

83. ERYSIMUM Linnaeus, Sp. Pl. 2: 660. 1753.

糖芥属 tang jie shu

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Cheiranthus Linnaeus; *Cheirinia* Link; *Cuspidaria* (de Candolle) Besser; *Syrenia* Andrzejowski ex Besser. Herbs annual, biennial, or perennial, rarely subshrubs or shrubs. Trichomes sessile, medifixed, appressed, malpighiaceus 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, latiseptate, 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 capitate, entire or 2-lobed. Seeds uniseriate or rarely biseriate, winged, margined, or wingless, oblong, plump or flattened; seed coat minutely reticulate, mucilaginous when wetted; cotyledons incumbent 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 malpighiaceus 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 latiseptate; with longitudinally oriented, malpighiaceus 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 malpighiaceus 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 malpighiaceus; 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*
- 3b. Fruiting pedicels distinctly narrower than fruit.
- 5a. Fruit valves densely stellate inside.
- 6a. 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*
- 6b. 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 malpighiaceus, 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 malpighiaceus 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.

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- 9a. Plants (10–)30–90(–110) cm tall; fruiting pedicels suberect or ascending, subappressed to rachis; leaves entire or obscurely denticulate 11. *E. hieracifolium*
 9b. Plants 3–10 cm tall; fruiting pedicels divaricate; leaves sinuate-dentate or dentate 12. *E. schlagintweitianum*

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, subterete, 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*

1. *Erysimum forrestii* (W. W. Smith) Polatschek, *Phyton* (Horn) 34: 200. 1994.

匍匐糖芥 pu fu tang jie

Parrya forrestii W. W. Smith, *Notes Roy. Bot. Gard. 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 malpighiaceus, 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 denticulate, 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 malpighiaceus trichomes, inside glabrous; style 1–2 mm; stigma capitate, entire. Seeds oblong, 3–4.5 × 1.5–2.5 mm, on stout funicles. Fl. May–Jul, fr. Jul–Oct.

• Limestone slopes, gravelly slopes, glacial gravel, pastures; 3600–4900 m. Yunnan.

The type collection of *Erysimum schneideri*, *Schneider 3292* (holotype, B; isotypes, G, GH, K), is indistinguishable from that of *Parrya forrestii*, *Forrest 6518* (holotype, E). In FRPS and Fl. Yunnan. (6: 102, 106. 1995) the two names were treated under *Erysimum* and *Cheiranthus*, respectively.

2. *Erysimum handel-mazzettii* Polatschek, *Phyton* (Horn) 34: 200. 1994.

无茎糖芥 wu jing tang jie

Cheiranthus acaulis Handel-Mazzetti, *Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl.* 62: 64. 1925, not Balbiani ex Sprengel (1819); *C. forrestii* (W. W. Smith) Handel-Mazzetti var. *acaulis* K. C. Kuan.

Herbs perennial, (2–)3–7(–10) cm tall; caudex several branched, covered with petiolar remains of previous

years. Trichomes malpighiaceus, 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, ebracteate. 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–)1.7–2.1(–2.3) cm × (4–)5–8 mm; claw longer than sepals. Filaments 6–8 mm; anthers oblong, 1.5–2 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 malpighiaceus 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.

• Alpine scree and gravel, mountain slopes; 4100–4800 m. Sichuan.
3. *Erysimum wardii* Polatschek, *Phyton* (Horn) 34: 201. 1994.

具苞糖芥 *ju bao tang jie*

Erysimum bracteatum W. W. Smith, *Notes Roy. Bot. Gard. Edinburgh* 8: 185. 1914, not (A. Gray) Kuntze (1891).

Herbs perennial, 20–90 cm tall. Trichomes almost exclusively malpighiaceus, 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, subequaling 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 malpighiaceus 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.

• Alpine meadows, grassy slopes or scrub, open stony pastures, sandy and rocky mountain slopes, scree; 3000–4600 m. Sichuan, Xizang, Yunnan.

4. *Erysimum roseum* (Maximowicz) Polatschek, *Phyton* (Horn) 34: 201. 1994.

红紫糖芥 *hong zi tang jie*

Cheiranthus roseus Maximowicz, *Fl. Tangut.* 57. 1889; *C. roseus* var. *glabrescens* Danguy; *Erysimum limprichtii* O. E. Schulz.

