

**48. ARABIS** Linnaeus, Sp. Pl. 2: 664. 1753.

南芥属 nan jie shu

*Parryodes* Jafri.

Herbs annual, biennial, or perennial, rarely subshrubs or shrubs. Trichomes stellate, dendritic, or stalked forked, sometimes mixed 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; septum complete, membranous, translucent, veinless; style obsolete or distinct; stigma capitate, entire or slightly 2-lobed. Seeds uniseriate or biseriate, winged or margined, oblong or orbicular, flattened; seed coat smooth or minutely reticulate, not mucilaginous when wetted; cotyledons accumbent.

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 worldwide basis is much needed.

- 1a. 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 caudices 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. Petals 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. Petals 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. Petals 3–6(–6.5) mm; lateral sepals not saccate; style in fruit 0.2–0.8 mm.
      - 11a. Basal rosette 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 rosette 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. Petals 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*

**1. *Arabis amplexicaulis*** Edgeworth, Trans. Linn. Soc. London 20: 31. 1851.

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 rosulate; petiole 0.5–5 cm; leaf blade lanceolate-obovate, oblong, or oblanceolate, 3–9(–11) × 1–2(–3) cm, base attenuate, margin dentate or entire, ciliate, apex obtuse or rounded. Middle cauline leaves sessile, oblong 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 oblong, 4–6 × 1.2–1.5 mm, glabrous, lateral pair saccate. Petals white, oblong or narrowly oblanceolate, (0.7–)0.9–1.2 cm × 2–3.5 mm, apex obtuse. Filaments 3.5–6 mm; anthers oblong, 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, oblong, 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).

**2. *Arabis bijuga*** Watt, J. Linn. Soc., Bot. 18: 378. 1881.

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 rosulate; petiole 0.5–5 cm; leaf blade obovate-spatulate, oblong, elliptic, or oblanceolate, 1.5–5 × 0.5–1.5 cm, base attenuate, margin dentate or entire, apex obtuse or rounded. Middle cauline leaves sessile, oblong-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 oblong, 3.5–5 × 1.2–1.8 mm, glabrous, lateral pair saccate. Petals white or pinkish, oblong or narrowly oblanceolate, 0.9–1.4 cm × 2–4 mm, apex obtuse. Filaments 5–8 mm; anthers oblong, 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, oblong, 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 *Yü 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. pangiensis* except for being glabrescent (vs. moderately to densely tomentose). However, this difference alone does not justify the recognition of more than one species.

**3. *Arabis serrata*** Franchet & Savatier, Enum. Pl. Jap. 2: 278. 1878.

齿叶南芥 *chi ye nan jie*

*Arabis alpina* Linnaeus var. *formosana* Masamune ex S. F. Huang; *A. amplexicaulis* Edgeworth var. *japonica* H. Boissieu; *A. amplexicaulis* var. *serrata* (Franchet & Savatier) Makino; *A. boissieuana* Nakai; *A. boissieuana* var. *glauca* (H. Boissieu) Koidzumi; *A. boissieuana* var. *sikokiana* Nakai; *A. fauriei* H. Boissieu (1899), not H. Léveillé (1910); *A. fauriei* var. *grandiflora* Nakai; *A. formosana* (Masamune ex S. F. Huang) T. S. Liu & S. S. Ying; *A. glauca* H. Boissieu; *A. glauca* subsp.

*pseudoauriculata* (H. Boissieu) Voroschilov; *A. hallaisanensis* Nakai; *A. iwatensis* Makino; *A. kishidae* Nakai; *A. pseudoauriculata* H. Boissieu; *A. serrata* var. *glabrescens* Ohwi; *A. serrata* var. *glauca* (H. Boissieu) Ohwi; *A. serrata* var. *platycarpa* Ohwi; *A. serrata* var. *japonica* (H. Boissieu) Ohwi; *A. serrata* var. *sikokiana* (Nakai) Ohwi; *A. sikokiana* (Nakai) Honda.

