

4. Tribe CARDUEAE

飞廉族 fei lian zu

Shi Zhu (石铸 Shih Chu); Eckhard von Raab-Straube, Werner Greuter, Ludwig Martins

Herbs, annual to perennial. Leaves alternate, sometimes all basal. Capitula homogamous or heterogamous, bisexual, sometimes unisexual in dioecious plants, persistent or deciduous, solitary or clustered at end of stem and branches, sometimes surrounded by \pm leaflike spiny bracts. Phyllaries imbricate, undivided. Receptacle densely covered with bristles, rarely with short scales, or naked. Florets few to numerous. Corolla usually actinomorphic or slightly zygomorphic, equally or unequally 5-lobed or sometimes strongly zygomorphic in radiant florets of heterogamous capitula. Stamen filaments glabrous, papillose, or hairy; anther sagittate, base caudate; connective with a sterile apical appendage. Style branches distinct and divergent or coherent medially for most of their length and only seceding along stigmatic margins; sweeping hairs usually confined to a ringlike sometimes swollen zone at base of style branches or longest there and distally abruptly shorter. Achene usually glabrous, rarely \pm hairy, apex with a peripheral rim surrounding an apical plate on which pappus is inserted; rim sometimes salient as an entire or dentate crown, sometimes inconspicuous.

About 75 genera and ca. 2,400 species: E and N Africa, Asia, Australia, Europe, North and South America; 37 genera (four endemic, three introduced) and 440 species (237 endemic, five introduced) in China.

- 1a. Achene attachment scar lateral or subbasal and oblique; capitula homogamous or heterogamous and mostly with radiant outer florets 5. Subtribe Centaureinae
- 1b. Achene attachment scar \pm basal; capitula always homogamous.
 - 2a. Leaf margin unarmed, entire or with blunt to mucronulate non-pungent teeth, apex of phyllaries sometimes recurved but never hooked 1. *Saussurea* group
 - 2b. Leaf margin spiny or spinulose, or if \pm entire then apex of phyllaries hooked.
 - 3a. Pappus of distinct scabrid bristles falling off singly or (rarely) pappus absent; style branches distinct and divergent 2. *Arctium* group
 - 3b. Pappus of scabrid to plumose bristles (rarely scales) basally connate into a ring and falling off together; style branches coherent for most of their length.
 - 4a. Achene with apical rim either inconspicuous or forming a conspicuous and crenulate (rarely entire) crown, apical plate lacking an elaiosome 3. *Onopordum* group
 - 4b. Achene with apical rim forming a smooth-margined upright crown, apical plate with a prominent oleaginous central umbo (elaiosome) 4. Subtribe Carduinae

1. SAUSSUREA group

风毛菊群 feng mao ju qun

Shi Zhu (石铸 Shih Chu); Eckhard von Raab-Straube

Cauliferous herbs, stemless rosette herbs, or subshrubs, biennial, perennial, or rarely annual. Leaves without spines; leaf blade undivided to pinnatisect, margin entire or with blunt to mucronate non-pungent teeth. Capitula homogamous, bisexual. Phyllaries in several rows, without spines, apically sometimes with a green or purplish membranous or herbaceous appendage or mucronate. Receptacle densely covered with long subulate bristles, short scales, apiculate papillae, or naked and alveolate. Florets bisexual, all fertile. Corolla \pm actinomorphic. Filaments distinct, glabrous. Style branches usually distinct and divergent, rarely partly coherent. Achene usually glabrous, sometimes glandular, rarely pubescent or papillose, apical rim inconspicuous or forming a \pm developed crenulate or denticulate crown. Pappus homomorphic or heteromorphic, in 1 to several distinct or connate rows of scabrid to plumose bristles or rarely of small scales; inner pappus long, usually overtopping involucre.

About 15 genera and ca. 700 species: NW Africa, Asia, Europe, North America; nine genera (two endemic, one introduced) and 323 species (205 endemic, one introduced) in China.

- 1a. Plants annual; outer pappus an incomplete row of small scales and inner pappus a ring of plumose bristles 21. *Hemisteptia*
- 1b. Plants perennial or biennial; pappus of only bristles.
 - 2a. Pappus bristles in several rows, of different length, usually scabrid or barbellate, rarely plumose; receptacle with short scales or naked and alveolate, rarely with bristles.
 - 3a. Pappus bristles silvery, dirty white, or white, inserted on a conic cupule, 0.5–1.5 cm; receptacle with short scales or bristles 14. *Jurinea*
 - 3b. Pappus bristles dirty white, yellowish, brown, or reddish, not inserted on a conic cupule, 1.5–4 cm; receptacle either alveolate or with long bristles.
 - 4a. Capitula several and clustered or solitary in center of leaf rosette; phyllaries not densely lanate; receptacle alveolate, naked or with very short apiculate papillae, without bristles 17. *Dolomiaea*
 - 4b. Capitulum solitary on a subscapose stem; phyllaries densely lanate; receptacle with long bristles 18. *Bolococephalus*

- 2b. Pappus bristles in 1 or 2 rows, with bristles of inner row of same length and always plumose; receptacle usually with \pm long, subulate bristles, sometimes naked and alveolate, or with short apiculate papillae.
- 5a. Pappus in 2 rows; achene smooth, ribbed, or sometimes wrinkled, apical rim inconspicuous or rarely with a short crown.
- 6a. Outer pappus a row of scabrid or rarely plumose caducous bristles (rarely lacking), inner pappus a ring of plumose bristles 22. *Saussurea*
- 6b. Outer and inner pappus bristles both plumose and connate with each other into a ring 15. *Diplazoptilon*
- 5b. Pappus in 1 row; achene wrinkled or muricate, apical rim always forming a distinct crown.
- 7a. Corolla limb with sessile glands; achene blackish, 2–5 mm, with a dentate crown 16. *Himalaiella*
- 7b. Corolla limb glabrous; achene straw-colored or brown with black spots, 5–8 mm, with a crenulate crown.
- 8a. Capitulum solitary, long pedunculate; petiole of basal leaves unwinged 19. *Frolovia*
- 8b. Capitula 2–7 and clustered, sessile or subsessile; petiole of basal leaves with a broad lobed wing 20. *Aucklandia*

14. JURINEA Cassini, Bull. Sci. Soc. Philom. Paris 1821: 140. 1821.

茼菊属 ling ju shu

Shi Zhu (石铸 Shih Chu); Eckhard von Raab-Straube

Pilostemon Iljin.

Herbs, perennial [or shrublets]. Leaves undivided to pinnatisect. Capitula solitary or several in a corymbiform synflorescence. Involucre bowl-shaped, ovoid, campanulate, hemispheric, or cylindrical. Phyllaries herbaceous or leathery, appressed or reflexed. Receptacle with broad rigid shortly acuminate scales or bristles. Corolla red to purple, with sessile glands. Anther tails lacerate-caudate. Style branches short, divergent. Achene isodiametric, narrowly obovoid, narrowly ellipsoid, or obconic, 3- or 4-angled, glabrous or glandular, sometimes spinulose-tuberculate, apical rim forming a crown. Pappus bristles in several rows, white, scabrid, barbellate, or plumose, unequal in length, sometimes 2–5 inner bristles much longer than others; bristles inserted on a conspicuous conical cupule, persistent or caducous as a whole.

About 250 species: NW Africa, C and SW Asia, Europe; ten species (one endemic) in China.

The genus *Pilostemon* differs from *Jurinea* only in the pilose anther connectives. All other diagnostic characters given in the protologue of the genus, especially concerning the receptacle, achene, and pappus structure, can be found at least in some sections of *Jurinea* as well. *Pilostemon* is therefore not accepted in this treatment.

- 1a. Achene not spinulose-tuberculate.
- 2a. Leaf blade linear-filiform, 1–2 mm wide; involucre obconic; pappus plumose, 1–1.5 cm 3. *J. filifolia*
- 2b. Leaf blade broadly linear to elliptic, more than 3 mm wide; involucre cylindrical or bowl-shaped; pappus scabrid or barbellate, 0.8–1.2 cm.
- 3a. Leaf blade broadly linear, abaxially grayish white, adaxially green, undivided; involucre cylindrical; phyllaries scarious 1. *J. multiflora*
- 3b. Leaf blade elliptic, obovate, or ovate, green to grayish green, almost concolorous, pinnately dentate, pinnately lobed, or pinnately divided; involucre bowl-shaped; phyllaries leathery 2. *J. mongolica*
- 1b. Achene spinulose-tuberculate.
- 4a. Pappus elements not connate into a ring, persistent.
- 5a. Outer and middle phyllaries with reflexed or slightly bent apex 6. *J. dshungarica*
- 5b. Outer and middle phyllaries straight, appressed, apex not reflexed.
- 6a. Involucre cylindrical, 1.2–1.5 cm in diam.; leaf blade grayish green, almost concolorous, arachnoid floccose 4. *J. adenocarpa*
- 6b. Involucre bowl-shaped, 2–3 cm in diam.; leaf blade abaxially grayish white and densely tomentose, adaxially green to pale green and glabrous or sparsely arachnoid tomentose 5. *J. lanipes*
- 4b. Pappus elements basally connate into a ring, caducous.
- 7a. Phyllaries straight, appressed, apex not reflexed 7. *J. lipskyi*
- 7b. Outer and middle phyllaries with reflexed to patent apex.
- 8a. Herbs (10–)20–45 cm tall; leaf blade of rosette leaves 4–11 \times 1–3 cm, green to grayish white, almost concolorous 10. *J. chaetocarpa*
- 8b. Herbs stemless or with shorter stems 2–10(–20) cm tall; leaf blade of rosette leaves 2–4 \times 0.3–1 cm, abaxially grayish white, adaxially green.
- 9a. Herbs stemless or shortly stemmed, to 10 cm tall; leaf blade of rosette leaves lyrate-pinnatifid, lyrate-pinnatisect, or pinnately divided, usually some undivided; outer phyllaries sparsely arachnoid, glabrescent, 5–15 mm 8. *J. algida*

- 9b. Herbs with developed stems, 7–18 cm tall; leaf blade of rosette leaves pinnately dentate to pinnately lobed; outer phyllaries densely arachnoid, 2–5 mm 9. *J. kaschgarica*

1. *Jurinea multiflora* (Linnaeus) B. Fedtschenko, Consp. Fl. Turkestan. 4: 295. 1911.

多花苓菊 duo hua ling ju

Serratula multiflora Linnaeus, Sp. Pl. 2: 817. 1753; *Jurinea linearifolia* Candolle; *Saussurea multiflora* (Linnaeus) Candolle.

