xizang [Kashmir].


*bai ma jie shu*

Herbs perennial, scapose, pulvinate, with a well-developed and few- to many-branched caudex covered with leaves or leaf remains of previous years. Trichomes simple and stalked, 1-forked, restricted to leaves. Stems absent. Basal leaves petiolate, rosulate, simple, entire, persistent, with stramineous, thick, flattened petioles. Cauline leaves absent. Racemes 2- or 3-flowered and ebracteate, or flowers solitary on short pedicels originating from axils of rosette leaves. Fruiting pedicels slender, erect or ascending, often hidden among basal leaves. Sepals oblong, base of lateral pair not saccate, margin membranous. Petals pink; blade spatulate, apex obtuse; claw slightly differentiated from blade, subequaling sepals. Stamens 6, slightly tetradynamous; filaments not dilated at base; anthers oblong, obtuse at apex. Nectar glands confluent and subtending bases of all stamens; median glands present. Ovules 6–12 per ovary.

Fruit linear siliques, strongly latiseptate, sessile; valves with an obscure midvein, smooth, longitudinally striate; replum rounded; septum complete, membranous, with a distinct midvein; style slender, to 1 mm; stigma capitate, entire. Seeds uniseriate, wingless, oblong, slightly flattened; seed coat minutely reticulate, not mucilaginous when wetted; cotyledons accumbent.

- Two species.
  1a. Leaves ovate or oblong, densely pubescent all over; flowers solitary; ovules 6–8 per ovary; Yunnan. *B. pulvinata*
  1b. Leaves narrowly linear, glabrous except for ciliate petiole margin and a tuft on leaf apex; flowers mostly in 2- or 3-flowered racemes; ovules 10–12 per locule; Qinghai.

1. Baimashania pulvinata
   白马芥 bai ma jie
   Herbs 0.5–2 cm tall; caudex many branched, to 3 mm in diam. Trichomes simple, to 1 mm, mixed with fewer, forked stalked ones, restricted to leaves. Basal leaves rosulate; petiole 2–5 mm, expanded base 0.5–1 mm wide, ciliate, persistent; leaf blade ovate or oblong, 2–4 × 1–2 mm, somewhat fleshy, densely pilose throughout, base subattenuate, margin entire, apex obtuse. Flowers solitary. Fruiting pedicels slender, 3–5 mm, ascending, glabrous. Sepals oblong, 1.5–2.5 × ca. 1 mm. Petals pink, spatulate, 3–4 × 1–1.5 mm; claw 1.5–2 mm. Filaments 2–2.5 mm; anthers 0.3–0.5 mm. Ovules 6–8 per ovary. Fruit linear, 4–8 × ca. 1.3 mm; valves longitudinally striate, without a distinct midvein; style 0.4–1 mm. Seeds 1–1.5 × 0.6–0.9 mm. Fl. Jun–Jul, fr. Jul–Aug.

- Moist gravelly meadows, limestone rock crevices; 4200–4600 m. NW Yunnan (Dêqên Xian: Baima Shan).

2. Baimashania wangii
   王氏白马芥 wang shi bai ma jie
   Herbs 1–1.5 cm tall; caudex few branched, to 6 mm in diam. Trichomes simple, to 1 mm, restricted to petiole margin and leaf apices, these mixed at leaf apex with fewer, forked stalked ones. Basal leaves rosulate; petiole 2–5 mm, expanded base 0.5–1.5 mm wide, ciliate; leaf blade narrowly linear, 4–15 × 0.5–1.5 mm, somewhat fleshy, base attenuate, margin entire, apex obtuse, with a tuft of trichomes. Flowers mostly in 2- or 3-flowered racemes, or solitary. Fruiting pedicels slender, 3–5 mm, ascending, glabrous. Flowers not seen. Ovules 10–12 per ovary. Fruit linear, 0.7–1.3 cm × ca. 1 mm; valves not torulose; style 0.4–0.7 mm. Mature seeds not seen. Fr. Jun.

- Under rocks; ca. 4100 m. Qinghai.

87. ALLIARIA
   Heister ex Fabricius, Enum. 161. 1759.
   葱芥属 cong jie shu
   Herbs annual or biennial, rarely short-lived perennial. Trichomes absent or simple. Stems erect, sometimes decumbent. Basal leaves long petiolate, rosulate, simple, crenate, dentate, or sinuate. Cauline leaves petiolate, dentate. Racemes several flowered, ebracteate, bracteate throughout, or only basally bracteate. Fruiting pedicels slender or thickened, narrower than or as thick as fruit, terete. Sepals oblong, erect, glabrous, base of lateral pair not saccate. petals white, longer than sepal; blade oblanceolate, apex obtuse; claw obscurely differentiated from blade. Stamens 6, slightly tetradynamous; filaments not dilated at base; anthers 0.3–0.5 mm. Ovules 4–20 per ovary. Fruit dehiscent siliques, linear or oblong, terete or 4-angled, sessile; valves with a prominent midvein and distinct marginal veins, glabrous or scabrous, torulose; replum rounded; style obsolete or distinct and to 6 mm; stigma capitate. Seeds uniseriate, wingless, oblong, plump; seed coat longitudinally striate, not mucilaginous when wetted; cotyledons incumbent.

Two species: one endemic to the Caucasus, the other native to SW Asia and Europe and naturalized elsewhere as a cosmopolitan weed.

   葱芥 cong jie
   *Arabis petiolata* Marschall von Bieberstein, Fl. Taur.-Caucas. 2: 126. 1808; *Alliaria officinalis* Andrzejewski ex Marschall von Bieberstein; *Erysimum alliaria* Linnaeus; *Sisymbrium alliaria* (Linnaeus) Scopoli.

   Herbs biennial, with garlicy smell when crushed. Stems erect, (15–)30–90(–130) cm tall, simple or branched above, glabrous or pilose basally with trichomes to 1.5 mm. Basal leaves rosulate, withered by fruiting; petiole 3–10(–16) cm; leaf blade reniform or cordate, (0.6–1.5–5(–7) cm wide, shorter in length, base cordate, margin crenate or dentate, glabrous or pilose. Cauline leaves with much shorter petioles, ovate, cordate, or deltoid, to 15 × 15 cm, base cordate or truncate, margin acutely to obtusely toothed, apex acute. Racemes ebracteate or rarely lowermost flowers bracteate. Fruiting pedicels divaricate or ascending, (2–)3–10(–15) mm, nearly as thick as fruit. Sepals oblong, (2–)2.5–3.5(–4.5) × 0.7–1.5 mm. Petals white, oblanceolate, (2.5–)4–8(–9) × (1.5–)2–3(–3.5) mm, attenuate to clawlike base. Filaments 2–3.5(–4.5) mm; anthers oblong, 0.7–1 mm. Fruit linear, (2–)3–7(–8) cm × 1.2–
2.5 mm, subtorulose, quadrangular or subterete, divaricate-ascending; valves glabrous; style (0.2–)1–2(–3) mm. Seeds brown or black, narrowly oblong, 2–4.5 × 0.7–2 mm, longitudinally striate. Fl. Apr–Jun, fr. May–Jul. 2n = 36, 42.

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**88. TAPHROSPERMUM** C. A. Meyer in Ledebour, Fl. Altaic. 3: 172. 1831.

### 沟子荠属 gou zi qi shu

**Glaribraya** H. Hara.

Herbs biennial or perennial. Trichomes simple, rarely absent. Roots often fleshy, narrowly fusiform, basally with a whorl of caducous or persistent scalelike leaves. Stems prostrate, ascending, or erect. Basal leaves petiolate, not rosulate, simple, entire. Cauline leaves petiolate, entire, lowermost whorled or alternate. Racemes many flowered, bracteate throughout or rarely only basally. Fruiting pedicels ascending or divaricate, straight or recurved. Sepals oblong, erect, glabrous or subapically pubescent, base of lateral pair not saccate. Petals white, longer than sepals; blade obovate or broadly so, apex rounded or emarginate; claw obscure. Stamens 6, subtetradynamous; filaments of median pairs dilated at base; anthers ovate, apex rounded. Nectar glands confluent, subtending bases of all stamens. Ovules to 12 per ovary. Fruit dehiscent siliques or silicles, cylindric, narrowly conical, or obcordate, ovate, or oblong, angustiseptate, terete, or latiseptate, sessile or subsessile; valves distinctly veined, glabrous or papillate, torulose or smooth; replum widely flattened throughout or only basally; style complete, rarely absent or perforate and reduced to a rim; style to 3 mm; stigma capitate, entire. Seeds uniseriate or biseriate, wingless, oblong, plump or flattened; seed coat foveolate or papillate, not mucilaginous when wetted; cotyledons incumbent, oblique, or accumbent.

Seven species: Bhutan, China, India, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Russia, Tajikistan; six species (three endemic) in China. *Taphrospermum platypetalum* Schrenk, which is endemic to Soongaria in Kazakhstan, might also be present in neighboring Xinjiang. It has racemes bracteate only basally, glabrous sepals, and cylindric fruit.

1a. At least some of the lowermost cauline leaves verticillate, other leaves opposite and/or alternate.

2a. Plants densely hirsute throughout with trichomes 0.5–1 mm ................................ ...................... 6. *T. tibeticum*

2b. Plants glabrous or puberulent with papillae 0.05–0.2 mm.

3a. Petals broadly obovate, (7–)8–9(–10) × (3.5–)4.5–6 mm; seeds foveolate; sepals caducous, margin ciliolate; sepal absent ................................................................ ................................ ... 4. *T. verticillatum*

3b. Petals narrowly obovate, 3–3.5 × 1.5–2 mm; seeds papillate; sepals persistent, margin not ciliolate; sepal complete ........................................................................................................... 5. *T. lowndesii*

1b. All leaves alternate.

4a. At least some leaves dentate; fruit oblong or ovate, latiseptate ................................. 2. *T. himalaicum*

4b. Leaves entire or rarely repand; fruit narrowly conical or obcordate, angustiseptate at least basally.

5a. Fruit obcordate, not torulose, (4–)5–7 mm wide; septum absent; cotyledons accumbent ..... 3. *T. fontanum*

5b. Fruit narrowly conical, torulose, (1.8–)2–2.5(–3) mm wide; septum complete or rarely reduced to a rim; cotyledons incumbent ................................ .............................................................. 1. *T. altaicum*

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**沟子荠 gou zi qi**


Herbs (4–)10–23(–30) cm tall, with narrowly fusiform roots, glabrous except for fruit. Stems prostrate, ascending, or erect, few to many from base. Leaves not rosulate, somewhat fleshy; petioles of basal and lowermost cauline leaves 1–4(–9) cm; leaf blade suborbicular, subcordate, ovate, or oblong, (0.5–) 1–2.5 × (0.4–)0.7–2 cm, gradually smaller upward, base obtuse or subcordate, margin entire or rarely repand, apex obtuse or rounded. Racemes densely flowered, elongated in fruit, bracteate throughout; bracts leafy. Fruiting pedicels glabrous, slender, strongly recurved or nearly forming a loop, (3–)5–8(–12) mm. Sepals oblong, 0.8–1.5(–2) × 0.5–0.8(–1) mm, persistent or caducous, membranous at margin. Petals white, obovate, (1.5–)2–2.5(–3) × (0.5–)0.8–1.5 mm, apex rounded or slightly emarginate, clawlike base to 0.5 mm. Filaments 0.8–1.2 mm, median pairs dilated, to 0.3 mm wide at base; anthers ovate, 0.2–0.3 mm. Ovules 6–10(–12) per ovary. Fruit narrowly conical, strongly torulose, angustiseptate at least basally, (4–)7–10 (–12) mm, base cardate or truncate and (1.8–)2–2.5(–3) mm wide, apex acuminate; valves membranous, sparsely puberulent
with papillae to 0.3 mm, rarely subglabrous, distinctly veined; replum widely expanded at base, narrowly flattened elsewhere; sepalum complete or rarely perforate and reduced to a rim, membranous; style slender, (0.5–)0.7–1.2(–1.5) mm. Seeds brown, oblong, plump, 1.4–1.8 × 0.8–1.2 mm; cotyledons incumbent or oblique. Fl. Jun–Aug, fr. Jul–Sep.

Mountain meadows, forest margins, gravelly ridges, open slopes, roadsides; 2000–4000 m. Gansu, Qinghai, Xinjiang, Xizang [Kazakhstan, Kyrgyzstan, Mongolia, Russia, Tajikistan].


须弥沟子荠 xu mi gou zi qi


Herbs (2–)5–10(–15) cm tall, glabrous throughout except for fruit and calyx. Root narrowly fusiform-linear, fleshy, apex with minute scalelike leaves. Stems solitary from fleshy root then producing a rosette with prostrate or rarely ascending to erect branches. Leaves not rosalate; petioles of basal and lowest cauline leaves (0.5–)1–2.5(–4) cm, gradually shorter upward; leaf blade broadly ovate or oblong, 4–10(–15) × 2–6(–10) mm, gradually reduced in size upward, base obtuse or subcordate, margin lobed, toothed, repand, or entire, apex obtuse or rounded. Racemes densely flowered, elongated considerably or not elongated in fruit, bracteate throughout; bracts leafy, representing all cauline leaves. Fruiting pedicels glabrous, slender, straight or strongly recurved and fruit appearing geocarpic, 4–9(–13) mm. Sepals oblong, 1.2–2 × 0.8–1 mm, persistent, membranous at margin, rarely pubescent distally. Petals white, obovate or spatulate, 2.5–4(–6) × 1.5–2.5(–3.5) mm, attenuate to base, apex slightly emarginate. Filaments white, 1.5–2 mm, median pairs dilated at base; anthers ovate, 0.2–0.4 mm. Ovules 4–12 per ovary. Fruit ovoid or oblong, latiseptate, not torulose, (2–)4–8(–10) × (1.5–)2–3.4(–4) mm, obtuse at both ends; valves membranous, sparsely puberulent with papillae to 0.5 mm, rarely subglabrous, obscurely veined; replum widely expanded throughout; sepalum absent; style slender, 0.5–1(–1.2) mm. Seeds (2–)6–8(–12), brown, oblong, 1.5–1.8 × 0.8–1 mm; cotyledons obliquely accumbent. Fl. Jun–Aug, fr. Jul–Sep.

Rocky grounds on exposed slopes, scree, deep rich soils, muddy slopes, streamssides, sandy beds, moist granite ledges, alpine pastures and dwarf scrub, Kobresia turf, under Juniperus trees; 3600–5200 m. Qinghai, Xizang [Bhutan, India, Nepal].