Herbs perennial, (5–)12–35(–45) cm tall, densely to sparsely pilose, with minute, short-stalked or sessile, submalpighiaceous and 3–5-rayed, stellate trichomes, rarely glabrescent or with some simple ones near stem base. Stems erect, single or few from base. Basal leaves rosulate; petiole (0.5–)1–4(–6) cm; leaf blade spatulate, oblanceolate, obovate, or narrowly oblong, (1–)2–7(–14) × (0.5–)1–2(–3) 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, base cordate or amplexicaul, margin dentate or entire. Racemes ebracteate. Fruiting pedicels ascending or divaricate, (0.5–)0.8–2(–2.5) cm, slender, straight, often glabrous. Sepals oblong, 3.2–4 × 1.2–1.8 mm, glabrous, lateral pair saccate. Petals white, rarely pinkish, oblong-oblanceolate, 7–10 × (1.5–)2–3(–3.5) mm, apex truncate-emarginate. Filaments 4–5 mm; anthers oblong, 1–1.4 mm. Ovules 28–60 per ovary. Fruit (2–)3.5–7(–8) cm × 1–1.5 mm, erect, divaricate, or rarely reflexed; valves with an obscure or distinct midvein, torulose, glabrous; style 1–2.5 mm. Seeds brown, oblong or rarely suborbicular, (1–)1.5–2(–2.5) × 0.8–1 mm, uniseriate, broadly winged apically; wing 0.3–0.6 mm wide. Fl. Apr–Jun, fr. May–Aug.  $2n = 32$ .

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*.

#### 4. *Arabis pendula* Linnaeus, Sp. Pl. 2: 665. 1753.

垂果南芥 *chui guo nan jie*

*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 withered 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, serrate, serrulate, repand, or entire, apex acuminate or acute. Racemes ebracteate. Fruiting pedicels 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-oblanceolate (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, Shandong, Shanxi, Sichuan, Xinjiang, 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.

圆锥南芥 *yuan zhui 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 stellate 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 stellate 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 suboblanceolate, 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(–6.5) 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, roadsides, 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.* 75–548 (PE) and *Ludlow & Sherriff* 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 chanetii* in FRPS is based on misidentified plants of *A. paniculata*. The holotype of *A. chanetii* is a specimen of *Orychophragmus 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 nonsaccate sepals, narrowly oblong-oblanceolate petals less than 0.8 mm, and narrower fruit rarely to 1.5 mm wide.

**6. *Arabis stelleri*** de Candolle, Syst. Nat. 2: 242. 1821.

基隆南芥 *ji 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. yokoscensis* 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 stellate 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, obovate, or oblong, (1–)2–5.5(–7) × (0.5–)1–2(–2.8) cm, base attenuate, margin entire or oc-

asionally denticulate, apex rounded or obtuse. Middle cauline leaves sessile, oblong or ovate, (1.2–)2–5(–7) × (0.4–)0.7–1.5(–2) cm, pilose with predominantly stellate 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, streamsides, forest margins; near sea level to 600 m. Taiwan [Japan, Korea, Russia].

**7. *Arabis pterosperma*** Edgeworth, Trans. Linn. Soc. London 20: 33. 1851.

窄翅南芥 *zhai chi nan jie*

*Arabidopsis yadungensis* K. C. Kuan & Z. X. An; *Arabis alpina* Linnaeus var. *purpurea* W. W. Smith; *A. latialata* Y. C. Lan & T. Y. Cheo.

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 stellate ones. Stems erect, simple from base, simple or branched above. Basal leaves rosulate; petiole often absent, rarely distinct and to 4 cm; leaf blade spatulate, oblanceolate, narrowly obovate, or oblong, (1–)2–7(–9) × (0.5–)1–2(–3) cm, base attenuate, margin dentate, serrate, or rarely entire, often ciliate, apex obtuse or acute. Middle cauline leaves sessile, oblong, elliptic, or ovate-lanceolate, (1–)2–4(–5) cm × (2–)4–10(–15) mm, hirsute, with predominantly simple trichomes, base auriculate, cordate, or rarely amplexicaul, margin dentate or entire, apex obtuse or acute. Racemes ebracteate. Fruiting pedicels erect or rarely ascending, often subappressed to rachis, 4–10(–16) mm, slender, straight. Sepals oblong or sublanceolate, 2.5–3.5 × 1–1.5 mm, often glabrous, not saccate. Petals purple, pink, or rarely white, oblong or narrowly oblanceolate, 6–9 × 2–3 mm, apex obtuse. Filaments 3.5–5 mm; anthers oblong, 0.6–1 mm. Ovules 40–80 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 0.5–1 mm. Seeds brown, orbicular to ovate-orbicular, 1–1.6 mm in diam., uniseriate, broadly winged all around; wing (0.1–)0.2–0.4 mm wide. Fl. (Mar–) May–Jul, fr. Jun–Oct.