Herbs 10–20[–50] cm tall, perennial. Caudex long, slender, usually branched. Stems several or solitary, erect, apically branched. Basal and lower stem leaves shortly petiolate; leaf blade abaxially grayish white, densely tomentose, and gland-dotted, adaxially green and glabrous or ± gland-dotted, margin entire and revolute, apex acute. Middle stem leaves sessile; leaf blade linear to broadly linear, 4–8[–15] × 0.3–0.6[–1] cm, base semiamplexicaul. Bracts linear-subulate, smaller than lower stem leaves. Capitula many, in a terminal corymbose synflorescence. Involucre cylindrical, 3–5 mm in diam. Phyllaries in 5 or 6 rows, scarious, appressed, glabrous or sparsely arachnoid pubescent, gland-dotted; outer phyllaries broadly to narrowly triangular, 3–5 × 1–2.5 mm; middle phyllaries elliptic to narrowly elliptic, 5–9 × 2–2.5 mm; inner phyllaries linear, 9–12 × 1–1.5 mm. Corolla pink to purple, 1.3–1.7 cm, tube 5–7.5 mm, limb 8–9 mm, lobes 4–5 mm. Achene brown to pale red, obconic, 3.5–5 mm, 4-ribbed, glabrous. Pappus bristles white, scabrid, 8–10 mm, not connate into a ring, persistent. Fl. Jun–Aug, fr. Jul–Sep.

Forests, saline steppes, meadows, wastelands, fields; 1800–2000 m. NW Xinjiang [Kazakhstan, Mongolia, Russia; E Europe].

2. *Jurinea mongolica* Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 19: 519. 1874.

蒙疆苓菊 meng jiang ling ju

Herbs 6–25 cm tall, perennial. Caudex stout, branched, apically covered with remains of petioles, densely white lanate. Stems erect, branched from base. Basal leaves petiolate; petiole 2–4 cm, base densely lanate; leaf blade elliptic to narrowly ovate-elliptic, 2–7 × 0.5–1.5 cm, pinnately divided, pinnately lobed, or pinnately dentate, green to grayish green, almost concolorous, glabrous or sparsely arachnoid, margin entire and revolute; lateral lobes 3 or 4 pairs, narrowly elliptic to narrowly triangular-ovate; terminal lobe narrowly ovate-elliptic, longer than lateral ones. Stem leaves sessile, similar to basal leaves or undivided. Capitulum solitary at end of branches. Involucre bowl-shaped, 1.5–2.5 cm in diam. Phyllaries in 4–6 rows, leathery, appressed, gland-dotted, apex acuminate; outer phyllaries narrowly triangular, 4–6 × 1.5–2.5 mm; middle phyllaries narrowly triangular-subulate, 7–11 × 1.5–2.5 mm; inner phyllaries linear, 15–20 × 2–3 mm. Corolla red, 2–2.5 cm, gland-dotted, tube 6–9 mm, limb 1.4–1.6 cm, lobes 5–7 mm. Achene brown, obconic, 4–6 mm, apically sparsely gland-dotted. Pappus bristles dirty white, barbellate, 5–12 mm, with 2–4 of inner ones much longer than others, not connate into a ring, persistent. Fl. Jun–Jul, fr. Jul–Aug.

Desert steppes; 1000–1500 m. Nei Mongol, Ningxia, Shaanxi, Xinjiang [Mongolia].

3. *Jurinea filifolia* (Regel & Schmalhausen) C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 11: 170. 1890.

毛蕊苓菊 mao rui ling ju

Saussurea filifolia Regel & Schmalhausen, Trudy Imp. S.-Peterburgsk. Bot. Sada 6: 312. 1880; *Jurinea argentata* C. Shih & S. Y. Jin; *J. pilostemonoides* Iljin; *Pilostemon filifolius* (Regel & Schmalhausen) Iljin.

Herbs 25–70 cm tall, perennial. Stems solitary or few, grayish green, erect, virgately branched from base. Leaves sessile, linear to filiform, 1–7[–10] × 0.1–0.2 cm, abaxially grayish white and densely arachnoid tomentose, adaxially green and glabrous, margin revolute, apex acute. Capitulum solitary at end of branches. Involucre obconic, 1–2 cm in diam. Phyllaries in 5–8 rows, purplish red, appressed, tomentose, apex not reflexed, acuminate, and cartilaginous; outer phyllaries narrowly ovate-elliptic, 3–5 × 1–1.5 mm; middle phyllaries narrowly ovate to narrowly elliptic, 5–13 × 1.5–2 mm; inner phyllaries broadly linear, ca. 14 × 1.5 mm. Corolla purplish red, 1.5–2 cm, tube 7–9 mm, limb 6–7 mm, lobes 3–4 mm. Anther connectives with few very fine long unicellular hairs. Achene blackish brown, obconic, 3–5 mm, apically densely glandular and with a dentate crown. Pappus bristles white or dirty white, plumose, 1–1.5 cm, not connate into a ring, persistent. Fl. Jul–Aug, fr. Aug–Oct.

Gravelly riversides, moist gorges, sandy places; 700–1000 m. C Xinjiang [Kazakhstan].

Jurinea pilostemonoides does not differ from *J. filifolia*, except by the glabrous anther connectives, which, however, can be glabrescent in *J. filifolia* as well.

Jurinea karategina (Lipsky) O. Fedtschenko, described from Tajikistan and also treated as *Pilostemon karateginus* (Lipsky) Iljin, is said to occur in Xinjiang as well (G. M. Shen, Fl. Xinjiang. 5: 258. 1999; Iljin, Fl. URSS 27: 711. 1962), but no specimens from China are known. It differs from *J. filifolia* by its broader, elliptic or oblong leaves, to ca. 10 × 1.5 cm, and by its smaller florets, with a corolla of 1–1.3 cm.

4. *Jurinea adenocarpa* Schrenk ex Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 46. 1841.

腺果苓菊 xian guo ling ju

Herbs 15–40 cm tall, perennial. Caudex stout, branched, apically lanate tomentose. Stems several, erect, divaricately branched in apical half. Lower and middle stem leaves shortly petiolate; leaf blade elliptic, 5–10 × 1–2 cm, pinnately lobed or pinnately divided, both surfaces grayish green and arachnoid floccose; segments narrowly elliptic to linear, margin sinuate. Upper stem leaves sessile, elliptic to linear, gradually smaller upward on stem, undivided. Capitulum solitary at end of branches. Involucre cylindrical, [0.8–]1.2–1.5 cm in diam. Phyllaries in ca. 6 rows, appressed, sparsely arachnoid floccose; outer phyllaries ovate, ca. 3 × 1 mm, apex acute; middle phyllaries narrowly ovate, 5–7 × 1–2 mm, apex spiniform-acuminate; inner phyllaries narrowly ovate, 10–14 × 2–3 mm, apex long acuminate. Corolla purple, 1–1.4 cm, tube 3.5–7.5 mm,

limb 2–3 mm. Achene cylindrical to obconic, 4.5–6.5 mm, minutely glandular, apically sparsely spinulose-tuberculate. Pappus bristles barbellate, 5–10 mm, not connate into a ring, persistent. Fl. May–Aug, fr. Jul–Sep.

Sandy steppes, rocky slopes, scree slopes; ca. 1500 m. N Xinjiang (Burqin) [Kazakhstan].

5. *Jurinea lanipes* Ruprecht, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 14(4): 58. 1869.

绒毛苓菊 rong mao ling ju

Jurinea flaccida C. Shih.

Herbs 15–50 cm tall, perennial. Caudex stout, apically covered with remains of petioles, densely lanate. Stems solitary or several, erect, simple or branched from base. Basal leaves petiolate; petiole 4–6 cm; leaf blade narrowly obovate to elliptic, 5–10 × 2–3 cm, lyrate pinnately lobed, abaxially grayish white and densely tomentose, adaxially green and glabrous or sparsely arachnoid and gland-dotted; lateral lobes 3–10 pairs, ovate to elliptic, margin entire, apex obtuse to rarely acute; terminal lobe larger than lateral ones. Lower and middle stem leaves few, shortly petiolate to sessile, similar to basal leaves. Uppermost stem leaves linear, usually undivided. Capitulum solitary at end of branches. Involucre bowl-shaped, 2–3 cm in diam. Phyllaries in ca. 6 rows, appressed, sparsely arachnoid, gland-dotted, apex spiniform-acuminate; outer phyllaries triangular, 6–10 × 1–2 mm; middle and inner phyllaries narrowly triangular-ovate, 10–18 × 1–2 mm. Corolla reddish purple, 1.6–1.7 cm, tube 4–7 mm, limb 1–1.2 cm, lobes ca. 5 mm. Achene cylindrical-obconic, 5–6 mm, apically spinulose-tuberculate. Pappus bristles white, barbellate, 0.8–1.2 cm, with 1 or 2 of inner ones much longer than others, not connate into ring, persistent. Fl. May–Aug, fr. Jun–Sep.

Alpine and subalpine forest meadows, steppes, wastelands, roadsides; 1200–2900 m. NW Xinjiang (Zhaosu) [Kazakhstan, Kyrgyzstan, Tajikistan].

6. *Jurinea dshungarica* (N. I. Rubtzov) Iljin in Schischkin & Bobrov, Fl. URSS 27: 683. 1962.

天山苓菊 tian shan ling ju

Jurinea chaetocarpa (Ledebour) Ledebour subsp. *dshungarica* N. I. Rubtzov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 8: 65. 1940.

Herbs 10–40(–60) cm tall, perennial. Caudex stout, apically covered with remains of petioles. Stems solitary or few, erect, simple or branched. Basal leaves petiolate; petiole 1.5–4(–8) cm, base adaxially densely lanate; leaf blade elliptic, 5–7(–12) × 1–2.5 cm, pinnately lobed to undivided, abaxially grayish white and densely tomentose, adaxially grayish green, arachnoid, and gland-dotted; lateral lobes 4–7 pairs, ovate, elliptic, or broadly triangular, margin entire or dentate, apex rounded to acute. Stem leaves few, similar to basal leaves, gradually smaller upward on stem. Capitulum solitary at end of branches. Involucre bowl-shaped, 1.5–2 cm in diam. Phyllaries in ca. 5 rows, yellowish green, arachnoid; outer and middle phyllaries narrowly triangular-ovate to narrowly elliptic, 3–10 ×

1–3 mm, apex spiniform-acuminate and reflexed; inner phyllaries elliptic to elliptic-linear, 8–14 × 1–2 mm, apex acuminate and not reflexed. Corolla reddish purple, 1.4–1.9 cm, tube 4–7 mm, limb 1–1.2 cm, lobes 4–6 mm. Achene obconic, 5–6 mm, apically spinulose-tuberculate. Pappus bristles white, barbellate, 0.8–1.2 cm, with 2 of inner ones much longer than others, not connate into a ring, persistent. Fl. May–Jun, fr. Jun–Aug.

Mountain slopes, sandy soils; 1800–2700 m. NW Xinjiang (Huocheng, Zhaosu) [Kazakhstan].

“*Jurinea suidumensis*” belongs here, but, to our knowledge, has never been validated by a description or diagnosis. When regarded as conspecific with *J. dshungarica* (e.g., by Tscherneva, Bot. Zhurn. 86 (12): 88–89. 2001), a concept which is followed here, the latter name has to be adopted as the correct one for this taxon.