泉沟子荠 quan gou zi qi

Herbs (2–)5–14(–20) cm tall, sparsely to moderately pubescent, rarely glabrous. Root narrowly fusiform-linear, fleshy, base with minute scalelike leaves usually less than 2 mm. Stems solitary from fleshy root then producing a few prostrate or rarely ascending or erect branches, sparsely to densely puberulent with retrorse to spreading trichomes to 0.5 mm, rarely glabrous. Leaves not rosalate; petioles of basal and lowest leaves (0.3–)0.6–2(–3) cm, gradually shorter upward; leaf blade ovate or oblong, (2–)4–10(–13) × (1–)2–4(–7) mm, gradually reduced in size upward, base obtuse or cuneate, margin entire or repand, apex obtuse or rounded. Racemes densely flowered, elongated slightly to considerably in fruit, bracteate throughout; bracts leafy, smaller than cauline leaves. Fruiting pedicels glabrous or pubescent adaxially, slender, straight or curved, (1.5–)3–10(–20) mm. Sepals oblong, 1.5–3 × 0.8–1.5 mm, persistent, membranous at margin, sparsely ciliate near apex with trichomes ca. 0.05 mm, sparsely pubescent distally with trichomes to 0.5 mm. Petals white or lavender, obovate or spatulate, 2–6 × (0.5–)0.7–3.5(–4) mm, attenuate to base, apex slightly emarginate. Filaments white or lavender, 1.5–3 mm, dilated at base; anthers ovate, 0.3–0.4 mm. Ovules 4–8 per ovary. Fruit broadly to narrowly obcordate, strongly to slightly angustiseptate, not torulose, (2–)3–5 × (4–)5–7 mm, obtuse or cuneate at base; valves membranous, sparsely to densely puberulent with trichomes to 0.5 mm, rarely subglabrous, often distinctly veined, smooth or tuberculate; replum widely and evenly expanded throughout; sepalum absent; style slender, (1–)2–3 mm. Seeds 3–8, brown, oblong, foveolate, compressed, 1.2–2.2 × 0.8–1.5 mm; cotyledons accumbent.

Slopes with dwarf bushes, disturbed alpine meadows, degraded alpine pastures, moist turf, Kobresia turf and cushions, alpine permafrost swamps, damp shingle by rivers, open gravel, slate and schist screes; (3200–)3600–5300 m. Gansu, Qinghai, Sichuan, Xinjiang, Xizang.

1a. Petals 4.5–6 × 2.5–3.5(–4) mm; fruit valves glabrous or sparsely puberulent, smooth, not tuberculate; seeds (1.5–)1.8–2.2 × (1.1–)1.2–1.5 mm ............... 3a. subsp. fontanum

1b. Petals 2–3 × (0.5–)0.7–1.2(–1.4) mm; fruit valves densely or rarely sparsely puberulent, often tuberculate; seeds 1.2–1.6 × 0.8–1.1 mm ... 3b. subsp. microspermum

3a. Taphrospermum fontanum subsp. fontanum

泉沟子荠(原亚种) quan gou zi qi (yuan ya zhong)


Sepals 2.5–3 mm; petals 4.5–6 mm, 2.5–3.5(–4) mm wide; filaments 2.5–3 mm. Fruit valves glabrous or sparsely puberulent, smooth, not tuberculate. Seeds 3 or 4 per fruit, (1.5–)1.8–2.2 × (1.1–)1.2–1.5 mm. Fl. Jun–Sep, fr. Jul–Oct.

小籽沟子荠 xiao zi quan gou zi qì
Dilophia fontana Maximowicz var. trichocarpa W. T. Wang.

Sepals 1.5–2 mm; petals 2–3 × (0.5–)0.7–1.2(–1.4) mm; filaments 1.5–2 mm. Fruit valves densely or rarely sparsely puberulent, often tuberculate. Seeds 2–8 per fruit, 1.2–1.6 mm × 0.8–1.1 mm. Fl. Jul–Aug. fr. late Jul–Sep.

3c. Taphrospermum verticillatum (Jeffrey & W. W. Smith) W. W. Smith; verticillata Braya

Herbs (4–)6–15(–23) cm tall, sparsely to moderately densely flowered, elongated slightly in fruit, bracteate throughout; bracts leafy, smaller than cauline leaves; rachis glabrous or papillate. Petioles 2–5 mm, gradually shorter upward; leaf blade spatulate, 3–15 × 1–5 mm, gradually reduced in size upward, base attenuate, margin entire, apex retuse or rounded. Racemes densely flowered, elongated considerably in fruit, bracteate throughout; bracts leafy, smaller than cauleine leaves; rachis glabrous or papillate. Sepals oblong, 1.5–2.5 × ca. 1 mm, persistent well after fruit dehiscence, distal margin and apex membranous, not ciliolate, glabrous or papillate. Petals white, narrowly obovate, 3–5 × 1.5–2 mm, attenuate to clawlike base to 1.5 mm, apex obtuse. Filaments white, 1.5–2.5 mm; anthers broadly ovate, 0.2–0.3 mm. Ovules 4–6 per ovary. Fruiting pedicels glabrous, slender, straight or curved, 4–8 mm. Fruit oblong or narrowly so, strongly latiseptate, not torulose, 0.7–1.5 cm × 3–5 mm, obtuse or cuneate at base; valves membranous, glabrous, often distinctly veined, smooth; replum widely and evenly expanded throughout; septum complete, membranous; style slender, (1–)2–3 mm. Seeds 3–8, brown, oblong, foveolate, compressed, 1.8–2.2 × 1.2–1.4 mm; cotyledons accumbent. Fl. Jun–Jul, fl. Jul–Aug.


轮叶沟子荠 luán yè gōu zi qì
Cardamine tibetica Maximowicz var. maximowiczii B. Y. Wang.

Sepals 1.5–2 mm; petals 2–3 × (0.5–)0.7–1.2(–1.4) mm; filaments 1.5–2 mm. Fruit valves densely or rarely sparsely puberulent, often tuberculate. Seeds 2–8 per fruit, 1.2–1.6 mm × 0.8–1.1 mm. Fl. Jul–Aug. fr. late Jul–Sep.


郎氏沟子荠 láng shì gōu zi qì

Herbs 5–12 cm, glabrous throughout or puberulent with papillae 0.05–0.2 mm. Root slender, slightly fleshy, base with a whorl of oblong scalelike leaves ca. 2.5 × 0.5–1 mm. Stems erect, 1–3 from root, lowermost leafless part 2–9 cm. Leaves glabrous, fleshy, lowermost cauleine ones verticillate, others alternate; petioles 2–5 mm, gradually shorter upward; leaf blade spatulate, 3–15 × 1–5 mm, gradually reduced in size upward, base attenuate, margin entire, apex retuse or rounded. Racemes densely flowered, elongated considerably in fruit, bracteate throughout; bracts leafy, smaller than cauleine leaves; rachis glabrous or papillate. Sepals oblong, 1.5–2.5 × ca. 1 mm, persistent well after fruit dehiscence, distal margin and apex membranous, not ciliolate, glabrous or papillate. Petals white, narrowly obovate, 3–5 × 1.5–2 mm, attenuate to clawlike base to 1.5 mm, apex obtuse. Filaments white, 1.5–2.5 mm; anthers broadly ovate, 0.2–0.3 mm. Ovules 4–6 per ovary. Fruiting pedicels glabrous, slender, straight or curved, 4–8 mm. Fruit oblong or narrowly so, strongly latiseptate, not torulose, 0.7–1.5 cm × 3–5 mm, obtuse or cuneate at base; valves membranous, glabrous, often distinctly veined, smooth; replum widely and evenly expanded throughout; septum complete, membranous; style slender, (1–)2–3 mm. Seeds 3–8, brown, oblong, compressed, 1.9–2.1 × 1.2–1.4 mm, with dense papillae 0.1–0.2 mm; cotyledons accumbent. Fl. Jul, fr. Jul–Aug. Scape slopes; 5000–5200 m. Xizang [Nepal].


西藏沟子荠 xī zhàng gōu zi qì

Herbs, 4–12 cm, densely hisrute with simple trichomes 0.5–1 mm. Root conical, slightly fleshy, base with a whorl of oblong, scalelike leaves to 5 × 2 mm. Stems erect, 1–3 from fleshy root, lowermost leafless part 1–9 cm. Leaves densely hisrute, not fleshy, lowermost cauleine verticillate, others opposite or alternate; petioles 3–5 mm, gradually shorter upward, densely hisrute; leaf blade oblong or spatulate, 4–7 × 1–3 mm, gradually reduced in size upward, base attenuate, margin entire or 2-toothed, apex retuse. Racemes densely flowered, elongated slightly in fruit, bracteate throughout; bracts leafy, smaller than cauleine leaves,

hirsute; rachis retrorsely or spreading hirsute. Fruiting pedicels hirsute, slender, straight, 3–6 mm. Sepals oblong, 1.7–2.5 × 1–1.5 mm, distal margin and apex membranous, ciliolate with trichomes to 0.1 mm, densely hirsute outside with trichomes ca. 0.5 mm. Petals white, broadly obovate, 4.5–5 × 2.5–3 mm, attenuate to clawlike base to 1.5 mm, apex emarginate. Filaments white, 2–2.5 mm, slightly dilated at base; anthers broadly ovate, ca. 0.5 mm. Ovules 4–6 per ovary. Immature fruit ovate, apparently latiseptate; valves membranous, densely puberulent; replum widely and evenly expanded throughout; septum absent; style subconical, 1–1.5 mm. Immature seeds oblong, ca. 1 mm, foveolate. Fl. Jun–Jul.

- Stony slopes, turf, earth slides, shale along streamsides; 4200–5000 m. Xizang.

89. EUTREMA R. Brown, Chlor. Melvill. 9. 1823.

山薑属 shan yu cai shu

Wasabia Matsumura.

Herbs perennial, rhizomatous or with a caudex. Trichomes absent or simple. Stems erect, ascending, or decumbent, simple or branched apically. Basal leaves petiolate, rosulate, simple, entire or palmately lobed, palmately veined. Cauline leaves petiolate or sessile and cuneate or auriculate, pinnately or palmately veined, entire, dentate, or crenate; ultimate veins ending or not with apiculate callosities. Racemes ebracteate or rarely bracteate throughout, elongated considerably or not elongated in fruit. Sepals ovate or oblong, base of lateral pair not saccate. Petals white or rarely pink; blade spatulate or rarely obovate, apex obtuse; claw absent. Stamens 6, slightly tetrady namous; filaments slightly dilated at base; anthers ovate or oblong, obtuse at apex. Nectar glands confluent and subtending bases of all stamens; median glands present. Ovules 2–10 per ovary. Fruit dehiscent, siliques or silicles, linear, oblong, ovoid, or lanceolate, terete or slightly 4-angled, sessile or shortly stipitate; valves with an obscure or prominent midvein, smooth or torulose; replum rounded; septum complete or perforated, translucent, veinless; style obsolete or distinct and to 3 mm; stigma capitate, entire. Seeds uniseriate, wingless, oblong, plump; seed coat obscurely reticulate, not mucilaginous when wetted; cotyledons incumbent.

Nine species: primarily C and E Asia and Himalayas, one species extending into North America; seven species (one endemic, one introduced) in China.

1a. Middle and upper cauline leaves sessile, pinnately veined.

2a. Main infructescence 0.2–2(–3.5) cm, often subumbellate; plants 2–15(–25) cm tall; petals 2–3.5 mm; sepals often persistent to fruit maturity ................................................................. 1. E. heterophyllum

2b. Main infructescence 10–20(–40) cm tall, lax racemes; plants 30–110 cm tall; petals 4–5 mm; sepals caducous.

3a. Plants glabrous throughout; uppermost leaves cuneate at base; fruit 5–8(–10) mm ........ 2. E. integrifolium

3b. Plants sparsely to densely pilose at least along midvein and leaf margin; uppermost leaves auriculate or amplexicaul at base; fruit (8–)12–20(–25) mm ...................................................... 3. E. himalaicum

1b. All leaves petiolate, palmately veined.

4a. Fruiting pedicels erect or ascending; ultimate leaf veins not ending in apiculate callosities; fruit lanceolate, ovoid, or oblong, not torulose, often subappressed to rachis, slightly 4-angled ...................... 4. E. deltoideum

4b. Fruiting pedicels divaricate or reflexed; ultimate leaf veins ending in apiculate callosities; fruit usually linear, torulose, not appressed to rachis, terete.

5a. Rhizomes fleshy; petals 6–8(–9) mm; sepals 3–4 mm; gynophore (1–)2–5 mm; filaments 3.5–5 mm ................................................................................................................. 7. E. wasabi

5b. Rhizomes not fleshy; petals 3.5–5(–6) mm; sepals 1.5–2 mm; gynophore absent or obsolete; filaments 1.5–2 mm.

6a. Racemes bracteate throughout ......................................................................................... 6. E. tenue

6b. Racemes ebracteate or only lowermost few flowers bracteate ............................................. 5. E. yunnanense


密序山薑 mi xu shan yu cai


Herbs 2–15(–25) cm tall, glabrous throughout or rarely puberulent, with a caudex and fleshy root. Stems erect, simple, often few from caudex. Basal leaves rosulate, somewhat fleshy; petiole (0.5–)1–5.5(–7.5) cm; leaf blade ovate, suborbicular, lanceolate, or rhombic, (0.3–)0.5–2(–2.5) cm × (2–)4–10(–15) mm, base cordate, truncate, or cuneate, sometimes distinctly oblique, margin entire, apex obtuse or subacute. Middle cauline
leaves lanceolate, ovate, or linear-lanceolate, 0.7–2.5(–3) cm × 2–9 mm, pinnately veined, sessile, base cuneate, margin entire, apex subacute. Infructescence compact, subumbellate or short racemes, little or not expanded in fruit, 0.2–2(–3.5) cm. Fruiting pedicels divaricate or slightly reflexed, 1–4(–5) mm. Sepals ovate, 1.5–2 × ca. 1 mm, persistent through fruit maturity. Petals white, spatulate, 2–3.5 × 1–1.7 mm. Filaments white, 1–2 mm, slightly dilated at base; anthers ovate, 0.2–0.3 mm. Ovules 4–10 per ovary. Fruit linear or oblong, (4–)5–10(–12) × 1.5–2 mm, slightly 4-angled, not torulose; valves cuneate at both ends, with a prominent midvein; gynophore to 0.5 mm; septum mostly perforate; style obsolete to 0.6 mm. Seeds oblong, plump, 1.5–2 × ca. 1 mm. Fl. Jun–Jul, fr. Jul–Aug.

Alpine meadows, scree, grassy slopes, near glaciers, Kobresia turf, alpine mats, sandstone ridges; 2500–5400 m. Gansu, Hebei, Qinghai, Shaanxi, Sichuan, Xinjiang, Xizang, Yunnan [Bhutan, Kazakhstan, Kyrgyzstan, Nepal, Tajikistan].

The records of *Eutrema edwardsii* R. Brown from China (e.g., in FRPS) and C Asia are based on misidentified plants of *E. heterophyllum*. The former species has lax, racemose infructescences to 18 cm, fruit appressed to the rachis, with erect to eect-ascending fruiting pedicels, and readily caducous sepals. By contrast, *E. heterophyllum* has compact, umbellate or shortly racemose infructescences rarely to 3.5 cm, nonappressed fruit, with divaricate or reflexed fruiting pedicels, and sepals often persisting well after fruit maturity. The record and illustration of *E. edwardsii* from Xinjiang in Fl. Xinjiang. (2(2): 204. 1995) are based on misidentified plants of *Taphrospermum alticum*.


Cochlearia integrifolia de Candolle, Syst. Nat. 2: 369. 1821; *Eutrema alpestre* Ledebour; *E. alpestre* var. *hisscaricum* Lipsky; *E. integrifolium* var. *hisscaricum* (Lipsky) O. E. Schulz; *Goldbachia laevigata* de Candolle var. *adscendens* Franchet; *Smelowska integrifolia* (de Candolle) C. A. Meyer.