Roadsides, woodlands, grassy slopes, alpine meadows; 2900–4300 m. Qinghai, Sichuan, Xizang, Yunnan [Bhutan, India, Kashmir, Pakistan, Nepal, Sikkim].

The above first record from Sichuan is based on *Wilson 3215* (A) and *Guan Kejian & Wang Wencai 239* (MO, PE); the above first record from Yunnan is based on *K. M. Feng 1239 & 2473* (A).

*Arabis alpina* var. *purpurea* was listed in FRPS as a synonym of *A. paniculata*. However, an examination of the type collection of the former (*Forrest 13977*; holotype, E; isotypes, K, P) clearly shows that it is indistinguishable from plants of *A. pterosperma*. The type collections of *A. latialata* and *Arabidopsis yadungensis* represent fruiting and flowering material, respectively, of *A. pterosperma*.

**8. *Arabis hirsuta*** (Linnaeus) Scopoli, Fl. Carniol., ed. 2, 2: 30. 1772.

硬毛南芥 *ying mao nan jie*

*Turritis hirsuta* Linnaeus, Sp. Pl. 2: 666. 1753; *Arabis hirsuta* var. *nipponica* (Franchet & Savatier) C. C. Yuan & T. Y. Cheo; *A. hirsuta* var. *purpurea* Y. C. Lan & T. Y. Cheo; *A. sagittata* de Candolle var. *nipponica* Franchet & Savatier.

Herbs perennial or sometimes biennial, (4–)10–80(–110) cm tall, usually densely hispid, with simple and stalked, forked or substellate trichomes. Stems erect, usually simple basally, often branched above. Basal leaves rosulate; petiole (0.5–)1–2 cm; leaf blade spatulate, oblanceolate, or oblong, (1.5–)2.5–8(–10) × (0.5–)1–2.5 cm, pubescent, margin entire, repand, or dentate, apex obtuse or acute. Cauline leaves sessile, lanceolate, oblong, oblanceolate, or ovate, (1–)1.5–5(–7) × (0.5–)1–2 cm, hirsute on both surfaces or adaxially glabrescent, base subcordate or auriculate and with obtuse or subacute auricles, margin dentate or entire, apex acute or obtuse. Racemes ebracteate. Fruiting pedicels erect to erect-ascending, (2–)3–10(–15) mm, slender, glabrous or sparsely hirsute. Sepals narrowly oblong, 2.5–4 × 0.5–1.2 mm, not saccate. Petals white, rarely pink or purplish, linear-oblanceolate or narrowly spatulate, rarely linear, (3.5–)4–5 × 1–1.5 mm, apex obtuse. Filaments slender, 2.5–4.5 mm; anthers oblong, 0.7–1 mm. Ovules 30–80 per ovary. Fruit linear, (1.5–)2–5.5(–7) cm × 0.8–1.2 mm, erect to erect-ascending, often subappressed to rachis, flattened; valves glabrous, torulose, with a prominent midvein extending full length; style (0.1–)0.3–0.8(–1) mm. Seeds brown, oblong or suborbicular, (0.8–)1–1.5(–1.7) × 0.8–1.3 mm, uniseriate, wingless, narrowly winged all around, or winged distally. Fl. Apr–Aug, fr. May–Sep.  $2n = 32$ . Meadows, grassy slopes, roadsides, mixed forests; 300–4000 m. Anhui, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan, Zhejiang [Japan, Kazakhstan, Korea, Russia; N Africa, SW Asia, Europe, North America]. A highly variable species, especially in spacing, shape, texture, base, and margin of cauline leaves, flower color, petal size, and density of indumentum. Many of the variants have been recognized at specific and infraspecific ranks. However, since the variation in China does

not follow consistent morphological and/or geographical patterns, it is better to recognize only one variable taxon.