Herbs perennial, (6–)10–28(–36) cm tall; caudex few branched, covered with petiolar remains of previous years. Trichomes malpighiaceus, rarely a few 3-fid ones on leaves adaxially. Stems single from base, leafy. Basal leaves rosulate; petiole (0.5–)1–4.5(–7) cm; leaf blade oblong, oblong-obovate, 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 subsessile, 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-oblong, 4-angled, (1–)1.5–3(–4) cm × 2–2.5 mm, not torulose, slightly curved; valves not keeled, with a distinct midvein, outside with malpighiaceus trichomes, inside glabrous; style (0.5–)1–2 mm; stigma capitate, prominently 2-lobed. Seeds oblong, 1.5–2.5 × 0.8–1 mm, on slender funicles to 4 mm. Fl. May–Jul, fr. Jul–Sep.

• Rocky schist cliffs, alpine meadows, limestone scree; 3200–4900 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan.

Although *Erysimum limprichtii* was described from Xizang, it was not listed in FRPS or Fl. Xizang. (vol. 2. 1985). Its type collection is indistinguishable in every aspect from that of *E. roseum*. The above first record of *E. roseum* from Yunnan is based on *Aldén et al.* 470 (E).

5. *Erysimum funiculosum* J. D. Hooker & Thomson, *J. Proc. Linn. Soc., Bot.* 5: 165. 1861.

紫花糖芥 *zi hua tang jie*

Erysimum absconditum O. E. Schulz; *E. chamaephyton* Maximowicz.

Herbs perennial, (1.5–)2–6(–8) cm tall; caudex several branched, covered with petiolar remains of previous years. Trichomes malpighiaceus, very rarely with a few 3-forked ones on leaves adaxially. Stems 1 to several from base, leafless or few leaved. Basal leaves rosulate; petiole (0.2–)0.5–2 cm; leaf blade oblong-linear or oblanceolate-linear, (0.4–)1–4 cm × 1.5–3.5(–5) mm, base attenuate, margin entire or rarely denticulate, apex acute. Racemes corymbose, not elongated or only slightly elongated in fruit, ebracteate or only lowermost flowers bracteate. Fruiting pedicels divaricate, (3–)4–7(–10) mm, stout, narrower than fruit, straight. Sepals narrowly oblong, 5–6.5 mm, sometimes persistent, lateral pair saccate. Petals pink, narrowly spatulate, 7–9(–10) × 1.7–2(–2.5) mm; claw

subequaling sepals. Filaments 4–6 mm; anthers oblong, 1–1.4 mm. Ovules (12–) 16–30 per ovary. Fruit oblong-linear, 4-angled, (1–)1.5–2(–2.3) cm × 2.5–3 mm, not torulose, slightly curved; valves slightly keeled, with a prominent midvein, outside with malpighiaceae trichomes, inside glabrous; style 0.5–1 mm; stigma prominently 2-lobed, lobes subdecurent. Seeds ovoid-oblong, 1.5–2 × 0.8–1 mm, on filiform funicles to 6 mm. Fl. Jun–Jul, fr. Jul–Aug.

Rocky slopes, grassy areas, alpine meadows, stone beaches; 3400–5500 m. Gansu, Qinghai, Xizang [Sikkim].

Although *Erysimum absconditum* was described in 1931 from a specimen collected in Xizang, the name was not listed in FRPS or Fl. Xizang. (vol. 2. 1985). Both floras recognized *E. chamaephyton*, but the type of this name is indistinguishable in every aspect from that of *E. funiculosum*, which was previously considered to be endemic to Sikkim.

6. *Erysimum amurense* Kitagawa, Bot. Mag. (Tokyo) 51: 155. 1937.

糖芥 tang jie

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 malpighiaceae 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 malpighiaceae trichomes, inside glabrous; style slender, (1.5–)2–4 mm, cylindrical, much narrower than fruit; stigma capitate, 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, hillsides, 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*.

7. *Erysimum flavum* (Georgi) Bobrov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 20: 15. 1960.

蒙古糖芥 meng gu tang jie

Herbs perennial, 10–60(–100) cm tall; caudex with petiolar remains of previous years. Trichomes exclusively malpighiaceae. Stems erect, simple or several from caudex. Basal leaves rosulate; petiole (0.3–)0.8–2(–4) cm, often grooved adaxially; leaf blade filiform to narrowly linear, rarely linear-oblongate, (0.7–)1–6(–9) cm × (0.5–)1–4(–8) mm, folded, 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; 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 malpighiaceae trichomes, inside glabrous; style slender, (0.5–) 1–3(–4) mm, cylindrical, 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, Kazakstan, 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 7a. subsp. *flavum*
- 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 7b. subsp. *altaicum*

7a. *Erysimum flavum* subsp. *flavum*

蒙古糖芥(原亚种) meng gu tang jie (yuan ya zhong)

Hesperis flava Georgi, Bemerk. Reise Russ. Reich. 1: 225. 1775; *Erysimum altaicum* C. A. Meyer var. *shinganicum* Y. L. Chang; *E. flavum* var. *shinganicum* (Y. L. Chang) K. C. Kuan.