Herbs (30–)40–80(–110) cm tall, glabrous throughout; rhizomes short. Stems erect, simple at base, branched above. Basal leaves rostrate, somewhat fleshy; petiole (2.5–)3.5–9(–12) cm; leaf blade ovate, orbicular, or cordate, (1.5–)2–4(–6) × (1.5–) 1.7–3.5(–5.5) cm, base cordate or rounded, margin entire, apex obtuse. Middle cauline leaves lanceolate to oblong-lanceolate, 4–6.5(–8) × 1–2(–3) cm, pinnately veined, sessile, base cuneate, margin entire, apex subacute. Infructescence lax raceme, main branch 10–20 cm. Fruiting pedicels divaricate, (4–)6–13(–18) mm. Sepals ovate, 2–2.5 × 1–1.5 mm, caducous. Petals white, spatulate, 4–5 × 2–3 mm. Filaments white, 1.7–2.5 mm, slightly dilated at base; anthers oblong, 0.6–0.7 mm. Ovules 4 per ovary. Fruit ellipsoid or oblong, 5–8(–10) × 1–2 mm, slightly 4-angled, not torulose; valves cuneate at both ends, with a prominent midvein; gynophore to 0.5 mm; septum complete or rarely perforate; style 0.3–0.6 mm. Seeds oblong, plump, 2–3 × 1–1.5 mm. Fl. May–Jun, fr. Jul–Aug.

Woods, subalpine areas, open slopes; 1200–2400 m. Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

The records of *Eutrema pseudocordifolium* Popov in FRPS and Fl. Xinjiang. (2(2): 204. 1995) are based on misidentified plants of *E. integrifolium*.


*Eutrema lancifolium* (Franchet) O. E. Schulz; *Goldbachia lancifolia* Franchet; *Hesperis spectabilis* (J. D. Hooker & Thomson ex Fournier) Kuntze; *Sisymbrium hookeri* Fournier; *Sisymbrium spectabile* J. D. Hooker & Thomson ex Fournier.

Herbs 30–80(–110) cm tall, sparsely to densely crisped pilose at least along leaf margin and midvein; rhizomes short. Stems erect, simple at base, branched above. Basal leaves rostrate, somewhat fleshy; petiole (2.5–)4–12(–17) cm; leaf blade ovate, oblong, or lanceolate, (1–)2–6(–8) × (0.7–)1.5–4(–5) cm, base cordate or rounded or cuneate, margin entire, apex obtuse or subacute. Middle cauline leaves lanceolate, oblong-lanceolate, or ovate, 3–6(–8) × 0.7–2(–3) cm, pinnately veined, sessile, base rounded or auriculate, margin denticulate or sparsely so near base, apex acuminate or acute. Infructescence lax raceme, main branch 10–25–40 cm. Fruiting pedicels divaricate, (0.5–)0.7–1.8(–2.2) cm. Sepals ovate, 2–2.5 × 1–1.5 mm, caducous. Petals white, spatulate, 4–5 × 2.5–3 mm. Filaments white, 1.5–2 mm, slightly dilated at base; anthers oblong, ca. 0.5 mm. Ovules 4–8 per ovary. Fruit linear or rarely oblong, (0.8–)1.2–2(–2.5) cm × 1.5–3 mm, slightly 4-angled, subtorulose; valves cuneate at both ends, with a prominent midvein; gynophore to 0.5 mm; septum perforated or complete; style 0.5–1 mm. Seeds oblong, plump, 2–3 × 1–1.5 mm. Fl. May–Aug, fr. Jul–Sep.

Stream sides, swampy or alpine meadows, among rocks; 3300–4400 m. Sichuan, Xizang, Yunnan [Bhutan, Sikkim].

A critical examination of the types of *Eutrema himalaicum* and *E. lancifolium* shows that they are indistinguishable. The species was recognized in FRPS as *E. lancifolium* and was recorded from Gansu, but the present authors have seen no specimens from that province.


三角叶山 فهو *Eutrema deltoideum* (J. D. Hooker & Thomson) O. E. Schulz in Engler, Pflanzenr. 86(IV. 105): 35. 1924. *San jiao ye shan yu cai*

*Eutrema deltoideum* (J. D. Hooker & Thomson) O. E. Schulz in Engler, Pflanzenr. 86(IV. 105): 35. 1924. *San jiao ye shan yu cai*
ovate-deltoid, or rhomboid, (1.5–)3–6(–10) × (0.3–)2–4.5(–6) cm, palmately veined, base truncate or cordate, margin dentate, apex obtuse or acute. Infructescence lax raceme, main branch 6–15 cm. Fruiting pedicels ascending or suberect, 5–1.2(–15) mm. Sepals ovate, 2–3 × 1.5–2.5 mm, caducous. Petals white or pink, spatulate or obovate, (5–)6–8 × 2.5–4 mm. Filaments white, 1.5–2.5 mm, slightly dilated at base; anthers oblong, 0.5–1 mm. Ovules 2–4 per ovary. Fruit lanceolate, oblong, or ovoid, 7–10 × 2–3 mm, often subapressed to rachis, slightly 4-angled, not torulose; valves with a prominent midvein; gynophore to 1 mm; septum perforated or complete; style obsolete or to 1 mm. Seeds oblong, plump, 2.5–3.5 × 1–1.5 mm. Fl. Jul–Aug, fr. Aug–Sep.

Rock crevices, among shrubs, steep slopes, moist meadows, Petalum-Rhododendron forests, streambeds; 3600–4700 m. Xizang, Yunnan [Bhutan, Sikkim].

The fruit shape and dimensions given for Eutrema deltoideum in all Chinese floras are based on misidentified plants of *E. himalaicum*. *Eutrema deltoideum var. gynodiform is has slightly larger flowers than those of the type, but these represent extremes of a continuous variation. The species was recorded from Sichuan in FRPS and in Fl. Sichuan. (14: 155. 1999), but the present authors have seen no material of that province.

5. **Eutrema yunnanense** Franchet, Pl. Delavay. 61. 1889.

Herbs (12–)20–60(–110) cm tall, glabrous or sparsely pilose on upper parts; rhizomes not fleshy. Stems erect, simple, often a few from base, rarely branched upward. Basal leaves rosulate; petiole 2–25(–35) cm, dilated at base; leaf blade cordate or reniform, (1–)3–10(–20) × (1.5–)3–10(–20) cm, base cordate, margin dentate, denticulate, repand, or subentire, with distinct apiculate callosities terminating ultimate veins, apex rounded or obtuse. Middle cauline leaves with petioles 0.7–2.5 cm; leaf blade broadly ovate to ovate-cordate, 0.7–2(–3.5) × 0.8–2 cm, palmately veined, base and margin as in basal leaves, apex acute. Infructescence lax raceme, bracteate throughout. Fruiting pedicels reflexed or spreading, slender, (0.5–)1–2(–2.5) cm. Sepals ovate, 1.5–2 × 1–1.2 mm, caducous. Petals white, oblong-spatulate, 4–5 × 1–1.5 mm. Filaments white, 1.5–2 mm; anthers ovate, 0.3–0.5 mm. Ovules 6–10 per ovary. Fruit linear, (0.8–)1–2 cm × 1.5–2 mm, terete, torulose; valves with an obscure midvein; gynophore absent or obsolete; septum complete; style 0.5–2 mm. Seeds oblong, plump, 2–3 × 1–1.5 mm. Fl. Mar–May, fr. Apr–Jun.

Near sea level to 4000 m. Guizhou, Sichuan, Xizang, Yunnan [Japan].

The record in FRPS of *Eutrema tenue* from Taiwan is based on misidentified plants of *E. wasabi*. Except for having stout styles to 0.7 mm (vs. 1–2 mm), the type of *E. thibeticum* is indistinguishable from that of *E. tenue*.


Herbs 12–35(–55) cm tall, glabrous or retrorsely pilose; rhizomes not fleshy. Stems decumbent, simple, often a few from base. Basal leaves rosulate; petiole 3–8(–10) cm; leaf blade cordate or reniform, 1–3(–5) × 1–3(–6) cm, base cordate, margin dentate, repand, or subentire, with distinct apiculate callosities terminating ultimate veins, apex rounded or obtuse. Middle cauline leaves with petioles 0.7–2.5 cm; leaf blade broadly ovate to ovate-cordate, 0.7–2(–3.5) × 0.8–2 cm, palmately veined, base and margin as in basal leaves, apex acute. Infructescence lax raceme, bracteate throughout. Fruiting pedicels reflexed or spreading, slender, (0.5–)1–2(–2.5) cm. Sepals ovate, 1.5–2 × 1–1.2 mm, caducous. Petals white, oblong-spatulate, 4–5 × 1–1.5 mm. Filaments white, 1.5–2 mm; anthers ovate, 0.3–0.5 mm. Ovules 6–10 per ovary. Fruit linear, (0.8–)1–2 cm × 1.5–2 mm, terete, torulose; valves with an obscure midvein; gynophore absent or obsolete; septum complete; style 0.5–2 mm. Seeds oblong, plump, 2–3 × 1–1.5 mm. Fl. Mar–May, fr. Apr–Jun.

Near sea level to 4000 m. Guizhou, Sichuan, Xizang, Yunnan [Japan].

The record in FRPS of *Eutrema tenue* from Taiwan is based on misidentified plants of *E. wasabi*. Except for having stout styles to 0.7 mm (vs. 1–2 mm), the type of *E. thibeticum* is indistinguishable from that of *E. tenue*.


*C. w. jing shan yu caic* Cochlearia wasabi Siebold, Verh. Batav. Genootsch. Kunst. Wet. 12: 54. 1832; Alliaria wasabi (Siebold) Prantl; Eutrema japonicum (Miquel) Koidzumi; E. koreanum (Nakai) K. Hammer; E. okinosimense Takenouchi; Lunaria japonica Miquel; Wasabia japonica (Miquel) Matsumura; W. koreana Nakai; W. pungens Matsumura; *W. wasabi* (Siebold) Makino.

Herbs 20–60(–75) cm tall, glabrous or sparsely pilose on upper parts; rhizomes fleshy, to 3 cm in diam. Stems erect or decumbent, simple. Basal leaves rosulate; petiole (6–)10–20(–26) cm, dilated at base; leaf blade cordate or reniform, (2.5–)6–15(–20) × (3–)6–18(–22) cm, base cordate, margin dentate, denticulate, shallowly crenate, repand, or subentire, with distinct apiculate callosities terminating ultimate veins, apex rounded or obtuse. Middle cauline leaves with petioles 1–5(–8) cm;
leaf blade broadly ovate to ovate-cordate, 1.5–4(–6) × 2–4(–6) cm, palmately veined, base and margin as in basal leaves, apex acute. Inflorescence lax raceme, bracteate throughout or basally. Fruiting pedicels ascending or divaricate, slender, 1–3.5 (–5) cm. Sepals oblong, 3–4 × 2–2.5 mm, caducous. Petals white, oblong-spatulate, 6–8(–9) × 2–3 mm. Filaments white, 3.5–5 mm; anthers oblong, 0.6–0.8 mm. Ovules 6–8 per ovary. Fruit linear, 1–2 cm × 1.5–2 mm, terete, torulose; valves with an obscure midvein; gynophore (1–)2–5 mm; septum usually complete; style 2–3 mm. Seeds oblong, plump, 2–3 × 1–1.5 mm. Fl. Mar–May, fr. May–Jun.

Cultivated, also naturalized in wet areas along streams in mountains; near sea level to 2500 m. Taiwan [native to Japan, Korea, ?Russia (Far East)].

This species is cultivated for its edible rhizomes, which are the source of the pungent condiment wasabi.


大 蒜 芥 属  da suan jie shu
Herbs annual, biennial, or perennial, rarely subshrubs. Trichomes absent or simple. Stems erect, rarely prostrate or decumbent, often branched apically. Basal leaves petiolate, rosulate or not, simple, entire or variously pinnately dissected. Cauline leaves petiolate or sessile, often similar to basal. Racemes ebracteate or rarely bracteate, often elongated considerably in fruit. Fruiting pedicels slender or thickened and nearly as wide as fruit. Sepals ovate or oblong, erect or spreading, base of lateral pair sometimes subascate. Petals yellow, white, pink, or purple, obovate, spatulate, oblong, or suborbicular, apex obtuse or emarginate; claw often subequaling or longer than sepals. Stamens 6, tetradynamous; filaments not dilated at base; anthers oblong, obtuse at apex. Nectar glands confluent and subindenting bases of all stamens; median glands present. Ovules 6–160 per ovary. Fruit dehiscent siliques, linear or rarely lanceolate or subulate, terete or rarely slightly latiseptate; valves papery to subleathery, with a prominent midvein and 2 conspicuous marginal veins, smooth or torulose; replum rounded; septum complete, membranous or rarely thickened, translucent or opaque, veinless or with a midvein; style cylindric, conical, or clavate, persistent, rarely obsolete; stigma capitulate, 2-lobed, lobes not curcurrent. Seeds uniseriate, wingless, oblong or ovate, plump; seed coat reticulate or papillate, not mucilaginous when wetted; cotyledons incumbent or obliquely so.

About 40 species: N Africa, Asia, Europe, a few species in S Africa and the New World; ten species (one endemic, one introduced) in China.

1a. Fruit subulate-linear, (0.7–)1–1.4(–1.8) cm, appressed to rachis .................................................. 10. S. officinale

1b. Fruit narrowly linear, (2–)3–14 cm, not appressed to rachis.

2a. Fruiting pedicels about as thick as mature fruit.

3a. Uppermost leaves simple or hastate, not divided into linear segments; sepals not cucullate;

   fruiting pedicels (2–)3–6 mm .............................................................. 6. S. orientale

3b. Uppermost leaves pinnatisect into linear lobes; sepals cucullate; fruiting pedicels (4–)6–10(–13) mm .............................................................. 5. S. altissimum

2b. Fruiting pedicels narrower than fruit.

4a. Perennials; sepals subapically cucullate; lowermost flowers bracteate.

5a. Fruit terete, torulose; sepals 3.5–5.5(–7) mm; petals 6–8(–10) × 1–1.5 mm; filaments 3–5(–6) mm;

   anthers 1–1.5 mm; middle leaves often lobed or hastate basally ..................................... 9. S. yunnanense

5b. Fruit subquadrangular, not torulose; sepals 7–9 mm; petals 12–16 × 2.5–3.5 mm; filaments

   6–10 mm; anthers 2–3 mm; middle leaves not lobed or hastate basally ....................... 8. S. luteum

4b. Annuals, if perennial then uppermost leaves filiform to narrowly linear; sepals not cucullate;

   flowers ebracteate.

6a. Perennials; uppermost leaves filiform to narrowly linear, to 5 mm wide ................ 7. S. polymorphum

6b. Annuals; uppermost leaves variously-shaped, sometimes lobed, never filiform or narrowly

   linear, wider.

7a. Fruit recurved or divaricate, very rarely ascending, (5–)6–10(–12) cm.

8a. Sepals 4–6 mm; petals 6–10(–12) mm; basal leaves often fleshy; fruiting pedicels

   stout ........................................................................... 3. S. brassiciforme

8b. Sepals 2.5–3.5 mm; petals 3–5 mm; basal leaves not fleshy; fruiting pedicels slender,

   nearly filiform ................................................................. 4. S. heteromallum

7b. Fruit erect or ascending, 2–4(–5) cm.