The records in FRPS and Fl. Xinjiang. (2(2): 142. 1995) of *Arabis borealis* Andrzejowski from Xinjiang, as well as those in FRPS and Fl. Guizhou. (7: 30. 1989) of *A. sagittata* de Candolle from Guizhou, are based on misidentified plants of *A. hirsuta*. Typical plants of *A. sagittata* are diploid ( $2n = 16$ ) biennials with strongly sagittate cauline leaves, whereas those of *A. hirsuta* are tetraploid perennials or occasionally biennials with auriculate or subcordate cauline leaves. However, the distinction between the two is often difficult, especially in biennial plants of *A. hirsuta*. The present authors have examined no Chinese material that belongs to either *A. borealis* or *A. sagittata*.

**9. *Arabis flagellosa*** Miquel, Ann. Mus. Bot. Lugduno-Batavi 2: 72. 1865.

匍匐南芥 *pu fu nan jie*

*Arabis flagellosa* var. *lasiocarpa* Matsumura.

Herbs stoloniferous perennial, (4–)10–30(–45) cm tall, sparsely to densely tomentose or pilose, with short-stalked, 3- or 4-rayed stellate trichomes, sometimes with few forked ones along leaf margin. Vegetative stems decumbent or procumbent, flowering ones erect and much shorter. Basal leaves rosulate; petiole (0.7–)1.5–4(–7) cm, winged; leaf blade spatulate, obovate, or oblanceolate, (0.7–)2–5(–7) × (0.5–)1–3 cm, base attenuate to petiole, margin dentate, apex obtuse or rounded. Cauline leaves shortly petiolate or subsessile; leaf blade obovate or oblong, (0.6–)1–3(–4) × (0.3–)0.6–1.6(–2) cm, margin dentate or subentire, apex obtuse. Racemes ebracteate, rarely lowermost 1 or 2 flowers bracteate. Fruiting pedicels ascending or divaricate, (0.8–)1–1.5 cm, slender, often straight. Sepals oblong, 4–5 × 1.5–2 mm, lateral pair saccate. Petals white, spatulate, 7–10 × 2.5–4 mm, apex rounded. Filaments 5–7 mm; anthers oblong, 1–1.5 mm. Ovules 30–50 per ovary. Fruit (1.5–)2–4(–4.8) cm × 1.2–1.5 mm; valves slightly torulose, glabrous or pilose, with an obscure midvein; style 1–3 mm. Seeds oblong-ovate, 1–1.5 × 0.8–1.1 mm, narrowly winged, uniseriate. Fl. and fr. Mar–May.

Along ditches, rocky crevices, foothills, forest margins, hillsides; near sea level to 1300 m. Anhui, Jiangsu, Jiangxi, Zhejiang [Japan].

The above first record from Jiangxi is based on *Ye 3852* (MO) and *Shan & Lai 2389* (MO).

**10. *Arabis axilliflora*** (Jafri) H. Hara, J. Jap. Bot. 47: 107. 1972.

腋花南芥 *ye hua nan jie*

*Parryodes axilliflora* Jafri, Notes Roy. Bot. Gard. Edinburgh 22: 207. 1957; *Arabis axilliflora* var. *brevistyla* H. Hara.

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 rosulate; petiole (0.5–)1.5–5 cm; leaf blade spatulate or oblanceolate, (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 denticulate,

apex rounded. Cauline leaves 1–3, sessile, sometimes absent; leaf blade oblong, oblanceolate, spatulate, or obovate, 1–4 × 0.5–1.5 cm, base cuneate, margins entire or few toothed. Racemes bracteate 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, 1–1.3 mm. Ovules 28–40 per ovary. Fruit 2.5–5.5 cm × 1.5–2 mm; valves glabrous, with a prominent midvein extending full length; style slender, 1–3 mm. Seeds dark brown, ovate, 1.2–1.5 × 0.9–1 mm, wingless. Fl. Jun–Jul, fr. Jul–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.