7. *Jurinea lipskyi* Iljin, Trudy Turkestansk. Nauchn. Obshch. Sredne-Aziatsk. Gosud. Univ. 2: 23. 1925.

苓菊 ling ju

Herbs 35–50 cm tall, perennial. Stems solitary or few, erect, simple or few branched. Basal leaves petiolate; petiole 1–2 cm; leaf blade elliptic to narrowly obovate, 2–4 × 1.5–2 cm, pinnately lobed, abaxially grayish white and sparsely tomentose, adaxially green to grayish green and glabrous or sparsely arachnoid; lateral lobes 3 or 4 pairs, narrowly elliptic to narrowly triangular-ovate, margin undulate or serrulate, apex obtuse. Stem leaves few, gradually smaller upward on stem; lower stem leaves similar to basal leaves; upper stem leaves linear to subulate. Capitulum solitary at end of branches. Involucre bowl-shaped, 1.5–2 cm in diam. Phyllaries in ca. 4 rows, appressed, glabrous or sparsely arachnoid, apex acute to acuminate; outer phyllaries narrowly triangular-ovate, 4–6 × 2–3 mm; middle and inner phyllaries narrowly ovate-elliptic to linear, 10–15 × 3–4 mm. Corolla purple, ca. 1.5 cm, tube 4.5–5.5 mm, limb ca. 1 cm, lobes 4–5 mm. Achene obconic, 6–7 mm, gland-dotted, apically spinulose-tuberculate. Pappus bristles white, scabrid to barbellate, to 9 mm, with 2 of inner ones much longer than others, basally connate into a ring, caducous. Fl. May–Jun, fr. Jun–Jul.

Montane steppes and meadows; ca. 1900 m. NW Xinjiang (Zhaosu) [Kazakhstan].

8. *Jurinea algida* Iljin, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 5: 170. 1924.

矮小苓菊 ai xiao ling ju

Jurinea pamirica C. Shih.

Herbs 2–10 cm tall, perennial, stemless or shortly stemmed. Caudex simple or branched, covered with remains of petioles. Rosette leaves petiolate; petiole 1.5–3 cm, base adaxially lanate; leaf blade elliptic to narrowly obovate, 2.5–4 × 0.5–1 cm, lyrate pinnately lobed to divided or pinnately divided, abaxially grayish white and densely tomentose, adaxially green, sparsely arachnoid, and gland-dotted but glabrescent; lateral lobes 2–4 pairs, narrowly ovate, elliptic, or obliquely triangular, margin revolute and entire or sinuately dentate, apex obtuse to rounded; terminal lobe usually larger than lateral ones. Capitulum solitary, in center of leaf rosette or terminal on

stem. Involucre bowl-shaped, 1.5–2.5 cm in diam. Phyllaries in 3–5 rows, sparsely arachnoid tomentose; outer and middle phyllaries narrowly triangular-ovate, 5–15 × 1–3 mm, apex spiniform-acuminate and reflexed; inner phyllaries narrowly triangular-ovate to linear, 10–14 × 1–3 mm, apex acuminate and not reflexed. Corolla purplish red, 1.4–2 cm, tube 6–8.5 mm, limb 8–10 mm, lobes 3.5–5 mm. Achene brown, narrowly ellipsoid, 4–7 mm, glabrous, apically spinulose-tuberculate. Pappus bristles white, scabrid to barbellate, 1.2–1.6 cm, with 3 or 4 of inner ones much longer than others, basally connate into a ring, caducous. Fl. Jul–Sep, fr. Aug–Sep.

Subalpine and alpine scree slopes; 2800–3100 m. W Xinjiang (Wuqia) [Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

Jurinea pamirica does not differ from *J. algida*, except for the stronger branched caudex, which leads to a more densely caespitose or even pulvinate habit. Leaf division is quite variable in *J. algida* so that this character cannot be used to separate *J. pamirica* from it.

9. *Jurinea kaschgarica* Iljin, Izv. Glavn. Bot. Sada S.S.S.R. 27: 81. 1928.

南疆苓菊 nan jiang ling ju

Herbs 7–18 cm tall, perennial. Caudex stout, simple or few branched, covered with remains of petioles. Stems solitary or several, erect or ascending, simple. Rosette leaves petiolate; petiole 5–10 mm; leaf blade linear-elliptic to narrowly obovate, 1.5–4 × 0.3–1 cm, pinnately lobed or pinnately dentate, abaxially grayish white and densely tomentose, adaxially green and sparsely arachnoid; lobes triangular. Stem leaves few, similar to rosette leaves or linear, pinnately lobed or undivided; upper and uppermost stem leaves linear, smaller than lower ones, undivided. Capitulum solitary at end of stem. Involucre bowl-shaped, 1.5–2 cm in diam. Phyllaries in 4 or 5 rows, densely arachnoid tomentose to glabrescent; outer phyllaries narrowly triangular-ovate, 2–5 × 1–2 mm, apex spiniform-acuminate and reflexed to patent; middle phyllaries narrowly ovate, 5–12 × 2–3 mm, apex acuminate; inner phyllaries linear, 12–15 × 2–3 mm, apex acuminate and not reflexed. Corolla reddish purple, 1.2–1.4 cm,

tube ca. 7.5 mm, limb to 9 mm, lobes 3–4 mm. Achene obconic, 5–6 mm, apically spinulose-tuberculate. Pappus bristles white, barbellate, 2–11 mm, with 2–5 of inner ones much longer than others, basally connate into a ring, caducous. Fl. and fr. Jun.

- Scree slopes, gullies; ca. 2300 m. W Xinjiang (Wuqia).

Jurinea kaschgarica is closely related to and possibly not clearly separable from *J. algida*.

10. *Jurinea chaetocarpa* (Ledebour) Ledebour in Candolle, Prodr. 6: 676. 1838.

刺果苓菊 ci guo ling ju

Serratula chaetocarpa Ledebour, Fl. Altaic. 4: 42. 1833; *Jurinea scapiformis* C. Shih.

Herbs 10–45 cm tall, perennial. Caudex apically covered with remains of petioles, densely lanate. Stems usually several or rarely solitary, erect, simple or few branched. Rosette leaves petiolate; petiole to 9 cm; leaf blade elliptic, 4–11 × 1–3 cm, pinnately lobed, green to grayish white, almost concolorous, glabrous to densely arachnoid tomentose; lobes 4–6 pairs, narrowly elliptic, narrowly ovate, or obliquely triangular, margin entire or sinuate, apex acute to acuminate; terminal lobe narrowly ovate-elliptic, longer than lateral ones. Stem leaves few or absent, similar to rosette leaves but sessile and sometimes linear-subulate and undivided. Capitulum solitary at end of branches. Involucre bowl-shaped, 1.5–2 cm in diam. Phyllaries in 4 or 5 rows, narrowly triangular-ovate to linear-subulate, apex spiniform-acuminate; outer and middle phyllaries 6–11 × 2–3 mm, apex reflexed to patent; inner phyllaries 1.4–2 × 0.3–0.4 cm. Corolla purplish red, 1.2–1.5 cm, tube ca. 4 mm, limb ca. 9 mm, lobes 3–4 mm. Achene ellipsoid-obconic, 4–6 mm, densely spinulose-tuberculate. Pappus bristles white, barbellate, 7.5–10 mm, with 1 or 2 of inner ones much longer than others, basally connate into a ring, caducous. Fl. May–Jun, fr. Jun–Jul.

Gravelly deserts, saline and sandy steppes; 500–2000 m. N Xinjiang [Kazakhstan, W Mongolia].

15. DIPLAZOPTILON Y. Ling, Acta Phytotax. Sin. 10: 85. 1965.

重羽菊属 chong yu ju shu

Shi Zhu (石铸 Shih Chu); Eckhard von Raab-Straube

Herbs, perennial, stemless. Leaves in basal rosette, undivided. Capitulum solitary. Receptacle alveolate, with unequal subulate processes. Corolla purple, glabrous. Anther tails long, fimbriate-lacerate, caudate. Style branches linear, long, divergent, apex acute. Achene obconic, 4-angled, glabrous, with apical rim forming a short crown. Pappus homomorphic, in 2 rows; bristles subequal, plumose, basally connate into a ring, caducous as a whole.

- One species: China.

1. *Diplazoptilon picridifolium* (Handel-Mazzetti) Y. Ling, Acta Phytotax. Sin. 10: 85. 1965.

重羽菊 chong yu ju

Jurinea picridifolia Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 69. 1925.

Herbs 3–9 cm tall, perennial, stemless or rarely shortly

stemmed. Caudex to 1.2 cm in diam., simple, densely covered with remains of petioles. Stem (if present) solitary, ca. 3 mm in diam., erect, simple. Rosette leaves petiolate; petiole 0.5–2 cm; leaf blade elliptic, narrowly ovate, or narrowly obovate, 8–15(–27) × 1–5 cm, both surfaces green, abaxially glabrous, adaxially sparsely strigose, base attenuate, margin entire or sparsely dentate with mucronulate teeth, apex acute to obtuse and mucronulate. Capitulum solitary in center of leaf rosette.

Involucre campanulate, 2.5–3.5 cm in diam. Phyllaries in 4 or 5 rows, apex acuminate; outer and middle phyllaries triangular-ovate, 1.5–2 × 0.4–0.5 cm; inner phyllaries narrowly ovate, elliptic, or linear, 2.5–3 × 0.2–0.4 cm. Corolla 2.5–2.7 cm, tube

1.5–1.7 cm, limb ca. 1 cm, lobes ca. 5 mm. Achene 5–6 mm. Pappus bristles pale brown, 2–2.3 cm. Fl. and fr. Aug–Sep.

• Alpine grasslands, mountain slopes; 3600–3800 m. SE Xizang, NW Yunnan.

16. HIMALAIELLA Raab-Straube, Willdenowia 33: 390. 2003.

须弥菊属 *xu mi ju shu*

Shi Zhu (石铸 Shih Chu); Eckhard von Raab-Straube

Saussurea sect. *Elatae* J. D. Hooker, Fl. Brit. India 3: 373. 1881.

Herbs, biennial or perennial, tall or rarely stemless. Stems usually densely leafy or rarely scapiform. Basal leaves often lyrate-pinnately lobed to pinnately divided. Capitulum solitary and terminal on stem or in a racemiform, paniculiform, or corymbiform synflorescence, often nodding or sometimes erect, sessile or pedunculate. Involucre hemispheric to campanulate. Phyllaries sometimes reflexed. Receptacle densely covered with subulate alveolate bristles and rarely also with subulate paleae. Corolla reddish purple, purple, pink, or white, gland-dotted. Anther tails moderately lacerate. Achene blackish, 2–5.5 mm, 4- or 5-angled, glabrous, wrinkled, squamulate, or muricate, apical rim forming a conspicuous crown. Pappus homomorphic, in 1 row; bristles snow white, dirty white, or brownish, plumose, basally connate into a ring, caducous as a whole.