9a. Young fruit overtopping flowers; petals 2.5–3.5(–4) mm; plants glabrous or sparsely

   pubescent ................................................................. 1. S. irio
9b. Young fruit not overtopping flowers; petals 6–8 mm; plants usually densely hispid at least below ........................................................ 2. S. loeselii


Herbs annual, (10–)20–60–(75) cm tall. Stems erect, branched below and above, glabrous or sparsely pubescent at least basally. Basal leaves not rosulate; petiole (0.5–)1–4.5–(6) cm; leaf blade oblanceolate or oblong in outline, runcinate-pinnatisect, (1.5–)3–12–(15) × (0.5–)1–6–(9) cm; lateral lobes (1 or)2–6–(8) on each side of midvein, smaller than terminal, orlando or lanceolate, entire, dentate, or lobed. Uppermost caule leaves smaller than basal, entire or 1–3-lobed. Fruiting pedicels divaricate or ascending, slender, much narrower than fruit, (5–)7–12–(20) mm. Sepals oblong, erect, 2–2.5 × 1–1.5 mm. Petals yellow, oblong-ob lanceolate, 2.5–3.5–(4) × 1.5–1.5 mm; claw subequaling sepals. Filaments yellowish, erect, 3–6 mm; anthers oblong, 0.5–0.9 mm. Ovules 40–90 per ovary. Fruit narrowly linear, slender, terete, (2.5–)3–4–(6) cm × 0.9–1.1 mm, straight or slightly curved inward, younger ones overtopping flowers; valves glabrous, slightly torulose; style 0.2–0.5 mm; stigma prominently 2-lobed; septum membranous. Seeds oblong, 0.8–1 × 0.5–0.6 mm, inserted in depressions of septum. Fl. May–Aug, fr. Jun–Oct. 2n = 14.

Rocky slopes, orchards, fields, pastures, waste grounds, prairies, disturbed sites; near sea level to 1700 m. Nei Mongol, Taiwan, Xinjiang [Afghanistan, India, Kashmir, Nepal, Pakistan, Tajikistan, Turkmenistan, Uzbekistan; W Asia, Europe].

The above first record from Nei Mongol is based on Liu 12 (MO).


新疆大蒜芥 Xinjiang da suan jie Sisymbrium loeselii var. brevicarpum Z. X. An. Herbs annual, (20–)35–120–(175) cm tall. Stems erect, branched above, usually densely hispid below with retrorse trichomes, usually glabrous above. Basal leaves rosulate; petiole 1–4–(5) cm; leaf blade broadly oblanceolate in outline, runcinate- to lyrate-pinnatipartite, (1.5–)2.5–8–(12) × (1–2)–5–(7) cm; lateral lobes 2–4 on each side of midvein, much smaller than terminal, entire or dentate; terminal lobe triangular, often hastate. Uppermost caule leaves entire or toothed, much smaller than basal. Fruiting pedicels divaricate or ascending, slender, narrower than fruit, 0.5–1.2–(1.5) cm. Sepals oblong, ascending, 3–4 × 1–1.5 mm. Petals yellow, spatulate, 6–8 × 2–3 mm; claw subequalling sepals. Filaments yellowish, erect, 3–4.5 mm; anthers oblong, ca. 1 mm. Ovules 40–60 per ovary. Fruit narrowly linear, stout, terete, 2–3.5–(5) cm × 0.9–1.1 mm, curved or straight; valves often glabrous, slightly torulose; style stout, 0.3–0.7 mm; stigma prominently 2-lobed; septum slightly membranous. Seeds oblong, 0.7–1 × 0.5–0.6 mm, inserted in depressions of septum. Fl. May–Sep, fr. Jun–Oct. 2n = 14.

Roadsides, rocky places, fields; 900–4500 m. Xinjiang, Xizang [Afghanistan, India, Kashmir, Kazakstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan].


垂果大蒜芥 Chui guo da suan jie Sisymbrium heteromallum Turczaninow ex Fournier; S. heteromallum var. dahuricum (Turczaninow ex Fournier) Glehn ex Maximowicz; S. heteromallum var. sinense O. E. Schulz. Herbs annual, (20–)35–100–(150) cm tall. Stems erect, branched above, sparsely to densely pubescent at least near base, usually glabrous above. Basal leaves rosulate, not fleshy; petiole 1–3–(5) cm; leaf blade broadly oblanceolate to oblong-ob lanceolate in outline, lyrate- or runcinate-pinnatipartite, 3–7–(10) × (0.5–)1.5–4 cm;
Sisymbrium fujianense


6. Sisymbrium orientale

Herbs annual, (10–)20–70(–85) cm tall. Stems erect, branched above, sparsely to densely soft pubescent at least near base, usually glabrous above. Basal leaves rosulate; petiole (1–)2.5–9(–9) cm; leaf blade broadly oblanceolate to oblong-ob lanceolate in outline, runcinate-pinnatifid, 3–8(–10) × (1–)2.5–6(–6) cm; lateral lobes 1–5 on each side of midvein, much smaller than terminal one, oblong or lanceolate, subentire or dentate; terminal lobe lanceolate or deltoid, often hasteate. Uppermost cauleine leaves with narrowly lanceolate or linear, often hasteate terminal lobe and 1 or 2 lateral lobes. Fruiting pedicles ascending to subdivaricate, stout and nearly as thick as fruit, (2–)3–6 mm. Sepals oblong, ascending, 3.5–5.5 × 1–2 mm. Petals pale yellow, spatulate, (6–)7–9(–10) × 2.5–4 mm; claw subequaling sepals. Filaments yellowish, erect, (4–)5–8 mm; anthers oblong, 1.1–1.8 mm. Ovules (60–)80–100(–140) per ovary. Fruit narrowly linear, stout, terete, (5–)6–10(–13) cm × 1–1.5 mm, straight; valves glabrous or pubescent, smooth; style subclavate, 1.3–4 mm; stigma prominently 2-lobed; septum slightly thickened. Seeds oblong, 1.1×0.7–0.9 mm, inserted in depressions of septum. Fl. Apr–Jul, fr. May–Aug. 2n = 14.

Waste grounds, roadsides, disturbed sites. Fujian, Shanxi [India, Japan, Kashmir, Pakistan, Russia; SW Asia, Europe; introduced elsewhere].

The above first record of Sisymbrium orientale from China is based on Li Huaxi 80 (MO) and the type of S. fujianense.

7. Sisymbrium polymorphum

(Murray) Roth, Mant. Bot. 2: 946. 1830.

多型大蒜芥
duo xing da suan jie

Brassica polymorpha Murray, Novi Comment. Soc. Regiae Sci. Gott. 7: 35. 1776; Sisymbrium junceum Marschall von Bieberstein; S. junceum var. latifolium Korshinsky; S. junceum var. soongaricum Regel & Herder; S. polymorphum var. latifolium (Korshinsky) O. E. Schulz; S. polymorphum var. soongaricum (Regel & Herder) O. E. Schulz.

Herbs perennial, (10–)25–90(–110) cm tall. Stems erect, branched below and above, glaucous, glabrous or sparsely pilose at least near base, glabrous above. Basal leaves fleshy, not rosulate; petiole 0.5–2 cm; leaf blade oblanceolate, oblong or lanceolate, pinnatisect or pinnatifid, 1–6(–9) cm × 1–8(–15) mm; lateral lobes 2–4 on each side of midvein, smaller than terminal one, oblong or lanceolate, entire or dentate. Uppermost cauleine leaves filiform to narrowly linear, entire. Fruiting pedicles divaricate, slender, narrower than fruit, (3–)4–8(–10) mm. Sepals narrowly oblong, spreading, 3.5–5 × 1–1.5 mm, glabrous or pilose. Petals yellow, spatulate, (5–)6–8(–9) × 2.5–4 mm; claw subequaling sepals. Filaments yellowish, erect, 3.5–6 mm; anthers oblong, 1–1.5 mm. Ovules 48–70 per ovary. Fruit narrowly linear, slender, terete, (2–)2.5–4(–4.5) cm × 0.5–1.2 mm; valves glabrous, torulose; style slender,
0.5–1 mm; stigma slightly 2-lobed; septum not thickened. Seeds oblong, 0.6–1 × 0.3–0.5 mm. Fl. May–Jun, fr. Jun–Jul.

Steppe, deserts, saline flats, sandy areas, slopes, roadsides; 300–1900 m. Gansu, Heilongjiang, Nei Mongol, Qinghai, Xinning [Kazakhstan, Kyrgyzstan, Mongolia, Russia, Tajikistan].


Herbs perennial, (0.6–)0.8–1.5(–2.2) m tall. Stems erect, *Sisymbrium yunnanense* (Maximowicz) O. E. Schulz var. *Arabis kandingensis* 云南大蒜芥


Herbs perennial, (40–)60–100(–120) cm tall. Stems erect, branched above, sparsely to densely hirsute at least near base, usually glabrous above. Basal leaves not seen; petiole of middle cauline leaves 1–2(–3) cm; leaf blade broadly ovate to ovate-lanceolate, (5–7)–12(–15) × 2–2.5(–7) cm, sparsely pilose or subhirsute adaxially, densely so abaxially, base cuneate, truncate, or rarely cordate, margin dentate with apiculate callosities, apex acute or acuminate. Uppermost cauline leaves narrowly lanceolate, margin dentate, apex acuminate. Racemes basally bracteate. Fruitting pedicels ascending or subdivaricate, stout, narrower than fruit, (0.7–)0.9–1.3 cm. Sepals linear, ascending, 3.5–5.5(–7) × 1–1.3 mm, subapically cucullate. Petals yellow, narrowly spatulate, 6–8 (–10) × 1–1.5 mm; claw subequaling sepals. Filaments yellowish, erect, 3–5(–6) mm; anthers oblong, 1–1.5 mm. Ovules 70–100 per ovary. Fruit narrowly linear, terete, (6–)8–13 cm × 0.9–1.5 mm; gynophore to 2 mm; valves glabrous, torulose, somewhat prominently veined; style stout, 0.5–1 mm; stigma slightly 2-lobed; septum slightly thickened or membranous. Seeds oblong, 1.4–2 × 0.6–0.8 mm, inserted in depressions of septum. Fl. Jun–Jul, fr. Jul–Aug. 2n = 28*.

- Thickets, ravines, mountain slopes, by streams; 2000–3000 m. Sichuan, Yunnan.

Although the present authors have not examined the type of *Arabis kandingensis*, the excellent description and illustration (Bull. Bot. Res., Harbin 14: 144–146. 1994; ibid. 18: 156–157. 1998; Fl. Sichuan. 14: 117. 1999) leave no doubt that it is a synonym of *Sisymbrium yunnanense*. It was described as having yellow flowers, exclusively simple trichomes, and chromosome number based on n = 7. No species of *Arabis* has any of these characters. *Arabis kandingensis* perfectly matches the above description of *S. yunnanense* in all characters.

*Sisymbrium yunnanense* was recognized in FRPS as a variety of *S. luteum*, but the differences between the two taxa (see the above key) are significant enough to support their recognition as distinct species.


*Erysimum officinale* var. *leiocarpum* de Candolle. 云南大蒜芥

Hesperis lutea

Linnaeus, Sp. Pl. 2: 660. 1753; *Sisymbrium officinale* var. *leiocarpum* de Candolle. Herbs annual, 25–75(–110) cm tall. Stems erect, branched above, sparsely to densely hirsute with retrorse trichomes, rarely subglabrous above. Basal leaves usually rosulate; petiole (1–)2–7(–10) cm; leaf blade broadly oblanceolate or oblong-ovate in outline, lyrate-pinnatifid, pinnatisect, or runcinate, (2–)3–10(–15) × (1–)2–5(–8) cm; lateral lobes (2 or)3 or 4(or 5) on each side of midvein, smaller than terminal one, oblong, or lanceolate, entire or dentate or lobed; terminal lobe suborbicular or deltoid, dentate. Uppermost cauline leaves lobed, dentate, or subentire. Fruitting pedicels erect, appressed to rachis, stout, narrower than fruit, 1.5–3(–4) mm. Sepals oblong-ovate, erect, 2–2.5 × ca. 1 mm. Petals yellow, spatulate, 2.5–4 × 1–2 mm. Filaments yellowish, erect, 2–3 mm; anthers ovate, 0.3–0.5 mm. Ovules 10–20 per ovary. Fruit subulate-linear, stout, terete, erect, appressed to rachis, (0.7–)1–1.4(–1.8) cm × 1–1.5 mm, straight; valves glabrous or pubescent, 3-veined, slightly torulose; style (0.8–)1–1.5(–2) mm; stigma slightly 2-lobed; septum submembranous. Seeds oblong, 1–1.3 × 0.5–0.6 mm. Fl. Mar–Jul, fr. Apr–Sep. 2n = 28*.

Roadsides, fields, pastures, waste grounds, deserts; near sea level to 1500 m. Heilongjiang, Jilin, Liaoning, Nei Mongol, Xizang [Japan, Kyrgyzstan, Mongolia, Russia, Tajikistan].


Herbs annual. Trichomes branched, finely dendritic. Stems erect, slender. Basal leaves petiolate, not rosulate, finely pinnatisect or 3-sect; lobes 3 or 5, filiform, linear, narrowly oblong, or oblanceolate-linear, sparsely to densely dendritic. Cauline leaves rarely petiolate, similar to basal leaves in division and pubescence, reduced in size upward and becoming trifid. Racemes few to several flowered, ebracteate; rachis strongly or rarely slightly flexuous. Fruiting pedicels slender, sometimes thickened and nearly as wide as fruit, erect or divaricate. Sepals oblong, erect, base of lateral pair not saccate. Petals white or pink, longer than sepals; stigma capitate, entire.

One species: C and SW Asia.


Herbs (2–)4–20(–30) cm tall, sparsely to moderately pubescent with finely branched trichomes to 0.1 mm. Stems slender, branched above or rarely simple; branches filiform. Basal and lowermost cauline leaves pinnatisect, with 1 or 2 lateral lobes; petiole 5–12 mm; lobes linear, filiform, narrowly oblong, or oblanceolate-linear, (1–)3–9(–12) × 0.2–0.8(–1.3) mm, margin entire or very rarely obtusely 1-toothed, apex obtuse. Upper and middle cauline leaves 3-lobed, similar to lowermost leaves. Infructescence axis strongly or rarely slightly flexuous. Fruiting pedicels (0.5–)3–8(–12) mm, slender or thickened, narrower or rarely nearly as wide as fruit, erect or divaricate, straight or slightly curved. Sepals oblong, (0.6–)0.8–1(–1.2) × 0.4–0.5 mm. Petals white or pink, (0.9–)1.1–1.5(–1.8) × 0.3–0.5 mm, oblanceolate, apex obtuse. Filaments white, 0.8–1.1 mm; anthers broadly ovate, ca. 0.2 mm. Fruit linear, (0.4–)0.7–1.8 (–2.5) cm × 0.5–0.8 mm; valves glabrous or sparsely pubescent; style absent, obsolete, or rarely to 0.1 mm. Seeds brown, oblong, 0.9–1.1(–1.2) × 0.4–0.5(–0.6) mm. Fl. May–Aug, fr. Jun–Aug. 2n = 28.

Limestone, marble outcrops, scree slopes; 2600–4200 m. Xizang [Afghanistan, India, Pakistan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

This species is represented in China by subsp. minutiflora; subsp. brevipedicellatum (Hedge) Al-Shehbaz & O’Kane (Microsisymbrium minutiflorum var. brevipedicellatum Hedge) is restricted to N Afghanistan and adjacent Tajikistan.

92. **APHRAHMUS** Andrzejowski ex de Candolle, Prodr. 1: 209. 1824.