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* (C. A. Meyer) Polozhij, Sist. Zametki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kuybysheva 86: 3. 1979.

阿尔泰糖芥 a er tai tang jie

Erysimum altaicum C. A. Meyer in Ledebour, Fl. Altaic. 3: 153. 1831; *E. altaicum* var. *humillimum* Ledebour; *E. humillimum* (Ledebour) N. Busch.

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].

8. *Erysimum deflexum* J. D. Hooker & Thomson, J. Proc. Linn. Soc., Bot. 5: 165. 1861.

外折糖芥 wai zhe tang jie

Herbs perennial, 2–10(–15) cm tall. Trichomes malpighiaceus 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, sessile. 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, spatulate or obovate, 6–10(–12) × 2–4 mm, apex rounded; claw subequaling sepals. 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 malpighiaceus and rarely 3-forked trichomes, glabrous inside; style stout, 1–3 mm, cylindrical, sparsely pubescent; stigma entire or slightly 2-lobed. Seeds oblong, 1.2–1.5(–1.9) × 0.7–1 mm. May–Jul, 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).

9. *Erysimum canescens* Roth, Catalecta 1: 76. 1797.

灰毛糖芥 hui mao tang jie

Herbs biennial or perennial, 20–90 cm tall. Trichomes almost exclusively malpighiaceus, 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) cm × 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, spatulate, 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, cylindrical, 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.

10. *Erysimum benthamii* Monnet, Notul. Syst. (Paris) 2: 242. 1912.

四川糖芥 si chuan tang jie

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 malpighiaceus ones. Stems erect, simple or branched basally, often angled, primarily with malpighiaceus trichomes. Basal leaves petiolate, rosulate, withered by flowering. Lower cauline 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 cauline leaves sessile or subsessile, denticulate or subentire. Racemes corymbose, densely flowered, bracteate basally, elongated considerably in fruit. Fruiting pedicels divaricate or ascending, (0.5–)0.6–1.5(–2.5) cm, stout, narrower than fruit, straight. Sepals oblong-linear, (5–)6–8 × 1–1.5 mm, lateral pair saccate. Petals orange-yellow to yellow, oblanceolate or spatulate, (0.8–)1–1.5 cm × 2–3(–3.5) mm, apex rounded; claw distinct, subequaling sepals. Filaments yellow, 7–10 mm; anthers linear, 2–3 mm. Ovules 60–90 per ovary. Fruit linear, 4-angled, (6–)7–11(–13) cm × 1.2–1.7 mm, slightly torulose, erect or ascending, straight; valves with a prominent midvein, outside with malpighiaceus and 3- or 4-forked trichomes, inside glabrous; style slender, 1–3 mm, cylindrical, narrower than fruit; stigma capitate, subentire. Seeds oblong, 1.5–2 × 0.8–1 mm. Fl. May–Jul, fr. Jul–Sep.

Dry rocky areas, oak woods, open pastures, grassy slopes, meadows, roadsides, mountain slopes; (1900–)2300–4100 m. Sichuan, Xizang, Yunnan [Bhutan, India, Nepal, Sikkim].

An examination of the syntypes of *Erysimum benthamii* (including that of var. *grandiflorum*) and the holotypes of *E. longisiliquum* and *E. szechuanense* clearly shows that they are conspecific. Unfortunately, the earliest name for the species, *E. longisiliquum*, is illegitimate (a later homonym, and the replaced synonym of *E. sikkimense*). In FRPS, both *E. benthamii* and *E. longisiliquum* were recognized, even though they are indistinguishable morphologically. *Erysimum benthamii* is the earliest legitimate name for the species.

11. *Erysimum hieraciifolium* Linnaeus, Cent. Pl. I, 18. 1755.

山柳菊叶糖芥 shan liu ju ye tang jie

Erysimum afghanicum Kitamura; *E. esepatum* Z. X. An.