Thirteen species: Afghanistan, Bhutan, China, N India, Kashmir, Laos, Myanmar, Nepal, Pakistan, N Thailand, N Vietnam; SW Asia (Iran); seven species (one endemic) in China.

In C. Shih and S. Y. Jin (FRPS 78(2): 57–66. 1999), most species of *Himalaiella* are included in *Saussurea* subg. *Frolovia* (Candolle) Lipschitz. They are, however, more closely related to *Jurinea* than to *Saussurea*.

- 1a. Leaf blade of basal and lower stem leaves pinnately or bipinnately divided, terminal lobe not much larger than lateral ones.
 - 2a. Plants almost stemless; capitula few, clustered in center of leaf rosette 1. *H. yakla*
 - 2b. Plants with tall stems; capitula many, in a racemiform or paniculiform synflorescence 7. *H. peguensis*
- 1b. Leaf blade of basal and lower stem leaves lyrate-pinnately lobed or lyrate-pinnately divided, terminal lobe much larger than lateral ones or blade undivided.
 - 3a. Stem simple, scapiform with reduced leaves; capitulum always solitary; leaf blade adaxially grayish green, arachnoid tomentose 2. *H. abnormis*
 - 3b. Stem branched or rarely simple, leafy, not scapiform; capitula numerous or solitary; leaf blade adaxially green, scabrous, strigose, or glabrescent.
 - 4a. Receptacle with bristles and long subulate paleae; pappus brown 3. *H. auriculata*
 - 4b. Receptacle with bristles but without paleae; pappus white or straw-colored.
 - 5a. Plants few branched, with 2–4 capitula; outer phyllaries without appendage, long acuminate 4. *H. qinghaiensis*
 - 5b. Plants usually much branched, capitula numerous; outer phyllaries with a green, herbaceous appendage.
 - 6a. Involucre 1–2 cm in diam.; capitula solitary or clustered, subsessile or shortly pedunculate; corolla 1–1.2 cm; pappus 0.8–1 cm 6. *H. nivea*
 - 6b. Involucre 2–4 cm in diam.; capitulum mostly solitary, long pedunculate; corolla 1.5–2 cm; pappus 1.4–1.6 cm 5. *H. deltoidea*

1. Himalaiella yakla (C. B. Clarke) Fujikawa & H. Ohba, J. Jap. Bot. 82: 133. 2007.

亚东须弥菊 *ya dong xu mi ju*

Saussurea yakla C. B. Clarke, Compos. Ind. 227. 1876; *Diplazoptilon cooperi* (J. Anthony) C. Shih; *Dolomiaea cooperi* (J. Anthony) Y. Ling; *Jurinea cooperi* J. Anthony.

Herbs, perennial, stemless or shortly stemmed. Rosette leaves petiolate; petiole 2–6[–10] cm; leaf blade ovate, elliptic, or oblong in outline, 5–40 × 3–8 cm, bipinnately lobed to bipinnately divided, abaxially white with distinct dark veins, arachnoid tomentose, and glandular, adaxially green, puberulent, and sparsely glandular; segments 5–10 pairs, triangular,

ovate, or oblong, 1–3.3 × 0.8–3.4 cm, margin dentate and mucronate, apex acute or obtuse and mucronate. Capitula (1–)3–8(–10), in a condensed corymbiform synflorescence in center of leaf rosette, sessile or subsessile. Involucre campanulate, 0.8–3 cm in diam. Phyllaries in 4–6 rows, light brown, green, or reddish, apex erect or reflexed; outer phyllaries narrowly triangular-ovate, 5–10 × 2–4 mm, apex acute; middle phyllaries narrowly ovate-elliptic, 10–18 × 2–4 mm; inner phyllaries narrowly elliptic to linear, 1.8–3 × 0.1–0.3 cm, apex obtuse. Receptacle bristles 3–5 mm. Corolla purple, 1.7–2.7 cm, tube 1.3–1.5 cm, limb ca. 5 mm, lobes 4–6 mm. Achene 2.5–5.5 mm, 4- or 5-angled, muricate, apex with a dentate crown. Pappus bristles dirty white to light brown, 1.6–2.5 cm. Fl. and fr. Aug–Nov. *2n* = 34.

Alpine meadows, grasslands; ca. 4100 m. S Xizang (Yadong) [Bhutan, India (Sikkim), Nepal].

2. Himalaiella abnormis (Lipschitz) Raab-Straube, Willdenowia 33: 390. 2003.

普兰须弥菊 pu lan xu mi ju

Saussurea abnormis Lipschitz, Bot. Zhurn. (Moscow & Leningrad) 56: 826. 1971; *S. neglecta* Ludlow.

Herbs 8–15[–30] cm tall, perennial. Stems solitary or several, grayish white, 2–3 mm in diam., erect or ascending, simple, densely arachnoid tomentose. Basal leaves petiolate; petiole 2–3 cm; leaf blade obovate to elliptic, 6–12[–25] × 1.5–5[–8] cm, lyrate-pinnately lobed, abaxially grayish white, with conspicuous veins, and densely arachnoid tomentose, adaxially grayish green and arachnoid; lateral lobes 2–6 pairs, elliptic, proximal ones small, apex obtuse to rounded; terminal lobe ovate, margin sinuate or denticulate, apex obtuse to acute. Capitulum solitary, terminal on stems, erect in bud, nodding at anthesis and in fruit. Involucre hemispheric to campanulate, 1.2–2 cm in diam. Phyllaries in 4 or 5 rows, arachnoid tomentose, apex long acuminate; outer phyllaries narrowly ovate-triangular, 8–9 × 1.2–1.5 mm, apically reflexed or erect; middle and inner phyllaries narrowly elliptic to linear, 10–12 × 1–1.5 mm. Receptacle bristles ca. 5 mm. Corolla pink, 1.4–1.7 cm. Achene cylindric, 2–3 mm, apex with a dentate crown. Pappus bristles white, ca. 1 cm. Fl. and fr. Jul.

Alpine scree slopes; 3800–4400 m. S and SW Xizang (Burang, Gyirong) [NW India, W Nepal].

3. Himalaiella auriculata (Candolle) Raab-Straube, Willdenowia 33: 390. 2003.

白背须弥菊 bai bei xu mi ju

Aplotaxis auriculata Candolle, Prodr. 6: 541. 1838; *Saussurea auriculata* (Candolle) Schultz Bipontinus; *S. hypoleuca* Sprengel ex C. B. Clarke, nom. illeg. superfl.

Herbs 0.4–1.5 m tall, perennial. Stem solitary, 2–5 mm in diam., erect, simple or few branched. Basal to middle stem leaves sessile, obovate, 8–22 × 2.5–10 cm, lyrate-pinnately parted, abaxially grayish green and sparsely arachnoid tomentose, adaxially black when dry and puberulent, base auriculate and amplexicaul; lateral lobes 1–3 pairs, obliquely triangular; terminal lobe triangular, large, margin dentate, apex acute. Upper stem leaves usually shortly petiolate; leaf blade narrowly ovate to elliptic, 3–11 × 0.5–5 cm, undivided. Capitula solitary or few, terminal on stem and branches, nodding at anthesis. Involucre broadly campanulate, 2–3 cm in diam. Phyllaries in ca. 5 rows, sparsely pubescent, margin ciliate, apex long acuminate; outer phyllaries narrowly triangular, 8–14 × 1.5–2.5 mm; middle and inner phyllaries narrowly triangular to linear, 12–17 × 1–2 mm. Receptacle bristles 2–5 mm; paleae yellowish brown, subulate, 1.2–1.5 cm, ciliate in distal half. Corolla dark purple, 8–10 mm, tube 3–5 mm, limb 4–6 mm, lobes 1.5–2(–3) mm. Achene blackish brown, cylindric, 3–3.5 mm, 4- or 5-ribbed, apically spinulose, apex with a denticulate crown. Pappus bristles brown, 7–10 mm. Fl. and fr. Aug–Sep. *2n* = 58.

Mixed forests; 2700–4000 m. S Xizang [Bhutan, N India, Kashmir, Nepal].

Saussurea hypoleuca is illegitimate because C. B. Clarke, in the protologue, cited the validly published earlier name *Aplotaxis auriculata* in synonymy.

4. Himalaiella qinghaiensis (S. W. Liu & T. N. Ho) Raab-Straube, **comb. nov.**

青海须弥菊 qing hai xu mi ju

Basionym: *Saussurea qinghaiensis* S. W. Liu & T. N. Ho, Fl. Qinghai. 3: 511. 1996.

Herbs, 80–90 cm tall, perennial. Stem solitary, apically few branched, erect, ca. 5 mm in diam. Basal and lower stem leaves often withered at anthesis, petiolate; petiole to 3 cm; leaf blade 2.5–7 × 3–4 cm, abaxially grayish green, tomentose, adaxially green, pubescent, base truncate, margin sparsely dentate, apex acute. Middle and upper stem leaves sessile, 4–10 × 0.5–3.5 cm, base auriculate, amplexicaul, apex acute to acuminate. Capitula 2–4, very long pedunculate, nodding, in racemiform synflorescence. Involucre broadly hemispheric, 2–3 cm in diam. Phyllaries in 7–9 rows, straw-colored, blackish brown at margin, arachnoid, narrowly ovate-subulate to subulate-filiform, 1–1.5 mm wide, apex long acuminate and reflexed. Corolla bluish purple, 1–1.3 cm, tube 6–7 mm, limb 6–7 mm, lobes 2–3 mm. Achene black, ca. 4 mm, 4-angled, transversely rugose, apex with a denticulate crown. Pappus pale brown, outer bristles short, inner bristles to 1.2 cm. Fl. Aug.

• Near mountain streams; ca. 3600 m. S Qinghai (Yushu).

This species has been described as having a row of short outer pappus bristles. However, on the image available to us, no such bristles can be seen. The nodding, large capitula and achene characters are typical for the genus *Himalaiella*; therefore, this taxon is excluded from *Saussurea* and included here in *Himalaiella*.

5. Himalaiella deltoidea (Candolle) Raab-Straube, Willdenowia 33: 391. 2003.

三角叶须弥菊 san jiao ye xu mi ju

Aplotaxis deltoidea Candolle, Prodr. 6: 541. 1838; *Frolovia formosana* (Hayata) Lipschitz; *Saussurea deltoidea* (Candolle) Schultz Bipontinus; *S. formosana* Hayata; *S. kouy-tcheensis* H. Léveillé; *S. lamprocarpa* Hemsley; *S. radiata* Franchet; *Synurus taiwanianus* S. S. Ying.