Herbs perennial, with thick caudex covered with petiolar remains of previous years, sometimes with slender rhizomes. Trichomes eglandular, simple or forked, less than 0.1 mm. Stems erect or ascending, often minutely puberulent. Basal leaves petiolate, rosulate, simple, entire. Cauline leaves petiolate or sessile, base cuneate or attenuate, not auriculate. Racemes few to several flowered, ebracteate throughout, slightly elongated or not in fruit. Fruiting pedicels slender, erect, ascending, divaricate, sometimes recurved, puberulent axially. Sepals oblong, base of lateral pair not saccate. Petals white, pink, or purple; blade broadly obovate or spatulate, apex obtuse or rounded; claw subequaling sepals. Stamens 6, slightly tetradynamous; filaments dilated or not at base; anthers obtuse at apex. Nectar glands confluent and subtending bases of stamens. Fruit dehiscent, ovate, elliptic, lanceolate, rarely linear, latiseptate; valves with an obscure or distinct midvein, smooth; replum flattened basally; septum complete and membranous, or absent; style obsolete or rarely to 2 mm; stigma capitulate, entire. Seeds uniseriate or biseriate, wingless, oblong or ovoid, plum, on filiform funicles often longer than seeds; seed coat minutely reticulate, not mucilaginous when wetted; cotyledons incumbent.

Five species: C Asia, Himalayas, North America; one species in China.

**Sisymbrium** Linnaeus sect. Torularia (Cosson) O. E. Schulz in Engler, Pflanzenr. 86(IV. 105): 213. 1924, not Bonnemaison (1828); based on petiolelike base to 3 mm, margin entire, apex rounded stellate, gradually reduced in size upward, cuneate to spatulate, (7–)12–40(–50) cm × (2–)4–10(–16) mm, leaves oblong-obovate or oblanceolate or rarely base, branched above. Basal leaves not seen. Cauline leaves oblong or oblanceolate or rarely base, branched above. Basal leaves not seen. Cauline leaves sessile, cuneate or attenuate, not expanded and to 3 mm wide; leaf blade spatulate, (0.2–)0.5–2(–3) cm × 0.5–3(–5) mm, glabrous, base cuneate or attenuate, margin entire, apex obtuse or acute. Cauline leaves and bracts similar to basal leaves but narrower and sessile or shortly petiolate, reduced in size upward. Racemes somewhat elongated in fruit. Fruiting pedicels erect or ascending, (1.5–)2–10(–20) mm, puberulent adaxially, glabrous abaxially. Sepals often purplish, 1.5–2.5 × 1.2–1.5 mm, glabrous. Petals deep purple or white, broadly obovate or spatulate, 3.5–5(–6) × 1.5–3(–4) mm, apex rounded; claw 1–2.5 mm. Filaments 1.5–2.5 mm; anthers 0.3–0.6 mm. Ovules 10–16 per ovary. Fruit lanceolate or elliptic, 5–10 × 1.5–2 mm, compressed; valves obscurely veined, glabrous or rarely sparsely puberulent; gynophore to 0.7 mm; septum entire, hyaline; style 0.5–1(–2) mm. Seeds light brown, oblong, biseriate, 0.9–1.3 × 0.6–1 mm. Fl. May–Aug, fr. Jul–Sep.

Moraine, gravel below glaciers, limestone rubble and cliffs, open stony slopes, alpine pastures, scree, dolomite cliffs, streambeds, peat grounds and turf; 3300–5600 m. Qinghai, Sichuan, Xinjiang, Zizang, Yunnan [Afghanistan, Bhutan, India, Kashmir, Nepal, Pakistan, Sikkim, Tajikistan].


**锥果芥属 zhui guo jie shu**

Herbs annual, canescent or pale green. Trichomes short-stalked or subsessile, stellate, 4–6-rayed. Stems erect, often simple basally, branched apically. Basal leaves absent by flowering. Cauline leaves sessile, cuneate or attenuate, not auriculate, entire. Seeds uniseriate, wingless, oblong, plump; seed coat smooth, minutely reticulate, not mucilaginous when wetted; cotyledons incumbent.

One species: China, Japan, Korea.


**锥果芥 zhui guo jie**


Plants (10–)20–50(–75) cm tall, pubescent throughout with stalked stellate trichomes. Stems erect, simple at base, branched above. Basal leaves not seen. Cauline leaves oblong-obovate or oblanceolate or rarely spatulate, (7)–12–40(–50) cm × (2)–4–10(–16) mm, stellate, gradually reduced in size upward, cuneate to petiolelike base to 3 mm, margin entire, apex rounded or obtuse. Fruiting pedicels slender, subappressed to rachis, (3)–4–7(–8.5) mm. Sepals narrowly oblong, stellate, 1.5–2(–2.5) × 0.5–0.8 mm. Petals white or pale pink, oblanceolate or oblong-obovate, (2.5–)3–4 × 1–1.5 mm, apex rounded. Filaments 2–3 mm, median pairs strongly broadened basally and to 1 mm wide; anthers 0.5–0.8 mm. Fruit linear, torulose, 0.8–1.4(–1.8) × 0.7–1 mm, densely stellate; style slender, (1–) 1.5–2(–2.5) mm. Seeds dark brown, oblong, ca. 1 × 0.5 mm. Fl. Jun–Oct, fr. Jul–Oct.

Rocky places, forests, mountain slopes; 300–900 m. Hebei, Henan, Jiangsu, Liaoning, Shandong, Zhejiang [Japan, Korea].


**念珠芥属 nian zhu jie shu**

**Torularia** (Cosson) O. E. Schulz in Engler, Pflanzenr. 86 (IV. 105): 213. 1924, not Bonnemaison (1828); based on **Sisymbrium** Linnaeus sect. **Torularia** Cosson, Comp. Fl. Atlant. 2: 136. 1887.

Herbs annual, biennial, or perennial with a woody caudex. Trichomes stalked or subsessile, 1- or 2-forked sometimes also simple. Stems erect or prostrate, usually several from base. Basal leaves petiolate or sessile, rosulate or not, entire, dentate, or pinnatisect. Cauline leaves often similar to basal ones, rarely absent. Racemes few to several flowered, ebracteate or rarely bracteate. Fruiting pedicels erect, ascending, or divaricate. Sepals ovate or oblong, erect or spreading, rarely reflexed, glabrous or pubescent, base of lateral pair not saccate. Petals white or pink, sometimes yellowish, longer or rarely shorter than sepals; blade obovate, spatulate, or oblanceolate, apex obtuse or retuse; claw distinct or not. Stamens 6, tetradynamous; filaments rarely dilated at base; anthers ovate or narrowly oblong, apex apiculate or obtuse. Median glands absent; lateral ones semilunar or 1 on each side of lateral stamen. Ovules (8–)16–36(–44) per ovary. Fruit dehiscent siliques, linear or rarely linear-oblong, terete or 4-angled, sessile; valves with branched trichomes sometimes mixed with simple ones, rarely glabrescent, torulose; replum rounded; septum complete; style obsolete or to 1 mm; stigma capitate, entire or 2-lobed. Seeds uniseriate, wingless, oblong or ovate, plump; seed coat reticulate, not mucilaginous when wetted; cotyledons incumbent.

About 14 species: C and SW Asia, one species extending into North America and another into N Africa and Europe; six species (one endemic) in China.

1a. Perennials, at least lowermost portion of raceme bracteate.
   2a. Fruit (9–)12–25(–32) × 0.5–0.9(–1) mm, uniform in width; petals 3–5(–8) mm; seeds uniseriate; racemes bracteate along lowermost portion, rarely throughout ........................................ 1. *N. humilis*
   2b. Fruit 3–10(–15) × 1–1.3 mm, widest near or at base; petals 1–2.5(–3) mm; seeds often subseriately at basal portion of fruit; racemes bracteate throughout or rarely only along proximal half ... 2. *N. brachycarpa*
   1b. Annuals or biennials, if perennial then style more than 1 mm; racemes ebracteate.
   3a. Racemes racemose flexuous; fruit straight; Nei Mongol ........................................ 6. *N. qingshuiehense*
   3b. Racemes rachis straight; fruit twisted or curved apically; elsewhere.
   4a. Stem leafless; petals less than 2 mm; basal leaves including petiole less than 1 cm ........... 5. *N. brevipes*
   4b. Stem leafy; petals more than 2 mm; basal leaves including petiole more than 1 cm.
   5a. Fruiting pedicels narrower than fruit, (3–)4–6(–8) mm; petals 5–7 mm ....................... 3. *N. korolkowii*
   5b. Fruiting pedicels as thick as fruit, 0.3–1–(2) mm; petals (2–)2.5–3.5(–4) mm .................. 4. *N. torulosa*
3. Neotorularia korolkowii

A highly variable species in pubescence, leaf shape and margin, flower color and size, length of the bracteate portion of the raceme, fruit orientation and length, cotedyledonary position, and chromosome number. Numerous taxa have been described from China, Russia, and North America, but the variation is continuous and does not support the recognition of infraspecific taxa. Fully bracteate racemes, though very rare, appear sporadically in populations that otherwise have racemes only basally bracteate. The above synonymy pertains only to China, and it represents about half of the total synonymy of the species.


Malcolmia brevipes (Boissier); T. torulosa var. scorpiuroides (Boissier)
Hedge & J. Léonard; Sisymbrium rigidum Marschall von Bieberstein; S. scorpiuroides Boissier; Torularia torulosa (Desfontaines) O. E. Schulz; T. torulosa var. scorpiuroides (Boissier) O. E. Schulz.

Herbs annual, (1.5–)7–25(–35) cm tall, sparsely to densely covered with rigid, straight, simple trichomes to 1 mm, these mixed with much smaller, short-stalked or sessile, forked trichomes, rarely glabrescent above. Stems usually few to several from the base, rarely simple, ascending to erect. Basal leaves rosulate; petiole 0.3–2(–4) cm; leaf blade oblanceolate, or linear-oblanceolate. (1.5–)2.5–6.5(–12) cm × (1–)3–13(–20) mm, sparsely to densely pubescent, rarely subglabrous, base attenuate, margin dentate or sinuate, rarely pinnatisect or subentire, apex acute or obtuse. Cauline leaves similar to basal leaves but progressively smaller upward, sessile to subsessile. Racemes ebracteate.

Fruiting pedicels divaricate or ascending, stout, as thick as fruit, 0.3–1(–2) mm. Sepals oblong, (1–)1.5–2 × 0.4–0.8 mm, not saccate. Petals white, oblanceolate, (2.2–)2.5–3.5(–4) × (0.3–)0.5–1 mm, apex obtuse. Filaments (1–)1.5–2.5 mm; anthers ovate, 0.3–0.5 mm, apex pubescent. Filaments 14–40 per ovary. Fruit cylindric, (0.8–)1.5–2.8(–3.7) cm × 0.8–1 mm, straight, arcuate, or spirally involuted up to 3 turns, terete, strongly torulose, glabrous or pubescent with forked and/or simple subsetose trichomes; style 0.3–1 mm; stigma entire or slightly 2-lobed. Seeds oblong, (0.6–)0.8–1.2 × 0.4–0.6 mm. Fl. and fr. Feb–Jun.

Deserts, steppe, hillsides, rocky areas; near sea level to 1500 m. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Turkmenistan, Uzbekistan [N Africa, SW Asia, SE Europe].

This is a highly variable species, especially in leaf morphology and pubescence. Forms with glabrous fruit are recognized by some botanists as var. scorpiuroides, but these do not merit recognition because both glabrous and pubescent plants can be found in the same population. The species is often confused with the following species, and the above description was taken from the protologue.

Herbs annual, (2–)4–11(–15) cm tall, sparsely covered with minute, short-stalked trichomes, often glabrescent above. Stems 1 or few from the base, erect. Basal leaves rosulate; petiole 0.5–1(–2) mm; leaf blade ovate or oblanceolate, (1–)3–10 × 0.5–1.5(–3) mm, sparsely pubescent, rarely subglabrous, base cuneate, margin entire, apex obtuse or rounded. Cauline leaves absent. Racemes ebracteate. Fruiting pedicels ascending, stout and slightly narrower than fruit, 0.1–2(–5) mm. Sepals oblong, 0.9–1.2 × 0.4–0.5 mm, not saccate. Petals white or lavender, oblanceolate, 1.1–1.7 × 0.3–0.4 mm, apex obtuse. Filaments 0.8–1.5 mm; anthers ovate, 0.1–0.2 mm, apex pubescent. Ovules 14–32 per ovary. Fruit cylindric, (0.6–)1–1.8(–2.2) cm × 0.5–0.8 mm, straight, terete, torulose, glabrous or pubescent with minute forked trichomes; style 0.2–0.7 mm; stigma slightly 2-lobed. Seeds oblong, 0.6–0.8(–1) × 0.2–0.4(–0.5) mm. Fl. and fr. Apr–Jun.

The above first records of Neotorularia brevipes from China and Afghanistan are based on Przewalski s.n., 2–14 May 1879 (LE) and Podlech 31387 (M), respectively. The latter is a mixed collection of N. brevipes and N. torulosa.


短梗念珠芥 duan geng nian zhu jie

Sisymbrium brevipes Karelín & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 154. 1942; Dichasianthus brevipes (Karelín & Kirilov) Soják; Fedtschenkova brevipes (Karelín & Kirilov) Dvorák; Hesperis brevipes (Karelín & Kirilov) Kuntze; Malcolmia brevipes (Karelín & Kirilov) Boissier; Torularia brevipes (Karelín & Kirilov) O. E. Schulz; T. brevipes var. leiocarpa O. E. Schulz.

Herbs annual, 8–13 cm tall, densely covered with short-stalked, forked or 3-rayed trichomes, these mixed with simple ones at least on petioles. Stems usually few from base, ascending or erect. Basal leaves rosulate; petiole 1–1.5 cm; leaf blade ovate, 1–1.5 cm × 2–2.5 mm, base cuneate, margin coarsely dentate or pinnatifid, apex acute; terminal lobe 2.5–3 mm. Cauline leaves few, similar to basal leaves but smaller and with a shorter petiole. Racemes ebracteate; rachis distinctly flexuous in fruit. Fruiting pedicels ascending or divaricate, slender, narrower than fruit, 3–4 mm. Sepals oblong, 2–2.5 × 1–1.3 mm, not saccate. Petals white or pink, broadly obovate, ca. 5 × 2.5 mm, apex retuse. Ovules 20–22 per ovary. Fruit cylindric, 0.8–2 cm × ca. 1 mm, straight, terete, strongly torulose, pubescent with short-stalked, forked or 3-rayed trichomes; style ca. 1 mm; stigma slightly 2-lobed. Seeds oblong, ca. 1 × 0.5–0.6 mm. Fl. and fr. Jul.

Rocky areas. Nei Mongol.

The present authors have seen no material of this species, and the above description was taken from the protologue.

**Platypetalum** R. Brown.

Herbs perennial with simple or many-branched caudices, sometimes forming cushions. Trichomes simple or forked.

Basal leaves petiolate, rosulate, simple, entire or dentate, rarely pinnately lobed, petiolar base persistent. Cauline leaves absent, rarely few, sessile or nearly so, not auriculate, entire or rarely dentate. Racemes ebracteate or only

**Synstemonanthus** Botschantzev.

Herbs annual or biennial. Trichomes flattened, strongly crisped, simple or minutely stalked and forked. Stems erect or ascending, often branched basally. Basal leaves petiolate, rosulate or not, simple, pinnatifid or pinnatisect, often withered by flowering. Cauline leaves petiolate or sessile, not auriculate, entire or pinnatisect. Racemes ebracteate, elongated in fruit. Fruiting pedicels ascending or divaricate. Sepals oblong, ascending, base of lateral pair not saccate. Petals lavender, much longer than sepals; blade obovate, apex rounded; claw subequaling sepals, sparsely to densely pubescent. Stamens 6, tetradyamous; filaments glabrous or sparsely to densely pubescent on proximal half, slightly dilated at base, median pairs united only basally; anthers oblong, apiculate at apex. Nectar glands confluent and subtending bases of all stamens; median glands present. Ovules 20–36 per ovary. Fruit dehiscent siliques, linear, latiseptate, sessile or shortly stipitate; valves papery, with a distinct midvein, sparsely pubescent basally when young, torulose; replum rounded; septum complete, membranous, translucent, veinless; style to 1 mm; stigma capitate, entire. Seeds uniseriate, winged distally, oblong, somewhat plump; seed coat minutely reticulate, mucilaginous when wetted; cotyledons incumbent.