**11. *Arabis alaschanica*** Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg, Sér. 3, 26: 421. 1880.

贺兰山南芥 he lan shan 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 rosulate; petiole 0.5–3.5(–5) cm, narrowly winged, ciliate, persistent; leaf blade oblanceolate, 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.

• Calcareous 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).

**12. *Arabis fruticulosa*** C. A. Meyer in Ledebour, Fl. Altaic. 3: 19. 1831.

小灌木南芥 xiao guan mu nan jie

*Arabis fruticulosa* var. *albescens* N. Busch; *Koelicia altimurana* K. H. Rechinger.

Subshrubs or shrubs, 10–35(–50) cm tall, densely tomentose throughout with short-stalked, dendritic trichomes rarely up to 0.2 mm in diam. Stems several from base, woody, creeping then erect, covered with leaf remains of previous years. Basal leaves rosulate; petiole 0.5–2.5 cm; leaf blade oblanceolate to oblong-lanceolate, 1–5(–6) cm × 1–7 mm, base attenuate, margin entire, apex obtuse or subacute. Cauline leaves absent or 1–4, sessile; leaf blade narrowly oblong to ovate-oblong, 0.5–1.7 cm × 2–5 mm, base subamplexicaul, margin entire, apex obtuse or subacute. Racemes ebracteate. Fruiting pedicels divaricate-ascending, 3–7(–10) mm, straight to slightly curved, slender, tomentose. Sepals oblong, 3–5 × 1.5–2 mm, tomentose, lateral pair saccate. Petals purple or pink, rarely white, obovate, (0.6–)0.9–1.2 cm × 2–4(–5) mm. Filaments 3–5 mm; anthers narrowly oblong, 1–1.2 mm. Ovules 26–40 per ovary. Fruit (2.5–)3–5 cm × 1–2 mm; valves tomentose, torulose, with inconspicuous or distinct midvein; style obsolete or absent. Seeds brown, oblong, 1.5–2.5 × 0.8–1.2 mm, uniseriate, narrowly winged; wing to 0.1 mm wide. Fl. Apr–May, fr. May–Jul.

Rocky crevices, slopes, hillsides; 500–3400 m. Xinjiang [Kazakstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan].

**13. *Arabis tibetica*** J. D. Hooker & Thomson, J. Proc. Linn. Soc., Bot. 5: 143. 1861.

西藏南芥 xi zang nan jie

*Arabidopsis tibetica* (J. D. Hooker & Thomson) Y. C. Lan & Z. X. An; *Arabis clarkei* O. E. Schulz; *A. multicaulis* Pampanini; *A. tenuirostris* O. E. Schulz; *A. thomsonii* J. D. Hooker.

Herbs biennial, (4–)10–35(–50) cm tall, sparsely to densely covered basally with a mixture of simple and stalked, forked, stellate, or subdendritic trichomes, sometimes one type predominant, rarely mostly with simple trichomes, often glabrous or glabrescent 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, obovate, or 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-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 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–

1.5 mm, attenuate to apex; valves glabrous, torulose, with an obscure midvein; style slender (0.5–)1–3 mm. Seeds brown, oblong, 0.9–1.2 × 0.5–0.7 mm, flattened, uniseriate, wingless or rarely apically with a narrow wing. Fl. May–Jun, fr. Jun–Jul.

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 *A. tibetica* as *Arabidopsis tibetica*, a position that might indeed prove correct with further studies.

**14. *Arabis auriculata*** Lamarck, Encycl. 1: 219. 1783.

耳叶南芥 *er ye nan jie*

*Arabis cadmea* 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, subappressed to stems, ovate, oblong, or elliptic, (0.5–)1–2(–2.5) cm × 2–10 mm, base auriculate or amplexicaul, margin entire or denticulate. Racemes ebracteate; rachis flexuous in fruit. Fruiting pedicels 1–3(–5) mm, stout, as thick as or about half as thick as fruit, ascending, pubescent or glabrous. Sepals oblong, 1–2 × 0.4–0.5 mm, not saccate. 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 16–50 per ovary. Fruit ascending, (1–)2–5 cm × 0.6–1(–1.2) mm, 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 [Kazakstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan; N Africa, SW Asia, E Europe].

*Arabis auriculata* 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.