Herbs 0.6–2(–3) m tall, biennial. Stem solitary, 0.5–1.5 cm in diam., erect, simple or branched. Lower and middle stem leaves petiolate; leaf blade ovate-elliptic in outline, lyrate-pinnately divided, abaxially grayish white, arachnoid tomentose, gland-dotted, and with brown articulate hairs, adaxially green and scabrous; lateral segments 1 or 2 pairs, narrowly elliptic to triangular, 1–3 × 0.5–2 cm; terminal segment triangular-hastate, 7–35 × 6–25 cm, margin dentate, apex acute. Upper stem leaves shortly petiolate or sessile, ovate-elliptic, margin lobed or dentate. Capitula usually numerous, in an ample paniculiform synflorescence, nodding, long pedunculate. Involucre broadly campanulate, (2–)3–4 cm in diam. Phyllaries in 5–7 rows, arachnoid tomentose; outer phyllaries triangular-ovate, 4–9 × 1.5–2 mm, apically with a triangular-ovate fimbriate appendage; middle phyllaries narrowly ovate-elliptic, 8–15 × 1.5–2.5 mm, with an apical appendage; inner phyllaries narrowly ovate to linear, 15–20 × 1.5–2.3 mm, apex acuminate and without an ap-

pendage. Receptacle bristles 7–10 mm. Corolla pink or white, (1.2–)1.5–2.1 cm, tube 0.9–1.2 cm, limb 6–9 mm, lobes 2.5–4 mm. Achene black, obconic, 3–4(–5) mm, 4-angled, apically muricate, apex with a denticulate crown. Pappus bristles white, (1.2–)1.4–1.6 cm. Fl. and fr. May–Nov. $2n = 34^*$.

Mountain slopes, grasslands, forests, thickets, wastelands, pastures, forest margins; 700–3400 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, N India, Laos, Myanmar, Nepal, Pakistan, N Thailand, N Vietnam].

6. Himalaiella nivea (Candolle) Raab-Straube, Willdenowia 33: 391. 2003.

小头须弥菊 xiao tou xu mi ju

Aplotaxis nivea Candolle, Prodr. 6: 541. 1838; *Saussurea cirsiium* H. Léveillé; *S. crispa* Vaniot; *S. deltoidea* (Candolle) Schultz Bipontinus var. *nivea* (Candolle) C. B. Clarke; *S. deltoidea* subsp. *polycephala* (C. B. Clarke) H. Koyama; *S. deltoidea* var. *polycephala* C. B. Clarke; *S. microdeltoidea* Kitamura; *S. nivea* (Candolle) Schultz Bipontinus (1846), not Turczaninow (1837).

Herbs (0.3–)0.5–1.8 m tall, biennial. Stem solitary, 5–10 mm in diam., erect, simple or branched. Lower stem leaves petiolate; leaf blade lyrate-pinnately parted, abaxially grayish green, with dark veins, and tomentose, adaxially green, scabrous or sparsely arachnoid, and gland-dotted; lateral lobes 1 or 2 pairs, oblong-triangular; terminal lobe triangular-hastate, 7–11 × 5–11 cm, margin dentate, apex acute. Middle and upper stem leaves petiolate; leaf blade triangular-hastate, narrowly ovate, or elliptic. Capitula numerous, in a racemiform to paniculiform synflorescence, subsessile to pedunculate. Involucre campanulate, 1–2(–2.5) cm in diam. Phyllaries in 4 or 5 rows; outer phyllaries ovate-elliptic, 3–5 × 1.5–2 mm, arachnoid tomentose and gland-dotted, with an orbicular fimbriate appendage; middle phyllaries narrowly ovate-elliptic, 5–9 × 1.5–2 mm, with an apical appendage; inner phyllaries narrowly ovate to linear, 12–13 × 1–1.5 mm, apex acuminate and without an appendage. Receptacle bristles 4–5 mm. Corolla purple, 0.9–1.2 cm, tube 5–7 mm, limb 4–6 mm, lobes 2–3 mm. Achene black, obconic, 2–3.5 mm, 4-angled, apically muricate, apex with a denticulate

crown. Pappus bristles straw-colored, 8–10 mm. Fl. and fr. Aug–Oct. $2n = 34$.

Grasslands on mountain slopes, forests and forest margins in mountain valleys; 200–2800 m. Guizhou, Sichuan, Xizang, Yunnan [NE India, Laos, Myanmar, Nepal, N Thailand, N Vietnam].

There are intermediate forms between *Himalaiella deltoidea* and *H. nivea* in those areas where both species occur. Further investigation is needed to clarify the status of these two taxa.

7. Himalaiella peguensis (C. B. Clarke) Raab-Straube, Willdenowia 33: 391. 2003.

叶头须弥菊 ye tou xu mi ju

Saussurea peguensis C. B. Clarke, Compos. Ind. 235. 1876; *S. dealbata* Collett & Hemsley; *S. deltoidea* (Candolle) Schultz Bipontinus var. *peguensis* (C. B. Clarke) J. D. Hooker; *S. leontopodium* H. Léveillé & Vaniot; *S. phyllocephala* Collett & Hemsley.

Herbs 0.5–1.5[–2.5] m tall, biennial. Stem solitary, 7–10 mm in diam., erect, simple. Basal and lower stem leaves petiolate; leaf blade elliptic to obovate in outline, 8–30[–40] × 5–10[–15] cm, bipinnately lobed to bipinnately divided, abaxially grayish green and densely tomentose, adaxially green, scabrous, and with brown articulate hairs; primary lobes 5–10 pairs; secondary lobes 1–4 pairs, ovate-elliptic to obliquely triangular, apex mucronate. Middle and upper stem leaves sessile, gradually smaller upward on stem, pinnately lobed to pinnately divided, base auriculate and semiamplexicaul, apex acute. Capitula numerous in a racemiform or paniculiform synflorescence, subsessile to pedunculate. Involucre campanulate, 1.5–2(–2.5) cm in diam. Phyllaries in 4 or 5 rows, apex acute; outer phyllaries grayish green, oblong-linear, 9–15 × 1–5 mm, herbaceous, arachnoid lanate, margin crenulate; middle phyllaries narrowly triangular-ovate, 8–10[–15] × 1–1.5 mm; inner phyllaries linear, 8–10[–20] × 1–1.5 mm. Corolla purple, 1.3–1.5 cm, tube 6–7 mm, limb 6–7 mm, lobes 2–2.5 mm. Achene blackish brown, cylindric, 2–4 mm, apically muricate, apex with a crenulate crown. Pappus bristles dirty white, 1.1–1.2 cm. Fl. and fr. Sep–Oct. $2n = 34$.

Forests; 1200–1600 m. Guizhou, Yunnan [Myanmar, N Thailand].

17. DOLOMIAEA Candolle, Arch. Bot. (Paris) 2: 330. 1833.

川木香属 chuan mu xiang shu

Shi Zhu (石铸 Shih Chu); Eckhard von Raab-Straube

Mazzettia Iljin; *Vladimiria* Iljin.

Herbs, perennial, rosulate and stemless or shortly stemmed. Capitula solitary or several, clustered in center of leaf rosette or terminal on stem and subtended by bracts, large. Involucre campanulate. Phyllaries in several rows, imbricate, leathery to subleathery, margin ciliate. Receptacle flat, alveolate, naked or margin of alveolae with very short subulate cartilaginous processes. Corolla gland-dotted. Anther tails lacerate. Style branches divergent or coherent. Achene trigonous or tetragonous, sometimes cylindric, with an apical rim. Pappus bristles in 2 to several rows, scabrid to shortly plumose, basally connate into a ring, caducous as a whole.

Thirteen species: China, NW India, Kashmir, Myanmar, Nepal; 12 species (ten endemic) in China.

1a. Capitulum solitary, in center of leaf rosette or terminal on stem.

2a. Leaf blade undivided.

3a. Leaves 4–9 × 1.2–2 cm, margin entire; pappus bristles in 2 rows, barbellate 1. *D. georgei*

- 3b. Leaves 7–20 × 4–19 cm, margin dentate; pappus bristles in many rows, scabrid 4. *D. berardioidea*
- 2b. Leaf blade pinnately lobed, pinnatifid, or pinnatipartite.
- 4a. Leaf blade green, concolorous, strigose or glabrous.
- 5a. Leaf blade 2.5–10 × 1–2.5 cm, glabrous; involucre 1.5–2.5 cm in diam. 2. *D. salwinensis*
- 5b. Leaf blade 5–20 × 3–17 cm, strigose; involucre 4–6 cm in diam. 3. *D. edulis*
- 4b. Leaf blade at least abaxially grayish white, densely tomentose.
- 6a. Leaf blade abaxially grayish white and densely tomentose, adaxially green and arachnoid only along midrib 5. *D. platylepis*
- 6b. Leaf blade on both surfaces grayish green to grayish white and arachnoid tomentose 10. *D. crispoundulata*
- 1b. Capitula 2–15, clustered in center of leaf rosette.
- 7a. Outermost pappus bristles recurved and covering achene 7. *D. souliei*
- 7b. Outermost pappus bristles straight and not covering achene.
- 8a. Leaf blade green, almost concolorous, undivided or sometimes pinnately lobed, strigose 6. *D. forrestii*
- 8b. Leaf blade at least abaxially grayish white, pinnately divided, densely tomentose.
- 9a. Leaf blade bipinnately lobed to bipinnatisect.
- 10a. Style branches oblong, short, ± coherent, apex rounded; pappus yellowish brown 11. *D. calophylla*
- 10b. Style branches linear, long and slender, divergent, apex acute; pappus brick-colored 12. *D. lateritia*
- 9b. Leaf blade pinnatipartite, pinnatisect, or lyrate pinnatisect.
- 11a. Leaf blade pinnatipartite, arachnoid tomentose on both surfaces 10. *D. crispoundulata*
- 11b. Leaf blade lyrate pinnatisect or pinnatisect, abaxially grayish white and tomentose, adaxially green and glabrous or sparsely arachnoid.
- 12a. Leaf blade lyrate pinnatisect, terminal lobe much larger than lateral ones 8. *D. wardii*
- 12b. Leaf blade pinnatisect, terminal lobe not much larger than lateral ones 9. *D. scabrada*

1. *Dolomiaea georgei* (J. Anthony) C. Shih, Acta Phytotax. Sin. 24: 294. 1986.

腺叶川木香 xian ye chuan mu xiang

Jurinea georgei J. Anthony, Notes Roy. Bot. Gard. Edinburgh 18: 21. 1934; *Vladimiria georgei* (J. Anthony) Y. Ling.

Herbs 5–12(–18) cm tall, perennial, stemless or shortly stemmed. Caudex 1.5 cm in diam., simple or few branched. Rosette leaves petiolate; petiole 3–9 cm; leaf blade elliptic, narrowly obovate, or spatulate, 4–9 × 1.2–2 cm, both surfaces green and densely gland-dotted but otherwise glabrous, base attenuate, margin entire or shallowly undulate, apex acute to obtuse. Capitulum solitary, in center of leaf rosette or terminal on stem and subtended by bracts. Involucre campanulate or broadly cylindric, 2–3 cm in diam. Phyllaries in 4 or 5 rows, leathery, glabrous, margin purplish and scarious; outer and middle phyllaries ovate, narrowly ovate, or ovate-elliptic, 1.5–3 × 0.5–0.8(–1) cm, apex obtuse; inner phyllaries elliptic to broadly linear, 3–3.5 × 0.3–0.4 cm, apex acute to acuminate. Corolla purplish red, 3–3.5 cm, tube ca. 2.7 cm, limb 8–9 mm, lobes 3.5–4 mm. Style branches 3–4 mm, slender, divergent. Achene trigonous or quadrangular, 4–6 mm, glabrous. Pappus bristles in ca. 2 rows, dirty white to pale yellowish brown, barbellate, 2.5–3.2 cm. Fl. and fr. Aug–Oct.