- Two species.

1a. Annuals; cauline leaves linear, sessile, entire, 0.5–1.7 mm wide; fruit straight; filaments sparsely to densely pilose basally ................................................................. 1. *S. petrovii*

1b. Biennials; cauline leaves narrowly lanceolate, petiolate, pinnatifid or pinnatisect, 3–10 mm wide; fruit arcuate; filaments glabrous ......................................................................................................... 2. *S. lulianlianus*


**连蕊芥** 胡里菊

*Synstemon deserticola* Y. Z. Zhao; *S. petrovii* var. *pilosus* Botschantzev; *S. petrovii* var. *xinglongicus* Z. X. An; *Synstemonanthus petrovii* (Botschantzev) Botschantzev; *S. petrovii* var. *pilosus* (Botschantzev) Botschantzev.

Herbs annual, 15–30 cm tall. Stems often branched basally and above, sparsely pilose or glabrescent. Basal leaves shortly petiolate, not rosulate, often withered by flowering, pinnatifid or pinnatisect, 1–2 cm × 3–5 mm, apex acute. Cauline leaves linear, sessile, 0.5–4 cm × 0.5–1.7 mm, somewhat fleshy, margin entire, apex acute, sparsely pilose. Fruiting pedicels divaricate or ascending, slender, glabrous, 4–10 mm. Sepals oblong, 2–2.5 × 0.9–1.2 mm, glabrous or densely pilose. Petals lilac, obovate, 4.5–5.5 × 1.7–2.8 mm, apex rounded; claw 1–2.5 mm, sparsely to densely pilose. Filaments of median stamens 2.5–3 mm, united at base, glabrous; lateral stamens 1.5–2.5 mm, glabrous; anthers oblong, 1–1.1 mm. Ovules 28–32 per ovary. Fruit linear, compressed, 2.5–3 × 1.2–1.5 mm, sparsely pilose or glabrescent. Petals lilac, obovate, 4.5–6 × 2–3 mm, apex rounded; claw 2–2.5 mm, pilose. Filaments of median stamens 2.5–3 mm, united at base, glabrous; lateral stamens 1.5–2.5 mm, glabrous; anthers oblong, 1–1.1 mm. Ovules 28–32 per ovary. Fruit linear, compressed, 2.5–3 cm × ca. 1.2 mm, arcuate; valves sparsely pubescent basally when young, soon glabrescent, with a distinct midvein; gynophore obsolete; style ca. 0.5 mm. Seeds oblong, ca. 1.3 × 0.7 mm. Fl. and fr. Apr.

- Gansu.

This species is known only from the type collection, *Dushendenko* 156 (LE).


**陆氏连蕊芥** 沙里lian zhu jie

Herbs biennial, 7–15 cm tall. Stems branched basally, unbranched above, sparsely pilose or glabrescent. Basal leaves petiolate, rosulate, often withered by flowering; petiole 0.5–1.5 cm; blade lanceolate, pinnatisect or pinnatifid, 1–2.5 cm × 4–10 mm, apex acute. Cauline leaves with petioles 1–4 mm; leaf blade narrowly lanceolate, 0.5–4 cm × 0.5–1.7 mm, glabrescent or pilose, pinnatisect, apex acute; lateral lobes oblong, 1–5 × 0.5–1 mm. Fruiting pedicels divaricate, slender, glabrous, 6–10 mm. Sepals oblong, 2.5–3 × 1.2–1.5 mm, sparsely pilose or glabrescent. Petals lilac, obovate, 4.5–6 × 2–3 mm, apex rounded; claw 2–2.5 mm, pilose. Filaments of median stamens 2.5–3 mm, united at base, glabrous; lateral stamens 1.5–2.5 mm, glabrous; anthers oblong, 1–1.1 mm. Ovules 28–32 per ovary. Fruit linear, compressed, 2.5–3 cm × ca. 1.2 mm, arcuate; valves sparsely pubescent basally when young, soon glabrescent, with a distinct midvein; gynophore obsolete; style ca. 0.5 mm. Seeds oblong, ca. 1.3 × 0.7 mm. Fl. and fr. Apr.

- Gansu.

This species is known only from the type collection, *Dushendenko* 156 (LE).


**肉叶芥属** 肉叶芥

*Platypetalum* R. Brown.

Herbs perennial with simple or many-branched caudices, sometimes forming cushions. Trichomes simple or forked. Basal leaves petiolate, rosulate, simple, entire or dentate, rarely pinnately lobed, petiolar base persistent. Cauline leaves absent, rarely few, sessile or nearly so, not auriculate, entire or rarely dentate. Racemes ebracteate or only
lowermost flowers bracteate, elongated or not in fruit. Fruiting pedicels erect or divaricate. Sepals ovate or oblong, caducous or persistent, erect, base of lateral pair not saccate, margin membranous. Petals white, pink, or purple, rarely yellow, longer than sepals; blade obovate or oblanceolate, apex obtuse or rounded; claw shorter than sepals. Stamens 6, tetradynamous; filaments dilated at base; anthers ovate or oblong, obtuse at apex. Nectar glands 4, 1 on each side of lateral stamen; median glands absent. Ovules 4–26 per ovary. Fruit dehiscent siliques or silicles, linear, oblong, ovoid, or lanceolate, or slightly latiseptate, sessile; valves with a distinct midvein, glabrous or pubescent, smooth or torulose; replum rounded; septum complete, membranous, translucent; style obsolete or to 1 mm; stigma capitate, entire or slightly 2-lobed. Seeds uniseriate or rarely biseriate, wingless, oblong or ovoid, plump; seed coat minutely reticulate, not mucilaginous when wetted; cotyledons incumbent.

Six polymorphic species: alpine, subarctic, or temperate regions of Asia, Europe, and North America; three species in China. *Braya siliquosa* Bunge (from Kazakhstan, Mongolia, and Russia) was recorded from Qinghai and Yunnan in FRPS, Fl. Qinghai (1: 501. 1997), and Fl. Yunnan. (6: 117. 1995), but these records are based on misidentified plants of *Neotorularia pamirica*. 1a. Petals yellow; inflorescence basally bracteate ................................................................. 1. *B. scharnhorstii*

1b. Petals white, lavender, or purple; inflorescence ebracteate.

2a. Caudex extensively branched, densely covered with persistent petioles; trichomes exclusively simple; fruit hardly longer than sepals ............................................................................................................ 2. *B. forrestii*

2b. Caudex few branched or simple, often with few or no petiolar remains; at least some trichomes forked; fruit often longer than sepals ..................................................................................................................................................... 3. *B. rosea*


*Braya pamirica* Z. X. An; *Braya pamirica* var. *B. thomsonii* O. E. Schulz; *Braya oxycarpa* (Regel & Korshinsky) O. Edw.; *Braya siliquosa* Korshinsky; *B. scharnhorstii* (Regel & Schmalhausen) O. E. Schulz; *B. pamirica* (Korshinsky) O. E. Schulz; *B. sternbergii* (Regel & Korshinsky) O. E. Schulz; *B. scharnhorstii* var. *B. pamirica* (Korshinsky) O. E. Schulz; *B. forrestii* Hooker var. *B. pamirica* var. *B. pamirica* var. *B. pamirica* var. glabra O. E. Schulz; *B. sternbergii* Krassnov; *B. thomsonii* J. D. Hooker var. *B. pamirica* (Korshinsky) O. E. Schulz; *Erysimum pamiricum* Korshinsky; *Neotorularia pamirica* Z. X. An; *Solms-laubachia carnosifolia* Z. X. An.

Herbs densely cespitose, (2–3–12–(17) cm tall, scapose, densely to sparsely pilose with short-stalked, forked trichomes often mixed with fewer simple ones; caudex densely covered with petiolar remains of previous years’ growth, few to many branched. Basal leaves rosulate; petiole (2–3–8–(11) mm, persistent and becoming papery, greatly expanded and to 3 mm wide at base, ciliate with simple trichomes; leaf blade linear to linear-oblong, obovate, rarely obovate, 0.2–0.4–2.5–(4) cm × 0.5–1.5–(2) mm, densely pilose or glabrous, base attenuate, margin entire, apex obtuse. Cauline leaves sessile, similar to basal ones. Racemes bracteate along lower part, elongated in fruit. Fruiting pedicels ascending, 2–6–(10) mm. Sepals greenish, ovate or oblong, 2–2.5 × 1–1.5 mm, sparsely to densely pubescent, broadly white margined. Petals yellow, broadly obovate, 3.5–5 × 1.5–3 mm, apex rounded; claw often pinkish, 1.5–2 mm. Filaments pinkish, 1.5–2.5 mm; anthers ovate, 0.5–0.6 mm. Ovules 6–14 per ovary. Fruit ovoid, oblong, or linear, (3–)4–8–(12) × 1–1.5 mm, puberulent, torulose; style 0.5–1 mm. Seeds ca. 1–1.4 × 0.5–0.6 mm. Fl. Jul–Aug, fr. Aug–Sep.

Stony slopes, sandy areas, mountains; 3500–5000 m. SW Xinjiang (Taxkorgan Tajik Zizhixian, Yecheng Xian) [Kyrgyzstan, Tajikistan].

The above first record of *Braya scharnhorstii* from China is based on the type collections of *Neotorularia pamirica* and *Solms-laubachia carnosifolia*, as well as on *Qinghai-Tibet Team 1151 (HNWP, KUN)*, from Yecheng Xian, and *Qinghai-Tibet Team 670474 (KUN)*; *Xinjiang Team 764 (MO, PE)*, *Xinjiang Team 1351 (WUK)*, and *Zhu Guiling 56 (XJA)*, all from Taskorgan Tajik Zizhixian.

This is the only species of the genus with yellow flowers, pinkish petal claws, and bracteate racemes. *Braya pamirica* differs from *B. scharnhorstii* only in having longer fruit, and the difference appears to be continuous and unreliable. The species is highly variable in the density of indumentum, and forms with glabrescent or variously pubescent leaf blades exist.


*Braya forrestii* var. *puberula* W. T. Wang.

Herbs densely cespitose, (0.7–)1.5–5.5–(6.5) cm tall, scapose, densely to sparsely pilose with exclusively simple trichomes to 1 mm, rarely glabrous throughout except for petiole margin and leaf apex; caudex densely covered with petiolar remains of previous years, up to 40-branched, unbranched basal portion to 3 cm in diam. Basal leaves rosulate; petiole (2–)4–10–(15) mm, persistent and becoming papery, greatly expanded and to 4 mm wide at base, ciliate; leaf blade linear to linear-oblong, rarely broadly obovate, (0.3–)1.2–2.8–3.5 cm × 0.5–2–(4) mm, densely to sparsely pilose, rarely glabrous except for a few trichomes at leaf apex, base attenuate, margin entire, apex obtuse or acute. Scapes spreading or retroflex pilose, leafless. Racemes ebracteate, not elongated and to 8 mm in fruit. Fruiting...
pedicels ascending, 2–5 mm. Sepals subapically purple, ovate or oblong, 2.5–3 × 1.5–2 mm, glabrous or pubescent, broadly white margined. Petals purple, pink, or white, broadly obovate, 4–6 × 2–3 mm, apex rounded; claw 1.5–2.5 mm. Filaments 2–3 mm; anthers oblong, 0.6–0.8 mm. Ovules 4–8 per ovary. Fruit ovoid, 4–7 × 1.5–3 mm, glabrous or puberulent; style 0.5–1 mm. Seeds ca. 1.7 × 0.9 mm. Fl. May–Jul, fr. Jul–Aug.

Alpine turf and scree, rocky pastures; 3700–5000 m. Sichuan, Xizang, Yunnan [Butuan].


红花肉叶荠 hong hua rou ye qi

Platypetalum roseum Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 11: 87. 1838; Braya aenea Bunge; B. aenea subsp. pseudoaenia Petrovsky; B. angustifolia (N. Busch) Vassilczenko; B. vassilczek Vassilczenko; B. brevicaulis Em. Schmid; B. limosella Bunge; B. limoselloidex Bunge ex Ledebour; B. rosea var. aenea (Bunge) Malyschev; B. rosea var. brachycarpa (Vassilczenko) Malyschev; B. rosea var. glabra Regal & Schmalhausen; B. rosea var. leiocarpa O. E. Schulz; B. rosea var. multicaulis B. Fedtschenko; B. rosea var. simplicior B. Fedtschenko; B. sinuata Maximowicz; Braya thomsonii J. D. Hooker; B. tibetica J. D. Hooker & Thomson; B. tibetica f. breviscapa Pampanini; B. tibetica f. linearifolia Z. X. An; B. tibetica f. sinuata (Maximowicz) O. E. Schulz; B. tinkleri Em. Schmid; Hesperis limosella (Bunge) Kuntze; H. limoselloides (Bunge ex Ledebour) Kuntze; H. rosea (Turczaninow) Kuntze; Sisymbrium alpinum (Sternberg & Hoppe) Fournier var. aeneum (Bunge) Trautvetter; S. alpinum var. roseum (Turczaninow) Trautvetter; S. limosella (Bunge) Fournier.

Herbs (1–)3–10(–16) cm tall, scapose, densely to sparsely pilose with short-stalked, forked trichomes


盐芥属 yan jie shu

Herbs annual, often glaucous above. Trichomes absent. Stems erect or ascending, sometimes prostrate. Basal leaves petiolate, somewhat fleshy, rosulate or not, often withered by flowering, simple, entire or rarely toothed or pinnatifid. Cauline leaves shortly petiolate or sessile, attenuate and not auriculate, auriculate, sagittate, or amplexicaul at base, entire or rarely obscurely dentate. Racemes few to several flowered, ebracteate. Fruiting pedicels ascending or divaricate. Sepals ovate or oblong, erect, base of lateral pair not saccate. Petals white, longer or shorter than sepals, rarely absent; blade obovate or oblanceolate, apex obtuse; claw obsessantly differentiated from blade. Stamens 6, slightly tetradynamous; filaments not dilated at base; anthers ovate or oblong, apex obtuse or apiculate. Median glands absent; lateral glands 1 on each side of lateral stamen. Ovules 15–90 per ovary. Fruit dehiscence rachis flexuous; petals absent or rarely as long as sepals; secondary veins of fruit valve conspicuously .................................................. 3. T. parvula

Three species: saline habitats from SW to E Asia, one species disjunct in North America; three species in China.

1a. Cauline leaves linear to linear-oblanceolate or linear-oblong, shortly petiolate, not auriculate at base; infructescence rachis flexuous; petals absent or rarely as long as sepals; secondary veins of fruit valve conspicuous .................................................. 3. T. parvula

1b. Cauline leaves cordate, ovate, or oblong, sessile, auriculate or amplexicaul at base; infructescence rachis straight; petals well-developed and much longer than sepals; secondary veins of fruit valve obscure.