Herbs biennial, (10–)30–90(–110) cm tall. Trichomes primarily 3- or 4-fid, malpighiaceus ones primarily on stem and pedicels. Stems erect, often branched above, slightly ribbed. Basal leaves rosulate, withered by fruiting; petiole 1–4 cm; leaf blade elliptic-oblong or oblanceolate, (1–)2–6(–8) cm × (0.3–) 5–10 mm, base cuneate, margin entire or obscurely denticulate, apex acute. Cauline leaves sessile or subsessile; leaf blade linear or elliptic-linear, entire or obscurely denticulate. Racemes corymbose, densely flowered, ebracteate, elongated considerably in fruit. Fruiting pedicels suberect or ascending, (3–)4–8(–10) mm, slender, narrower than fruit, subappressed to rachis. Sepals oblong, 4–7 × 1–1.5 mm, not saccate. Petals yellow, obovate, (6–)7–9(–10) × 2–3 mm, apex rounded; claw distinct, subequaling 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 malpighiaceus ones, inside glabrous or rarely sparsely pubescent; style slender, 0.5–2 mm, cylindrical; stigma capitate, entire. Seeds oblong, 1–1.5 × 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, Kazakstan, 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* Ehrhart 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.

12. *Erysimum schlagintweitianum* O. E. Schulz, Notizbl. Bot. Gart. Berlin-Dahlem 11: 227. 1931.

矮糖芥 ai tang jie

Herbs annual or biennial, 3–10 cm tall. Trichomes malpighiaceus mixed with 3(or 4)-forked ones. Stems erect, simple at base. Basal and lowermost cauline leaves subsessile; petiole 2–7 mm; leaf blade narrowly oblanceolate, flat, 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 × ca. 1 mm. Petals yellow, spatulate, 7–10 × 1.8–2.5 mm, apex rounded; claw subequaling sepals. Filaments yellow, 4.5–6.5 mm; anthers linear-oblong, 1.5–2 mm. Ovules 30–40 per ovary. Fruit narrowly linear, subterete, 2–3.5 cm × ca. 1 mm, somewhat torulose, divaricate-ascending, straight or curved upward; valves pubescent outside with malpighiaceus and 3(or 4)-forked trichomes, glabrous inside; style stout, 1–2 mm, cylindrical, 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].

13. *Erysimum cheiranthoides* Linnaeus, Sp. Pl. 2: 661. 1753.

小花糖芥 xiao hua tang jie

Erysimum brevifolium Z. X. An; *E. cheiranthoides* var. *japonicum* H. Boissieu; *E. japonicum* (H. Boissieu) Makino; *E. parviflorum* Persoon.

Herbs annual, (7–)15–100(–150) cm tall. Trichomes primarily 3- or 4-fid, sometimes mixed with 5-fid ones, malpighiaceus 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–)5–10(–20) mm, base cuneate, margin sub-entire or denticulate, 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 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, cylindrical; 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, Kazakstan, 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-oblanceolate.

14. *Erysimum macilentum* Bunge, Enum. Pl. China Bor. 6. 1833.

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 primarily 3- or 4-fid, sometimes mixed with 5-fid ones, malpighiaceae 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 subsessile; 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-oblong, 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, cylindrical; 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, Hubei, Hunan, Jiangsu, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan.

An examination of the types of *Erysimum macilentum*, *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*.

15. *Erysimum sisymbrioides* C. A. Meyer in Ledebour, Fl. Altaic. 3: 150. 1831.

小糖芥 *xiao tang jie*

Herbs annual, (2–)8–25(–40) cm tall. Trichomes malpighiaceae 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 oblanceolate, 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 malpighiaceae trichomes, inside glabrous; style stout, 0.5–1(–1.5) mm, cylindrical, 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, Kazakstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

16. *Erysimum repandum* Linnaeus, Demonstr. Pl. 17. 1753.

粗梗糖芥 *cu geng tang jie*

Erysimum rigidum de Candolle.

Herbs annual, (4–)15–45(–70) cm tall. Trichomes malpighiaceae, 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 malpighiaceae 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, Kazakstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; N Africa, SW Asia, Europe].

17. *Erysimum siliculosum* (Marschall von Bieberstein) de Candolle, Syst. Nat. 2: 491. 1821.

棱果糖芥 *leng guo tang jie*

Cheiranthus siliculosus Marschall von Bieberstein, Fl. Taur.-Caucas. 2: 121. 1808; *Syrenia siliculosa* (Marschall von Bieberstein) Andrzejowski.

Herbs biennial or perennial, 30–90(–100) cm tall. Trichomes malpighiaceae 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-oblongate, 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, subequalling 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 malpighiaceae 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 [Kazakhstan, Russia, Turkmenistan].

The record of *Erysimum vassilczenkovi* 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.

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