- Grasslands on mountain slopes; ca. 3200 m. NW Yunnan.

2. *Dolomiaea salwinensis* (Handel-Mazzetti) C. Shih, Acta Phytotax. Sin. 24: 295. 1986.

怒江川木香 nu jiang chuan mu xiang

Jurinea salwinensis Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 69. 1925; *Mazzettia salwinensis* (Handel-Mazzetti) Iljin; *Vladimiria salwinensis* (Handel-Mazzetti) Iljin.

Herbs 4–10 cm tall, perennial, stemless or shortly stemmed. Caudex 0.5–1.5 cm in diam., unbranched. Rosette leaves petiolate; petiole long, winged; leaf blade elliptic, narrowly elliptic, narrowly ovate, or spatulate, 2.5–10 × 1–2.5 cm, both surfaces green and glabrous, base attenuate, margin entire, obtusely dentate, or ± pinnately lobed, apex obtuse to acute. Upper stem leaves similar to basal leaves, subtending and overtopping capitulum. Capitulum solitary, in center of leaf rosette or terminal on stem. Involucre 1.5–2.5 cm in diam. Phyllaries in 3 or 4 rows, apex obtuse to acute; outer phyllaries ovate, 10–13 × 3–6 mm; middle phyllaries ovate to narrowly ovate, 14–15 × 3–5 mm; inner phyllaries narrowly ovate, 1.6–2 × 0.2–0.3 cm. Corolla purplish red, 2–2.5 cm, tube 1–1.7 cm, limb 7–8 mm, lobes 4–5 mm. Style divergent, 1.5–2 mm. Achene black, trigonous, 3.5–4 mm. Pappus bristles in several rows, yellowish brown, scabrid to barbellate, 1.2–2.3 cm, apically shortly plumose. Fl. and fr. Jul–Sep.

Forest margins, grasslands on mountain slopes; 2900–3800 m. NW Yunnan (Dèqên, Gongsan) [Myanmar].

3. *Dolomiaea edulis* (Franchet) C. Shih, Acta Phytotax. Sin. 24: 294. 1986.

菜川木香 cai chuan mu xiang

Saussurea edulis Franchet, J. Bot. (Morot) 2: 337. 1888; *Jurinea edulis* (Franchet) Franchet; *J. edulis* var. *caulescens* Franchet; *Vladimiria edulis* (Franchet) Y. Ling.

Herbs 8–30 cm tall, perennial, stemless or shortly stemmed. Rosette leaves petiolate; petiole 1–11 cm; leaf blade obovate, elliptic, broadly ovate-elliptic, or suborbicular, 5–20 × 3–17 cm, pinnately divided, pinnately lobed, or sometimes undivided, both surfaces green to yellowish green and sparsely to densely strigose, base cordate, cuneate, or truncate; lobes 3–7 pairs, ovate, falcate, or obliquely triangular, margin apiculate or spinulose dentate. Capitulum solitary, in center of leaf rosette or

terminal on stem and subtended by uppermost leaves. Involucre broadly campanulate, 4–6 cm in diam. Phyllaries in 4 or 5 rows, rigid; outer and middle phyllaries ovate to elliptic, 1.2–2.6 × 0.8–1.7 cm, apex rounded to obtuse; inner phyllaries narrowly ovate, elliptic, or broadly linear, 2.5–4 × 0.3–0.6 cm, apex acuminate. Corolla purplish red to bluish purple, 2.8–3.2 cm, tube 2–2.7 cm. Achene pale brown, trigonous, 7–8 mm, wrinkled. Pappus bristles in many rows, yellowish brown, scabrid to barbellate, 2–2.6 cm. Fl. and fr. Jun–Oct.

Forest margins, grasslands, fallow open areas; 2600–4700 m. W Sichuan, SE Xizang, NW Yunnan [N Myanmar].

4. *Dolomiaea berardioidea* (Franchet) C. Shih, Acta Phytotax. Sin. 24: 294. 1986.

厚叶川木香 *hou ye chuan mu xiang*

Jurinea edulis (Franchet) Franchet var. *berardioidea* Franchet, J. Bot. (Morot) 8: 338. 1894; *J. berardioidea* (Franchet) Diels; *Vladimiria berardioidea* (Franchet) Y. Ling.

Herbs 5–17 cm tall, perennial, stemless or shortly stemmed. Caudex 2 cm in diam., simple. Rosette leaves petiolate; petiole 1–13 cm; leaf blade elliptic, ovate, or oblong, 7–20 × 4–19 cm, both surfaces green to yellowish green and densely strigose and gland-dotted, base shallowly cordate to truncate, margin undulate or sparsely spinulose-dentate, apex rounded to acute. Bracts 4–7, sessile, smaller than rosette leaves. Capitulum solitary, in center of leaf rosette, sessile or shortly pedunculate. Involucre campanulate, 4–6(–8) cm in diam. Phyllaries in 4 or 5 rows; outer phyllaries elliptic, narrowly obovate-elliptic, or narrowly ovate-elliptic, 1.5–2.5 × 1–1.3 cm; middle and inner phyllaries narrowly ovate-elliptic, 2.5–4 × 0.6–0.8 cm. Corolla purplish red, 3–3.2 cm, tube 2–2.3 cm, limb ca. 1 cm. Achene trigonous, 7–10 mm. Pappus bristles in many rows, yellowish brown, scabrid to barbellate, 2.5–2.8 cm. Fl. and fr. Jun–Oct.

• Grasslands or thickets on mountain slopes; 2800–3300(–5200) m. NW Yunnan (Dali, Lijiang, Yangbi).

5. *Dolomiaea platylepis* (Handel-Mazzetti) C. Shih, Acta Phytotax. Sin. 24: 295. 1986.

平苞川木香 *ping bao chuan mu xiang*

Jurinea platylepis Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 658. 1937; *Vladimiria platylepis* (Handel-Mazzetti) Y. Ling.

Herbs 7–12 cm tall, perennial, stemless or shortly stemmed. Rosette leaves petiolate; petiole to 10 cm; leaf blade obovate, ovate, or elliptic, 5–18 × 5–13 cm, pinnately lobed or pinnatifid, abaxially grayish white and densely tomentose, adaxially green and arachnoid only along midrib, base truncate or cuneate, margin pinnately dentate; lobes 2 or 3 pairs, obliquely broadly triangular to obliquely ovate, margin spinulose-denticulate, apex rounded, obtuse, or acute; terminal lobe semiorbicular to irregularly rhombic, apex obtuse to rounded. Capitulum solitary, in center of leaf rosette or terminal on stem. Involucre broadly bowl-shaped, 3.5–6 cm in diam. Phyllaries in ca. 4 rows, leathery; outer phyllaries broadly ovate, 1.4–1.8 ×

1–1.5 cm, apex rounded to obtuse; middle phyllaries narrowly elliptic to elliptic, 2–2.5 × 0.5–1 cm, apex obtuse to acute; inner phyllaries narrowly ovate-elliptic to linear, 2.5–3 × 0.3–0.5 cm, apex acute. Corolla purplish red, ca. 3 cm, tube ca. 2 cm and slender, limb 8–10 mm, lobes 4.5–5 mm. Style branches 3.5–4.5 mm, slender. Achene obconic, ca. 8 mm. Pappus bristles in many rows, yellowish white, barbellate, 2.5–3 cm. Fl. and fr. Sep–Oct.

• Grasslands, thickets on mountain slopes; 3100–3400 m. SW Sichuan.

6. *Dolomiaea forrestii* (Diels) C. Shih, Acta Phytotax. Sin. 24: 293. 1986.

膜缘川木香 *mo yuan chuan mu xiang*

Jurinea forrestii Diels, Notes Roy. Bot. Gard. Edinburgh 5: 200. 1912; *Dolomiaea denticulata* (Y. Ling) C. Shih; *Vladimiria denticulata* Y. Ling; *V. forrestii* (Diels) Y. Ling.

Herbs 6–15 cm tall, perennial, stemless or shortly stemmed. Caudex 1–1.5 cm in diam., simple. Rosette leaves petiolate; petiole 3–10 cm; leaf blade elliptic, obovate, ovate, or subtriangular, 10–20(–30) × 5–15 cm, pinnately lobed to undivided, green or yellowish green, almost concolorous, sparsely strigose, base subcordate, truncate, or cuneate-attenuate, margin spinulose-dentate to sinuate-denticulate, apex rounded to acuminate; lobes 4–8 pairs, ovate, broadly triangular, or falcate. Upper leaves smaller, pale yellowish green, base cuneate-attenuate, apex acute. Capitula 3–9, clustered in center of leaf rosette, sessile or shortly pedunculate. Involucre campanulate, 2–2.5(–3) cm in diam. Phyllaries in 5 or 6 rows, leathery, glabrous, margin dark brown and scarious; outer phyllaries ovate to elliptic, 7–15 × 5–9 mm, apex rounded to obtuse; middle and inner phyllaries elliptic to narrowly elliptic, 1.5–3 × 0.4–0.7 cm, apex obtuse, acute, or acuminate. Corolla purplish red, 2.3–2.8(–3.5) cm, tube 1.4–2 cm, limb 8–10 mm, lobes 5–6 mm. Achene cylindrical, 4–7 mm, 4-angled, apically verrucose. Pappus bristles in many rows, yellowish brown, scabrid to barbellate, 2–2.5 cm. Fl. and fr. Jul–Nov.

• Grasslands on mountain slopes, thickets, forests, forest margins; 3000–4200 m. SW Sichuan, SE Xizang, NW Yunnan.

Dolomiaea denticulata was described from a specimen without basal leaves and is only known from two collections. The diagnostic characters, exclusively of the upper leaves, do not seem to be sufficient to treat these plants as specifically different from *D. forrestii*.

7. *Dolomiaea souliei* (Franchet) C. Shih, Acta Phytotax. Sin. 24: 294. 1986.