2a. Seeds uniseriate, (0.5–)0.6–0.8 mm; ovules 15–26 per ovary; fruit 0.4–0.5 mm wide .................. 1. *T. halophila*

2b. Seeds biseriate, 0.4–0.5 mm; ovules 55–90 per ovary; fruit (0.7–)0.8–1 mm wide .................. 2. *T. salsuginea*

1. *Thellungiella halophila* (C. A. Meyer) O. E. Schulz in Engler, Pflanzenr. 86(IV. 105): 253. 1924. 小盐芥  *Sisymbrium halophilum* C. A. Meyer in Ledebour, Fl. Altaic. 3: 143. 1831; *Hesperis halophila* (C. A. Meyer) Kuntze; *Stenophragma halophilum* (C. A. Meyer) B. Fedtschenko. Herbs (2–)6–22(–30) cm tall. Stems erect or ascending, simple or few branched at base. Basal leaves rosulate; petiole 1–6 mm; blade obovate, spatulate, or oblong, 3–10(–20) × 1–3(–5) mm, margin dentate, pinnatifid, or entire, apex obtuse. Middle cauline leaves oblong or ovate, sessile, 3–12(–20) × 1–3(–5) mm, base auriculate or rarely deeply sagittate-amplexicaul, margin dentate or entire, apex acute or obtuse. Infructescence rachis straight. Fruiting pedicels slender, divaricate to divaricate-ascending, 2–7(–10) mm. Sepals oblong, 1.5–1.5 × 0.5–0.6 mm. Petals white, obovate, 2–3 × 1–1.7 mm. Apex obtuse. Ovules 55–96 per ovary. Fruit 0.7–1.6(–2) cm × (0.7–)0.8–1 mm, distinctly torulose, sessile; valves obscurely veined; style 0.1–0.3 mm. Seeds brown, oblong, biseriate, 0.4–0.5 × 0.2–0.3 mm. Fl. and fr. Apr–Jul.

Saline flats, river banks, steppe. Hebei, Henan, Jiangsu, Jilin, Nei Mongol, Shandong, Xinjiang [Kazakstan, Kyrgyzstan, Mongolia, Russia, Turkmenistan, Uzbekistan; North America].

2. *Thellungiella salsuginea* (Pallas) O. E. Schulz in Engler, Pflanzenr. 86(IV. 105): 252. 1924. 小盐芥  *Sisymbrium salsugineum* Pallas, Reise Russ. Reich. 2: 466. 1773; *Arabidopsis salsuginea* (Pallas) N. Busch; *Hesperis salsuginea* (Pallas) Kuntze; *Stenophragma salsugineum* (Pallas) Prantl. Herbs (6–)10–30(–40) cm tall. Stems erect or ascending, simple or several branched at base. Basal leaves rosulate or not; petiole 5–10 mm; blade obovate, spatulate, or oblong, 0.5–1.5(–2.5) cm × 2–5 mm, margin entire or rarely dentate or pinnatifid, apex obtuse. Middle cauline leaves cordate, ovate, or oblong, sessile, 0.4–1.7(–2.5) cm × 1–7(–10) mm, base deeply sagittate-amplexicaul, rarely auriculate, margin entire or repand, apex acute or obtuse. Infructescence axis straight. Fruiting pedicels slender, divaricate to divaricate-ascending, 3–10 mm. Sepals oblong, 1–1.5 × 0.5–0.6 mm. Petals white, obovate, 2–3 × 1–1.7 mm. Filaments 1–1.5 mm; anthers oblong, 0.2–0.4 mm, apiculate. Ovules 55–96 per ovary. Fruit 0.7–1.6(–2) cm × (0.7–)0.8–1 mm, distinctly torulose, sessile; valves obscurely veined; style 0.1–0.3 mm. Seeds brown, oblong, biseriate, 0.4–0.5 × 0.2–0.3 mm. Fl. and fr. Apr–Jun.

Saline areas. Xinjiang [Kazakstan, Russia (Siberia)]. Records in FRPS of *T. salsuginea* from Hebei, Henan, Jiangxi, Nei Mongol, and Shandong were based on misidentified plants of *T. salsuginea*. The differences in stem branching, margin of basal leaves, and fruit length given in FRPS and other floras are unreliable, and only the characters in the key above consistently separate the two species.

3. *Thellungiella parvula* (Schrenk) Al-Shehbaz & O’Kane, Novon 5: 309. 1995. 小条叶盐芥  *Diplotaxis parvula* Schrenk in Fischer & C. A. Meyer, Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Pétersbourg 2: 199. 1844; *Arabidopsis parvula* (Schrenk) O. E. Schulz; *Sisymbrium parvulum* (Schrenk) Lipsky; *Stenophragma parvulum* (Schrenk) B. Fedtschenko. Herbs (4–)7–25(–30) cm tall. Stems erect or ascending, simple or few branched at base. Basal leaves not rosulate, withered by flowering time. Middle cauline leaves shortly petiolate, linear to linear-oblancoleolate or linear-oblong, (0.4–)1.5–3(–4) cm × 0.5–2 mm, base attenuate and not auriculate, margin entire or rarely 1- or 2-toothed on each side, apex rounded or obtuse. Infructescence axis flexuous. Fruiting pedicels slender, glabrous, divaricate to divaricate-ascending, 1–7 mm. Sepals oblong, 1–1.5 × 0.5–0.6 mm, glabrous. Petals absent, rarely present and white, oblanceolate and to 1.5 mm. Filaments 1.5–2 mm; anthers ovate, 0.1–0.2 mm, apex obtuse. Ovules 25–50 per ovary. Fruit (0.5–)0.7–1.5(–2) cm × 1.1–1.4 mm, torulose, sub-sessile or on a gynophore to 0.3 mm; valves prominently veined; style 0.2–0.6 mm. Seeds brown, ovate, 0.5–0.8 × 0.4–0.6 mm. Fl. and fr. May–Jun. 2n = 14.

Saline steppe. Xinjiang [Kazakstan, Russia, Turkmenistan, Uzbekistan; SW Asia].


Herbs annual or biennial. Trichomes simple, mixed with short-stalked, forked smaller ones. Stems simple basally, branched above, base often hisrute with simple trichomes. Basal leaves petiolate or subsessile, not rosulate, simple, entire or toothed, rarely lobed, withered by flowering. Cauline leaves sessile, auriculate or sagittate at base, entire or
dentate. Racemes ebracteate, elongated considerably in fruit. Fruiting pedicels slender, divaricate. Sepals oblong or ovate, erect, base of lateral pair not saccate. Petals yellow or rarely white, spatulate, longer than sepal, apex obtuse. Stamens 6, in 3 pairs of unequal length; filaments not dilated at base; anthers ovate or oblong, obtuse at apex. Nectar glands 4, 1 on each side of lateral stamen; median glands absent. Ovules 8–25 per ovary. Fruit dehiscence silicles or rarely siliques, obpyriform, obovoid, or rarely linear, shortly stipitate; valves leathery, often with a prominent midvein, smooth, margins of 2 valves flattened and connate, apex abruptly curdulate and extending 1–2 mm into style; replum rounded, concealed by connate margins of valves; septum complete; style 1.5–4 mm; stigma capitulate, entire. Seeds biseriate or rarely uniseriate, wingless or narrowly margined, oblong, plump or slightly flattened; seed coat minutely reticulate, copiously mucilaginous when wetted; cotyledons incumbent or rarely accumbent.

Six or seven species: SW Asia and S Europe; two species in China.

1a. Stems and leaves glabrous, glabrescent, or mainly with minute branched trichomes; fruit 7–9(–10) mm; seeds

(1.5–)1.7–3 mm

1b. Stems (at least basally) and leaves with predominantly simple trichomes to 2.5 mm, these mixed with much smaller branched ones; fruit (2.5–)3.5–5(–6) mm; seeds 0.8–1.4(–1.5) mm

2. C. sativa


Camelina sativa Linnaeus, Sp. Pl. 2: 641. 1753; Camelina caulaca (Sinskaya) Vassilczenko; C. glabrata (de Candolle) Fritsch ex N. Zinger; C. pilosa (de Candolle) N. Zinger; C. sativa var. caulaca Sinskaya; C. sativa var. glabrata de Candolle; C. sativa var. pilosa de Candolle.

Herbs annual, (12–)30–80(–100) cm tall, glabrous or sparsely pubescent with small branched trichomes rarely mixed with fewer simple ones. Stems simple or branched above, often glabrescent. Cauline leaves lanceolate, narrowly oblong, or linear-lanceolate, middle ones (1–)2–7(–9) cm × 2–10(–15) mm, glabrescent or sparsely pubescent with primarily forked trichomes, base saccate or strongly auriculate, margin entire or rarely remotely denticulate, apex acute. Fruiting pedicels (0.8–)1.2–2.7 cm. Sepals 2–3 × 0.5–1 mm. Petals yellow, (3–)4–5.5 × 0.5–1 mm. Filaments 1.5–3 mm; anthers ca. 0.5 mm. Fruit obpyriform or broadly obovoid, 7–9(–10) × 4–5 mm, often subtruncate at apex; valves with a distinct midvein and less prominent lateral veins; style 1–3.5 mm. Seeds dark brown, oblong (1.5–)1.7–2.5(–3) × 0.7–1 mm. Fl. May–Jun. 2n = 40.

Farms, fields, roadsides, forest margins, mountain slopes; 700–1600 m. Gansu, Heilongjiang, Henan, Jilin, Liaoning, NE Mongolia, Shandong, Xinjiang [Kazakhstan, Mongolia, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia, Europe; introduced in North America].

Camelina microcarpa. Plants with similarly deformed morphology have been observed in collections from Europe and North America.

Camelina longistyla Bordzil; C. microphylla Z. X. An; C. sativa (Linnaeus) Crantz subsp. microcarpa (de Candolle) Hegi & E. Schmid; C. sylvestris Wallrath.

Herbs annual, (8–)20–60(–80) cm tall, densely to moderately hirsute with simple trichomes to 2.5 mm, these mixed with branched fewer ones. Stems simple or branched above, densely hirsute basally, glabrescent above. Cauline leaves lanceolate or narrowly oblong, or linear-lanceolate, middle ones (0.8–)1.5–5.5(–7) cm × 1–10(–20) mm, pubescent primarily with simple trichomes, often subulate, base sagittate or minutely auriculate, margin entire or rarely remotely denticulate, apex acute. Fruiting pedicels 4–14(–17) mm. Sepals 2–2.5 × 0.5–1 mm. Petals pale yellow, 3–4 × 0.5–1 mm. Filaments 1.5–3 mm; anthers ca. 0.5 mm. Fruit obpyriform to narrowly so, (2.5–)3.5–5(–6) × 2–4(–5) mm, acute at apex; valves with a distinct midvein and less prominent lateral veins; style 1–3.5 mm. Seeds reddish brown or brown, oblong, 0.8–1.4(–1.5) × 0.5–0.6 mm. Fl. Apr–Jun. fr. May–Aug. 2n = 40.

Farms, fields, roadsides, forest margins, mountain slopes; 700–1600 m. Gansu, Heilongjiang, Henan, Jilin, Liaoning, NE Mongolia, Shandong, Xinjiang [Kazakhstan, Mongolia, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia, Europe; introduced in North America].

Camelina microphylla is based on grazed and deformed plants of C. microcarpa. Plants with similarly deformed morphology have been observed in collections from Europe and North America.

ebracteate or rarely basally bracteate, elongated or not in fruit. Fruiting pedicels slender, divaricate or erect. Sepals oblong or linear, erect or ascending, base of lateral pair not saccate. Petals yellow or rarely cream white, as long as or longer than sepals; blade obovate or oblancoate, rarely oblong, apex obtuse; claw obsolete or distinct. Stamens 6, tetradynamous; filaments not dilated at base; anthers oblong, obtuse at apex. Nectar glands confluent, subtending bases of all stamens; median glands present. Ovules 5–100 per ovary. Fruit dehiscent siliques or silicles, linear, oblong, clavate, or rarely elliptic, terete, sessile; valves with a prominent midvein, smooth or torulose; replum rounded; septum complete or perforated, membranous, veinless or with 1–3 longitudinal veins; style absent or rarely distinct and to 1 mm; stigma capitate, entire. Seeds uniseriate or biseriate, wingless, oblong or ellipsoid, plump; seed coat minutely reticulate, usually mucilaginous when wetted; cotyledons incumbent.

About 40 species: mainly in North and South America (30 species) and Macaronesia (seven species), one species a cosmopolitan weed.

The record of Descurainia sophioides (Fischer) O. E. Schulz in FRPS and Fl. Xizang. (2: 410. 1985) is based on misidentified plants of D. sophia. The former species is restricted to Alaska, Canada, and Russia (Far East and Siberia). It is readily distinguished from D. sophia by having clavate glands on the distal parts of the plant and generally shorter fruiting pedicels 2–7(–10) mm. By contrast, D. sophia is completely eglandular and has fruiting pedicels (5–)8–15(–20) mm.


Herbs annual, (10–)20–70(–100) cm tall, eglandular, sparsely to densely pubescent with dendritic trichomes, sometimes glabrous distally. Stems erect, simple basally, often branched above. Basal and lowermost cauline leaves 2- or 3-pinnatisect, ovate or oblong in outline, to 15 × 8 cm; petiole 0.1–2(–3) cm; leaf blade ultimate division linear or oblong, entire, acute to 10 × 2 mm. Upper cauline leaves sessile or shortly petiolate, smaller and often with narrower ultimate lobes, often glabrous. Fruiting pedicels (0.5–)0.8–1.5(–2) cm, slender, much narrower than fruit, straight, divaricate or ascending. Sepals yellowish, oblong-linear, 2–2.5 × ca. 0.5 mm. Petals yellow, narrowly obovate-linear, 2–2.5 × ca. 0.5 mm; claw 1.5–2 mm. Filaments 2–3 mm; anthers ca. 0.5 mm. Ovules 20–40 per ovary. Fruit narrowly linear, (1.2–)1.5–2.7(–3) cm × 0.5–0.8(–1) mm; valves glabrous, torulose, with a prominent midvein; septum with a broad central longitudinal band appearing as 2 or 3 veins; style obsolete or to 0.2 mm. Seeds reddish brown, oblong, 0.7–1 × 0.3–0.6 mm. Fl. and Fr. Apr–Jun. 2n = 28*.

Roadsides, waste places, disturbed sites, fields, pastures, deserts; near sea level to 4200 m. Throughout China except Guangdong, Guangxi, Hainan, Taiwan [Afghanistan, Bhutan, Japan, Kashmir, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia, Sikkim, Tajikistan, Turkmenistan, Uzbekistan; N Africa, SW Asia, Europe; introduced elsewhere].

The seeds are sometimes used as a substitute for mustard. Preparations from the plant are taken internally to eradicate worms, and externally to treat indolent ulcers.

100. SOPHIOPSIS O. E. Schulz in Engler, Pflanzenr. 86(IV. 105): 346. 1924.

Herbs annual or biennial. Trichomes finely dendritic, rarely also simple and stalked forked at stem base. Stems erect or ascending, sometimes prostrate, terete. Basal leaves petiolate, not rosulate, simple, 2-pinnatisect. Cauline leaves petiolate or uppermost subsessile, 1- or 2-pinnatisect, rarely pinnatifid. Racemes ebracteate, bracteate throughout, or only basally bracteate. Fruiting pedicels erect, ascending, or divaricate. Sepals oblong or ovate-oblong, ascending, base of lateral pair not saccate. Petals yellow, shorter or much longer than sepals; blade obovate or spatulate, apex rounded; claw slightly to strongly differentiated from blade, shorter than to as long as sepals. Stamens 6, slightly tetracydynamous; filaments not dilated at base; anthers ovate or oblong, obtuse at apex. Nectar glands confluent and subtending bases of all stamens; median glands present; lateral glands semiunnular. Ovules 4–16 per ovary. Fruit dehiscent siliques or silicles, linear, oblong, obovate, or ellipsoid, terete or slightly 4-angled, sessile or shortly stipitate; valves with an obscure to prominent midvein, glabrous, smooth or subtorulose; replum rounded; septum complete or basally perforated, membranous; style obsolete or short and less than 1 mm; stigma capitate, entire. Seeds uniseriate, wingless, oblong, plump; seed coat minutely reticulate, mucilaginous when wetted; cotyledons incumbent.

