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 latepiate, sessile or subsessile; valves distinctly veined, glabrous or papillate, torulose or smooth; replum widely flattened throughout or only basally; septum 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; septum absent .................................................. 4. T. verticillatum
      3b. Petals narrowly obovate, 3–3.5 × 1.5–2 mm; seeds papillate; sepals persistent, margin not ciliolate; septum complete ............................................................. 5. T. lowndesii

1b. All leaves alternate.
   4a. At least some leaves dentate; fruit oblong or ovate, latisepate .................................................. 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 concial, torulose, (1.8–)2–2.5(–3) mm wide; septum complete or rarely reduced to a rim; cotyledons incumbent ............................................. 1. T. altaicum


Cochlearia altaica (C. A. Meyer) J. D. Hooker & T. Anderson; Taphrospermum altaicum var. macrocarpum Z. X. An.

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 subacute, 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 cordate or truncate and (1.8–)2–2.5(–3) mm wide, apex acuminatae; valves membranous, sparsely puberulent with papillae to 0.3 mm, rarely subglabrous, distinctly veined; replum widely expanded at base, narrowly flattened elsewhere; septum 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].

Mustiyouzi xiu 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 rosulate; petioles of basal and lowermost 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 subacute, 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 geocauline leaves. Fruiting pedicels glabrous, slender, 0.5–1 (–1.2) mm. Seeds (2–)6–8 (–10) mm, torulose, 1.5–2.5 × (1.5–)2–3.4 (–4) mm, obtuse at apex of ovary. Fruit ovoid or oblong, latiseptate, not dilated at base; anthers ovate, 0.2–0.4 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 and evenly expanded throughout; septicid 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

qua guzi qi (yu yan 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.

- Moist turf, alpine permafrost swamps, damp shingle by rivers, open gravel, slate and schist screes; (3200–)3600–5300 m. Gansu, Qinghai, Sichuan, Xizang.

3b. Taphrospermum fontanum subsp. microspermum

qua guzi qi (yu yan zhong)

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.

- Slopes with dwarf bushes, disturbed alpine meadows, degraded alpine pastures, Kobresia turf and cushions; 3900–5000 m. Qinghai, Xinjiang, Xizang.


- Leaves densely flowered, elongated considerably in fruit, bracteate throughout; bracts leafy, smaller than cauline 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. Sceere slopes; 5000–5200 m. Xizang [Nepal].


- 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 cauline 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 cauline 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. Sceere slopes; 5000–5200 m. Xizang [Nepal].
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; 4200–500 m. Xizang.