川木香 *chuan mu xiang*

Herbs, perennial, stemless. Caudex 1.5–2 cm in diam., simple. Rosette leaves petiolate; petiole 2–6(–16) cm; leaf blade elliptic, narrowly elliptic, narrowly ovate, or narrowly obovate, 10–30 × 5–13 cm, pinnately lobed, pinnatisect, or sometimes bipinnatisect, green, pale green, or grayish white, concolorous or abaxially grayish white, both surfaces sparsely strigose and gland-dotted or abaxially sparsely arachnoid to tomentose, margin lobed and spinulose-dentate, rarely entire; lateral lobes 4–7 pairs, obliquely triangular to narrowly ovate; terminal lobe

similar to lateral ones but smaller. Capitula 2–12, clustered in center of leaf rosette, pedunculate. Involucre broadly campanulate, 2.5–4(–6) cm in diam. Phyllaries in ca. 6 rows, apex acuminate and spinulose; outer phyllaries ovate to ovate-elliptic, 2–2.5 × 0.8–1 cm; middle phyllaries elliptic to narrowly ovate-elliptic, 2.5–3 × 0.6–1.1 cm; inner phyllaries narrowly ovate-elliptic, 3–3.5 × 0.5–0.8 cm. Corolla dark red, 3–4 cm, tube 2–3 cm, limb 1–1.2 cm, lobes 6–7 mm. Achene cylindrical, 7–8 mm, glabrous or apically gland-dotted. Pappus bristles in many rows, yellowish brown, scabrid to barbellate, 2.5–4 cm; outermost pappus recurved, plicate and covering achene. Fl. and fr. Jul–Oct.

• Alpine grasslands or thickets, grasslands on mountain slopes; 3500–4800 m. W Sichuan, E Xizang, NW Yunnan.

The roots are used medicinally.

- 1a. Leaf blade green to pale green, ± concolorous 7a. var. *souliei*
 1b. Leaf blade abaxially grayish white, adaxially green to pale green 7b. var. *cinerea*

7a. *Dolomiaea souliei* var. *souliei*

川木香(原变种) chuan mu xiang (yuan bian zhong)

Jurinea souliei Franchet, J. Bot. (Morot) 8: 337. 1894;
Vladimiria souliei (Franchet) Y. Ling.

Leaf blade green to pale green, ± concolorous, sparsely strigose, gland-dotted.

• Alpine grasslands or thickets; 3700–4800 m. W Sichuan, E Xizang.

7b. *Dolomiaea souliei* var. *cinerea* (Y. Ling) Q. Yuan, Acta Bot. Yunnan. 30: 439. 2008.

灰毛川木香 hui mao chuan mu xiang

Vladimiria souliei var. *cinerea* Y. Ling, Acta Phytotax. Sin. 10: 79. 1965; *Dolomiaea souliei* var. *mirabilis* (J. Anthony) C. Shih; *Jurinea mirabilis* J. Anthony; *J. muliensis* Handel-Mazzetti; *J. trachyloma* Handel-Mazzetti; *V. muliensis* (Handel-Mazzetti) Y. Ling; *V. trachyloma* (Handel-Mazzetti) Y. Ling.

Leaf blade abaxially grayish white, sparsely arachnoid to arachnoid tomentose, and gland-dotted, adaxially green to pale green, sparsely strigose, and gland-dotted.

• Grasslands on mountain slopes; 3500–4200 m. W Sichuan, E Xizang, NW Yunnan.

Jurinea muliensis and *J. trachyloma* were described on account of their leaf shape and indumentum, which is quite different from that of *Dolomiaea souliei* and seems to be a constant character at least in *J. trachyloma* from SW Sichuan. More material is needed to clarify the taxonomic status of these plants.

8. *Dolomiaea wardii* (Handel-Mazzetti) Y. Ling, Acta Phytotax. Sin. 10: 88. 1965.

西藏川木香 xi zang chuan mu xiang

Jurinea wardii Handel-Mazzetti, J. Bot. 76: 290. 1938.

Herbs 3–5 cm tall, perennial, stemless. Rosette leaves

petiolate; petiole 1.5–7.5 cm; leaf blade obovate, narrowly obovate, or oblong, 5–20 × 2–5 cm, lyrate pinnatisect, abaxially grayish white and densely tomentose, adaxially green and glabrous or sparsely arachnoid; lateral segments in 3–6 pairs, broadly elliptic, oblong, or suborbicular, 0.7–1.5 × 0.7–1.5 cm, margin serrate-dentate or denticulate or rarely shallowly crenate, apex rounded; terminal segment ovate to broadly ovate, 2.5–5 × 1.5–3 cm. Capitula 4–8, clustered in center of leaf rosette, forming a hemispheric synflorescence, sessile or subsessile. Involucre campanulate, 1.5–2(–3) cm in diam. Phyllaries in 4 or 5 rows, herbaceous, basally straw-colored, apically purple, apex acute to acuminate; outer phyllaries obovate to elliptic, 4–8 × 3.5–4 mm; middle phyllaries elliptic to narrowly ovate-elliptic, 10–15 × 2–3(–5) mm; inner phyllaries linear-elliptic to broadly linear, 1.5–2.3 × 0.2–0.3 cm. Corolla purplish red, 1.6–2 cm, tube 7.5–11 mm, limb 8–9 mm, lobes 3–3.5 mm. Style branches ca. 3 mm, slender. Achene grayish brown, obconic, 6–7 mm, wrinkled. Pappus bristles in many rows, dirty white but basally pale brown, scabrid, 1.5–2 cm. Fl. and fr. Jul–Sep.

• Thickets on mountain slopes, gravelly and sandy riversides; 3800–4500 m. SE Xizang.

9. *Dolomiaea scabrida* (C. Shih & S. Y. Jin) C. Shih, Acta Phytotax. Sin. 24: 293. 1986.

糙羽川木香 cao yu chuan mu xiang

Vladimiria scabrida C. Shih & S. Y. Jin, Acta Phytotax. Sin. 21: 91. 1983.

Herbs, perennial, stemless. Rosette leaves petiolate; petiole 2–4.5 cm; leaf blade narrowly elliptic, 4–12 × 1–3 cm, pinnately divided, abaxially grayish white and densely arachnoid tomentose, adaxially green and glabrous or sparsely arachnoid on veins; lateral segments 4–6 pairs, elliptic, obliquely ovate, or obovate, 0.5–2 × 0.4–1.5 cm, margin denticulate; terminal segment narrowly ovate, 2–3 × 1–2 cm. Capitula 2 or 3, clustered in center of leaf rosette, shortly pedunculate. Involucre ca. 3 cm in diam. Phyllaries in ca. 4 rows, glabrous, apex acuminate; outer phyllaries narrowly triangular, ca. 15 × 4 mm; middle phyllaries narrowly ovate to elliptic, 16–19 × 2–3 mm; inner phyllaries broadly linear, ca. 1.9 × 0.2 cm, apex acuminate. Corolla purple, ca. 2 cm, tube ca. 1.1 cm, limb ca. 9 mm. Style branches ca. 2.5 mm, apex acuminate. Achene brown, obconic, 6–7 mm, glabrous. Pappus bristles in 2 rows, pale brown to dirty brown, scabrid, ca. 3 cm. Fl. and fr. Aug.

• Gravelly places by rivers; 4400–4500 m. SC Xizang (Ngamring).

This species is only known from a single locality and is probably close to *Dolomiaea wardii*.

10. *Dolomiaea crispoundulata* (C. C. Chang) Y. Ling, Acta Phytotax. Sin. 10: 9. 1965.

皱叶川木香 zhou ye chuan mu xiang

Jurinea crispoundulata C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 67. 1935; *Dolomiaea crispoundulata* var. *chienenii* Y. Ling; *Vladimiria crispoundulata* (C. C. Chang) C. Shih & S. Y. Jin.

Herbs to 6 cm tall, perennial, stemless or shortly stemmed. Caudex stout, simple or branched. Rosette leaves petiolate; petiole 1–3 cm; leaf blade elliptic to broadly linear, 2–7 × 0.7–1.3 cm, pinnately divided, abaxially grayish white and densely arachnoid tomentose, adaxially grayish green and arachnoid tomentose, base obtuse to rounded; segments in 3–15 pairs, obtusely triangular, broadly ovate, or semiorbicular; terminal lobe ovate, to 1 cm, apex obtuse. Capitula solitary or to 3, in center of leaf rosette, sessile or subsessile. Involucre campanulate, 2–3 cm in diam. Phyllaries in 4 or 5 rows, pale green, apically purplish, leathery, sparsely arachnoid, glabrescent, apex acuminate; outer phyllaries triangular to ovate-triangular, 6–13 × 1.5–2.5 mm; middle and inner phyllaries triangular to narrowly ovate, 1.4–2.5 × 0.3–0.4 cm. Corolla pale purple, 2.1–2.3 cm, tube 1.2–1.5 cm, limb 8–10 mm, lobes 4–6 mm. Style branches linear, ca. 2 mm, divergent, apex obtuse. Achene cylindrical, 3–5 mm, wrinkled, glabrous. Pappus bristles in 2–4 rows, basally yellowish brown and apically purplish, scabrid, 1.5–1.6 cm. Fl. Jul.

• Thickets, open ground; 4100–4400 m. SC Xizang (Gyangzê, Nyêmo).

11. *Dolomiaea calophylla* Y. Ling, Acta Phytotax. Sin. 10: 88. 1965.

美叶川木香 mei ye chuan mu xiang

Herbs, perennial, stemless. Rosette leaves petiolate; petiole 2–4 cm; leaf blade elliptic to narrowly obovate, 6–30 × 2–5 cm, bipinnately lobed, abaxially white and densely tomentose, adaxially green and strigose or sparsely arachnoid; primary lobes 5–10 pairs, ovate to elliptic; secondary lobes elliptic, obliquely ovate, or semiorbicular, margin spinulose-dentate. Capitula 5–15, clustered in center of leaf rosette, forming a hemispheric synflorescence. Involucre 1.5–2 cm in diam. Phyllaries in 5 or 6 rows, apically purplish red, apex mucronate; outer phyllaries elliptic, 9–11 × ca. 5 mm; middle phyllaries narrowly ovate-elliptic, 12–17 × ca. 5 mm; inner phyllaries narrowly ovate-elliptic to linear, 1.8–2 × 0.2–0.3 cm. Corolla purplish red, 1.5–2.2 cm, tube ca. 1.2 cm, lobes 4–5 mm. Style branches ca. 1 mm, ± coherent, apex obtuse. Achene tetragonous, obconic, 4–5 mm, ± wrinkled. Pappus bristles in many

rows, blackish to yellowish brown, barbellate, ca. 2 cm. Fl. and fr. Aug.

• Alpine grasslands, scree slopes; 3300–4700 m. SC Xizang.

Dolomiaea calophylla is very close to *D. macrocephala* Royle, which occurs to the SW of Xizang in Nepal, NW India, and Kashmir. That species is said to differ from *D. calophylla* by larger capitula (involucre to 2.5 cm in diam.; phyllaries to 3.5 cm; corolla 2.5–3 cm; achene 6–8 mm; pappus ca. 2.5 cm), scabrous phyllaries with serrulate margin, and a brown or purplish brown pappus. Further studies are needed to investigate whether these plants actually represent two different species. *Dolomiaea macrocephala* has been recorded from Xizang (Yadong and Lhasa) (S. Y. Liang, Fl. Xizang. 4: 917. 1985), but no specimens were seen.

12. *Dolomiaea lateritia* C. Shih, Acta Phytotax. Sin. 32: 190. 1994.