Four species: C Asia; two species in China.

1a. Fruiting pedicels erect or ascending, often subappressed to rachis, densely pubescent; racemes bracteate at least basally; stems prostrate or rarely ascending; uppermost leaves 1-pinnatisect or pinnatifid; fruit terete; ovules 10–16 per ovary .......................................................... 1. S. annua

1b. Fruiting pedicels divaricate, not appressed to rachis, glabrous or glabrescent; racemes ebracteate; stems erect or rarely ascending; uppermost leaves 2-pinnatisect; fruit slightly 4-angled; ovules 4–8 per ovary 2. S. sisybrioides
1. **Sophiopsis annua** (Ruprecht) O. E. Schulz in Engler, Pflanzenr. 86(IV. 105): 347. 1924.

*zhong ya yu lie ye qi* or *zhong ya yu lie ye qi* (Kazakstan, Kyrgyzstan, Tajikistan, Uzbekistan).

Plants biennial, (4–)10–30(–40) cm tall, uniformly pubescent throughout with minute dendritic trichomes. Stems few to many from base, prostrate or rarely ascending. Basal leaves 2-pinnatisect, with 2–4 lateral lobes; petiole 1–3(–4) cm; leaf blade oblong or ovate in outline, 1–3(–5) cm × 5–10(–15) mm; ultimate segments oblong or obovate, 1–7 × 0.5–2 mm, margin entire, apex obtuse or rounded. Upper cauline leaves 1-pinnatisect or pinnatifid, subsessile, smaller than basal leaves. Racemes bracteate throughout or basally. Fruiting pedicels 3–7 mm, slender, erect or ascending, often subappressed to rachis, densely pubescent. Sepals 1.5–2 × 0.7–0.8 mm, sparsely pubescent. Petals yellow or pale yellow, oblanceolate, 2.5–3.5 × 1–1.5 mm, apex rounded, base attenuate to a clawlike base 0.5–1 mm. Filaments 1–1.5 mm; anthers ovate, 0.4–0.5 mm. Ovules 10–16 per ovary. Fruit ellipsoid to linear-ellipsoid, 5–10 × 1–1.8 mm, retuse; valves with an obscure midvein, apex acute; style slender, 0.1–0.2 mm; septum complete or basally perforated. Seeds brown, oblong, 1.3–2 × 0.6–1 mm. Fl. Jun.–Aug, fr. Jul.–Sep.

Gravelly slopes, alpine meadows; 2500–5100 m. Xinjiang [Kazakstan, Kyrgyzstan, Tajikistan, Uzbekistan].

The above first record from Xinjiang is based on Anonymous 13568 (PE). Although *Sophiopsis annua* was recorded from Xinjiang in FRPS, the species was not included in Fl. Xinjiang. (vol. 2(2). 1995).

There are several collections of the species from Xinjiang, including Qinghai-Xizang Team 870473 (HNWP, PE).

2. **Sophiopsis sisymbrioides** (Regel & Herder) O. E. Schulz in Engler, Pflanzenr. 86(IV. 105): 346. 1924.

*yu lie ye qi* or *yu lie ye qi* (Kazakstan, Kyrgyzstan, Tajikistan, Uzbekistan).

Plants biennial, (7–)12–45(–55) cm tall, uniformly pubescent throughout with minute dendritic trichomes. Stems simple or branched at base, erect or ascending. Basal leaves 2-pinnatisect, with 3 or 4 lateral lobes; petiole 1–3.5(–5) cm; leaf blade oblanceolate or ovate in outline, 2–6(–8) × 0.7–2.5(–3) cm; ultimate segments oblanceolate or obovate, 1–5(–10) × 0.5–2(–5) mm, margin entire, apex obtuse or rounded. Middle and upper cauline leaves 2-pinnatisect, petiolate, smaller than basal leaves, with 1 or 2 lateral lobes. Racemes ebracteate. Fruiting pedicels (4–)6–11(–13) mm, slender, divaricate, glabrous or glabrescent. Sepals 1.5–2–(2.5) × 0.7–0.8 mm, sparsely pubescent. Petals pale yellow, oblanceolate, 2.5–4 × 1–1.5(–1.8) mm, attenuate to a clawlike base 0.5–1 mm, apex rounded. Filaments 1.2–2 mm; anthers ovate, ca. 0.3 mm. Ovules 4–8 per ovary. Fruit obvoid or ellipsoid or narrowly obvoid-ellipsoid, (2.5–)3.5–7 × 1–1.5 mm, slightly 2-angled; valves with a prominent midvein, apex obtuse; style slender, 0.2–0.5 mm; septum complete or basally perforated. Seeds brown, oblong, 1.2–1.5 × 0.6–0.8 mm. Fl. May–Aug, fr. Jun.–Sep.

Slopes, crevices, forests; 1100–3600 m. Xinjiang [Kazakstan, Tajikistan, Uzbekistan].

**101. SMELOWSKIA** C. A. Meyer in Ledebour, Icon. Pl. 2: 17. 1830.

*Chrysanthemopsis* K. H. Rechinger.

Herbs perennial, often pulvinate, with well-developed caudex covered with petioles of previous years. Trichomes dendritic, sometimes mixed with simple and forked stalked ones. Stems erect or ascending, several from caudex, simple or branched apically. Basal leaves petiolate, rosulate, simple, 1- or rarely 2-pinnatisect, sometimes entire, densely pubescent. Cauline leaves shortly petiolate or sessile, not auriculate, entire or pinnatisect. Racemes ebracteate or basally bracteate, elongated in fruit. Fruiting pedicels suberect, ascending, or divaricate. Sepals ovate or oblanceolate, ascending or spreading, base of lateral pair not saccate. Petals white, creamy white, or purplish, longer than sepals; blade suborbicular, oblanceolate or spatulate, apex rounded; claw subequal to or shorter than sepals. Stanens 6, tetradynamous; filaments dilated at base; anthers ovate or oblong, obtuse at apex. Nectar glands confluent and subtending bases of all stamens. Ovules 6–30 per ovary. Fruit dehiscent siliques or silicles, linear, oblanceolate, obovate, ovoid, ellipsoid, obovate, or spatulate, apex rounded; claw subequal to or longer than sepals. Seeds brown, obovate, 2.5–4 × 1–1.5 mm, with a prominent midvein, smooth; replum rounded; septum complete or perforated; style absent or short and to 1.5 mm; stigma capitate, entire. Seeds uniseriate, wingless, obovate, plump; seed coat minutely reticulate, not mucilaginous when wetted; cotyledons incumbent.

Seven species: three in C and E Asia, three in North America, and one in both areas; two species in China.

*Smelowskia bifurcata* (Ledebour) Botschantzev was recorded from Xinjiang in FRPS, but the present authors have seen no material to confirm that record.
1a. Fruit linear to linear-ellipsoid; seeds (or ovules) (12–)14–22 per fruit; fruiting pedicels divaricate; inflorescence often branched .................................................. 1. S. alba

1b. Fruit ovoid, pyriform, ellipsoid, oblong, or rarely linear-ellipsoid; seeds (or ovules) 4–10(–12) per fruit; fruiting pedicels suberect, ascending, or rarely divaricate; inflorescence often simple .................................. 2. S. calycina


Hutchinsia calycina (Stephan) Desvaux; 433. 1800; Chrysanthemopsis koelzii

Lepidium calycinum

F. Altaic. 3: 170. 1831.

2. Smelowskia calycina (Stephan) Desvaux var. pectinata (Bunge) Regel & Herder; H. pectinata Bunge; Smelowskia calycina var. pectinata (Bunge) B. Fedtschenko; S. koelzii (K. H. Rechinger) K. H. Rechinger; S. pectinata (Bunge) Velichkin; S. tianschanica Velichkin.

H. calycina

Herbs (3.5–)7–30(–40) cm tall, canescent basally or throughout. Stems often simple above, densely pubescent with simple trichomes to 2 mm and/or much smaller dendritic ones, sometimes glabrescent. Basal leaves with petioles (0.5–)1–5 (–7) cm, ciliate with simple trichomes; leaf blade 1- or 2-pinnate, oblong or ovate in outline, 1.5–8 × 0.4–1.5 cm; ultimate segments linear, oblong, or ovate, to 15 × 3 mm, apex obtuse or subacute. Middle and upper caulin leaves sessile or subsessile, smaller and less divided than basal ones. Inflorescence often simple. Fruiting pedicels suberect or ascending, rarely divaricate, slender, 5–10(–14) mm, pubescent with dendritic and/or simple straight trichomes. Sepals ovate, 2.5–4 × 1.5–2 mm, caducous or persistent. Petals white or pale yellow, suborbicular or obovate, (3.5–)5–7 × 2–4 mm, rounded at apex, narrowed to claw 1–2.5 mm. Filaments 1.5–3.5 mm; anthers oblong, 0.5–0.8 mm. Ovules 4–10(–12) per ovary. Fruit ellipsoid or oblong, rarely ovoid or linear-ellipsoid, (3.5–)5–9(–10) × 1.5–2.5 mm, cuneate at least at apex; valves with a prominent midvein; gynophore obsolete or to 0.5 mm; septum perforate or to 0.5 mm; septum perforated or complete, with a midvein distally; style 0.5–1(–1.5) mm. Seeds brown, oblong, 0.5–0.7 mm. Fl. Jun–Aug, fr. Jul–Sep.

Smelowskia calycina is highly variable and has been divided in both Asian and North American accounts into several, poorly defined species or varieties. In the absence of authoritative studies on the species throughout its range, it is better not to recognize any infraspecific taxa. The Chinese plants are a good match for the type collection of the species. Synonyms pertaining only to C Asia are listed above.


Sinosophiopsis

华羽芥属 hua yu jie shu

Herbs annual. Trichomes a mixture of simple and short-stalked, forked. Stems erect, simple or branched at base and above middle, angled, longitudinally striate. Basal leaves withered by anthesis. Cauline leaves petiolate, not auriculate at base, pinnatisect. Racemes many flowered, ebracteate or proximal half bracteate, elongated considerably in fruit. Fruiting pedicels slender, ascending, divaricate, or reflexed. Sepals oblong, caducous, ascending, base of lateral pair not saccate, margin and apex membranous. Petals white, longer than sepals; blade spatulate, apex obtuse; claw distinct, shorter than sepals. Stamens 6, tetradynamous; filaments wingless, not dilated at base; anthers ovate, obtuse at apex. Nectar glands confluent, subtending bases of all stamens; median glands present. Ovules (20–)26–40 per ovary. Fruit dehiscent siliques, linear, terete, not inflated; valves papyry, with an
obscure midvein, glabrous or sparsely puberulent, strongly torulose; replum rounded; septum complete, membranous, translucent, veinless; style distinct, less than 1 mm, slender, cylindric, glabrous; stigma capitate, entire, unappendaged. Seeds uniseriate, wingless or apically winged, oblong, plump; seed coat coarsely reticulate, mucilaginous when wetted; cotyledons incumbent.

-  Two species.

1a. Racemes bracteate at least along proximal half; fruiting pedicels 1–3(–4) mm; seeds wingless; petals 2–2.5 × 0.7–1 mm ................................................................. 1. *S. bartholomewii*

1b. Racemes ebracteate; fruiting pedicels (5–)7–15 mm; seeds apically winged; petals 4–5 × 1.5–2 mm 2. *S. heishuiensis*


华羽芥  hua yu jie

Herbs annual, 13–55 cm tall, sparsely pilose with a mixture of simple and short-stalked, 1-forked trichomes to 1 mm. Stems erect, simple or branched along lower half, longitudinally striate, pilose or glabrescent distally. Basal leaves withered by anthesis. Middle cauline leaves pinnatisect, 1.5–5.5 × 0.5–2.5 cm; petiole 4–13 mm, not auriculate at base; terminal lobe lanceolate or oblong, 0.7–2 cm × 3–7 mm, base decurrent with distal pair of lateral lobes, margin dentate, apex acute or sub- acuminate; lateral lobes 3–5 on each side of midvein, similar to terminal lobe but smaller. Uppermost cauline leaves with axillary flowers, undivided, much smaller than middle leaves, margin entire or denticulate. Racemes bracteate at least along proximal half. Fruiting pedicels ascending or divaricate, 1–3(–4) mm, straight, slender, glabrous or sparsely pilose. Sepals oblong, 1–1.3 × 0.4–0.6 mm, glabrous or sparsely pilose, not saccate. Petals white, spatulate, 2–2.5 × 0.7–1 mm, base attenuate, apex obtuse; claw shorter than sepals. Median filament pairs 1.5–1.8 mm, lateral pair 1.1–1.3 mm; anthers ovoid, ca. 0.2 mm. Ovules (20–)26–36 per ovary. Fruit linear, 1.5–2.5 cm × 0.8–1 mm; valves glabrous or sparsely puberulent; style 0.1–0.3 mm. Seeds brown, oblong, 0.8–1.1 × 0.5–0.6 mm, plump, strongly reticulate, wingless. Fl. and fr. Aug–Sep.

-  Slopes with *Picea likiangensis* forest, among shrubs and under trees, disturbed alpine meadows, slopes and riparian areas along river bottoms; 3400–4100 m. Qinghai, Xizang.


黑水华羽芥  hei shui hua yu jie


Herbs annual, 15–45 cm tall, sparsely pilose with a mixture of simple and short-stalked, 1-forked trichomes to 1 mm. Stems erect, several branched along lower half, longitudinally striate, pilose. Basal leaves withered by flowering. Middle cauline leaves pinnatisect, 1.2–4.5 × 1–2.5 cm; petiole 3–15 mm, not auriculate at base; terminal lobe lanceolate, elliptic, or oblong, 0.3–2 cm × 2–12 mm, base decurrent with distal pair of lateral lobes or shortly petiolulate, margin dentate or subentire, apex acute or obtuse; lateral lobes 2–4 on each side of midvein, similar to terminal lobe but smaller. Uppermost cauline leaves much smaller and less divided than middle leaves. Racemes ebracteate. Fruiting pedicels divaricate or reflexed, (0.5–)0.7–1.5 cm, straight, slender, glabrous or sparsely pilose. Sepals oblong, 1.5–2.3 × 0.8–1 mm, glabrous or sparsely pilose, not saccate. Petals white, spatulate, 4–5 × 1.5–2 mm, base attenuate, apex obtuse; claw shorter than sepals. Median filament pairs 2–3 mm, dilated; lateral pair 1–1.5 mm; anthers ovoid, 0.4–0.5 mm. Ovules 24–40 per ovary. Fruit linear, 1.5–3 cm × 0.7–1 mm; valves glabrous; style 0.4–1 mm. Seeds brown, oblong, 1.2–1.4 × 0.6–0.8 mm, plump, strongly reticulate, apically winged. Fl. and fr. Jun–Aug.

-  Rock crevices; 2100–2500 m. Sichuan.