红冠川木香 hong guan chuan mu xiang

Herbs, perennial, stemless. Rosette leaves petiolate; petiole ca. 5 cm; leaf blade elliptic, 9–24 × 5–8 cm, bipinnately lobed to bipinnately divided, abaxially grayish white and densely tomentose, adaxially green and glabrous; primary lobes ca. 8 pairs, narrowly ovate to elliptic; secondary lobes triangular, narrowly triangular, or ovate, margin spinulose-denticulate. Capitula ca. 8, clustered in center of leaf rosette, forming a hemispheric synflorescence, shortly pedunculate. Involucre campanulate, ca. 2.5 cm in diam. Phyllaries in ca. 6 rows, dark red, leathery, glabrous, apex acuminate; outer phyllaries narrowly ovate-triangular, ca. 10 × 2 mm; middle phyllaries narrowly triangular, 1.5–2.5 × 0.5–0.6 cm; inner phyllaries narrowly ovate-elliptic to elliptic, 2.3–3.5 × 0.6–0.7 cm. Corolla purplish red, ca. 3 cm, tube ca. 2.2 cm, limb 8–10 mm, lobes 4–5 mm. Style branches linear, narrowed, divergent. Achene (ripe) unknown. Pappus bristles in many rows, brownish in basal half and brick-colored in apical half, scabrid, ca. 1.8 cm. Fl. Sep.

• Alpine meadows, thickets; ca. 3400 m. S Xizang (Gyirong).

Dolomiaea lateritia is only known from the type collection. Except for the divergent and narrowed style branches and for the pappus color, this species is very similar to *D. calophylla* and *D. macrocephala*. Lack of material does not permit a decision here about whether these plants are conspecific or not.

18. *BOLOCEPHALUS* Handel-Mazzetti, J. Bot. 76: 291. 1938.

球菊属 qiu ju shu

Shi Zhu (石铸 Shih Chu); Eckhard von Raab-Straube

Herbs, perennial. Stems subscapose. Capitulum large. Involucre densely white lanate. Phyllaries imbricate, herbaceous. Receptacle with long subulate bristles. Corolla limb 3 × as long as tube. Anther tails filiform-acuminate, undivided. Style branches long, slender, divergent, apex truncate to obtuse. Pappus homomorphic, in several rows, inner bristles longer than outer ones, fragile, basally connate into a ring, caducous.

• One species: China.

The character combination for this genus is rather unique within the *Saussurea* group, but *Bolocephalus* is probably closely related to *Dolomiaea* and *Frolovia*. In the protologue, the receptacle was described as naked, whereas by C. Shih (FRPS 78(1): 44. 1987) that description was corrected to a receptacle having long bristles. *Bolocephalus* is preliminarily maintained here as a distinct genus because morphological data of receptacle, achene, and pappus structure are not sufficient to attribute it to another genus, and molecular data are lacking.

1. Bolocephalus saussureoides Handel-Mazzetti, J. Bot. 76: 292. 1938.

球菊 qiu ju

Dolomiaea saussureoides (Handel-Mazzetti) Y. L. Chen & C. Shih.

Herbs 10–30 cm tall, perennial. Caudex stout, unbranched. Stem solitary, 4–6 mm in diam., erect, simple, hollow, basally sparsely arachnoid, apically densely lanate. Basal leaves many, petiolate; petiole 3–6 cm; leaf blade elliptic to broadly linear, 10–20 × 1–1.5 cm, runcinate, pinnately lobed, or pinnatifid, abaxially grayish white and densely tomentose, adaxially green and sparsely arachnoid tomentose but glabrescent; lobes 2–5

pairs, broadly or obliquely triangular, margin entire; terminal lobe elliptic to narrowly elliptic, apex acute to rounded. Stem leaves few, similar to basal leaves. Uppermost stem leaves linear, undivided. Capitulum solitary, drooping. Involucre globose, 5–6 cm in diam. Phyllaries in 5 or 6 rows, densely and fluffily lanate, apex long acuminate; outer and middle phyllaries triangular-subulate, 1.5–2.5 × 0.1–0.3 cm; inner phyllaries linear-subulate, 2.5–3.5 × 0.1–0.3 cm. Receptacle bristles to 1.1 cm. Corolla purplish red, ca. 1.6 cm, tube ca. 4 mm, limb ca. 1.2 cm, lobes ca. 2.5 mm. Achene brown, obconic, ca. 5 mm, 4- or 5-ribbed, apically with a rim. Pappus bristles scabrid, to 1.5 cm. Fl. and fr. Aug.

• Alpine scree slopes, cliffs, rocks, *Rhododendron* thickets; 4000–5000 m. Xizang (Nangxian).

19. FROLOVIA (Candolle) Lipschitz, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 16: 461. 1954.

齿冠属 chi guan shu

Shi Zhu (石铸 Shih Chu); Eckhard von Raab-Straube

Aplotaxis sect. *Frolovia* Candolle, Prodr. 6: 538. 1838.

Herbs to 1 m tall, perennial. Stems stout, erect, hollow. Basal leaves large, lyrate pinnatisect with large terminal lobe or undivided and ovate to narrowly ovate-elliptic. Capitula solitary or few, 2–8 cm in diam., long pedunculate. Phyllaries in many rows, narrowly ovate-elliptic to linear, subequal in length, apex long acuminate; outer phyllaries ± reflexed. Receptacle with numerous bristles. Corolla bluish or reddish purple, glabrous. Anther tails lacerate. Achene large, obtusely 4-angled, wrinkled, glabrous, apex with an obtusely crenulate crown. Pappus homomorphic, in 1 row; bristles numerous, snow white or light brown, plumose, basally connate into a ring, caducous as a whole.

Five species: Afghanistan, China, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Uzbekistan; one species in China.

Frolovia is very closely related to *Aucklandia* (see note under that genus). In G. M. Shen (Fl. Xinjiang. 5: 273. 1999), the species of this genus is included in *Saussurea*. Molecular analysis by Y. J. Wang et al. (Ann. Bot. 99: 311–322. 2007) has shown that *Frolovia* and *Aucklandia* are more closely related to *Dolomiaea* than to *Saussurea*.

1. Frolovia frolowii (Ledebour) Raab-Straube, Willdenowia 33: 391. 2003.

大序齿冠 da xu chi guan

Saussurea frolowii Ledebour, Icon. Pl. 4: 16. 1833; *Aplotaxis frolowii* (Ledebour) Candolle.

Herbs 25–80[–110] cm tall, perennial. Stem solitary, 5–8 mm in diam., simple, apically sparsely leafy or leafless. Basal and lower stem leaves petiolate; petiole to 15 cm; leaf blade obovate-elliptic, 10–35 × 5–20 cm, lyrate pinnatisect, abaxially grayish green and arachnoid tomentose, adaxially green and sparsely pilose; lateral lobes 1–4 pairs, ovate-triangular, gradually smaller toward base; terminal lobe ovate to triangular-hastate, large, margin crenate-dentate or subentire, apex acuminate. Middle and upper stem leaves narrowly ovate-oblong to linear, 3–15 × 0.2–2 cm, margin dentate or entire. Capitula solitary or rarely 2, nodding. Involucre broadly campanulate to

hemispheric, 2–3 cm in diam. Phyllaries in ca. 6 rows, blackish green, narrowly triangular-ovate to linear, 2.5–2.8 × 0.15–0.3 cm, subequal in length, apex long acuminate; outer phyllaries reflexed; inner phyllaries erect. Receptacle bristles filiform, 6–12 mm. Corolla reddish purple, 1.5–1.6 cm, tube 7–9 mm, limb 6–8 mm, lobes (2.5–)5–6 mm. Achene brown to straw-colored with dark spots, cylindrical to obconic, 5–8 mm, wrinkled, apex with a short obtusely crenulate crown. Pappus straw-colored, bristles 1.1–1.3 cm. Fl. Jul–Aug. $2n = 36$.

Alpine and subalpine meadows, forest meadows, coniferous forests; ca. 2000 m. N Xinjiang [Kazakhstan, Russia (S Siberia)].

The specific epithet of *Saussurea frolowii* is spelled in the protologue with a “w” (except on the accompanying figure, which, however, does not have nomenclatural impact), whereas the sectional and hence the generic names are spelled with a “v.” As both spellings are transcriptions from a Russian personal name, the former in German and the latter in Latin, they cannot be treated as correctable errors but have to be accepted as they are.

20. AUCKLANDIA Falconer, Ann. Mag. Nat. Hist. 6: 475. 1841.

云木香属 yun mu xiang shu

Shi Zhu (石铸 Shih Chu); Eckhard von Raab-Straube

Herbs 0.3–2 m tall, perennial. Stem stout, erect, hollow. Basal leaves very large, lyrate with winged petiole shallowly pinnately

lobed or undivided; leaf blade cordate, triangular-ovate, or ovate. Capitula usually clustered at stem apex, large. Involucre hemispheric. Phyllaries blackish, imbricate, narrowly ovate-elliptic to linear, apex long acuminate and often reflexed. Receptacle with many long subulate bristles. Corolla glabrous, tube as long as limb. Anther tails lacerate, lanate. Achene glabrous, wrinkled, apically crowned. Pappus homomorphic, in 1 row; bristles numerous, straw-colored to brownish, plumose, flattened, basally connate into a ring, caducous as a whole.

One species: N India, Kashmir, N Pakistan; introduced to China.

Aucklandia and *Frolovia* are very closely related. In a molecular study by Y. J. Wang et al. (Ann. Bot. 99: 311–322. 2007), the two genera form together a small clade, which is nested within the morphologically much different genus *Dolomiaea*. However, as sampling and analysis of this group is not yet complete, we prefer not to make generic rearrangements of these species here. In C. Shih and S. Y. Jin (FRPS 78(2): 58. 1999), the species of this genus is included in *Saussurea* subg. *Frolovia*.

1. *Aucklandia costus* Falconer, Ann. Mag. Nat. Hist. 6: 475. 1841.

云木香 yun mu xiang

Aplotaxis lappa Decaisne; *Saussurea costus* (Falconer) Lipschitz; *S. lappa* (Decaisne) Schultz Bipontinus.

Herbs (0.4–)1–1.5(–2) m tall, perennial. Rootstock 1–5 cm in diam. Stems 1.5–2 cm in diam., simple or apically branched. Basal and lower stem leaves petiolate; petiole 10–40 cm, broadly winged and lobate; leaf blade lyrate, cordate, or triangular-hastate, 20–50 × 10–30 cm, abaxially sparsely pubescent and gland-dotted, adaxially sparsely strigose, margin sinuate-dentate and mucronate, apex acute. Middle and upper stem leaves petiolate or sessile; leaf blade lyrate, ovate, or triangular-ovate, (5–)10–45 × (3–)5–25 cm. Capitula (1 or)2–5, clustered

in a synflorescence or sometimes solitary, sessile. Involucre hemispheric, 2–4 cm in diam. Phyllaries in 7–10 rows, dark purple to black, apically arachnoid but glabrescent, apex spiniform and reflexed; outer phyllaries narrowly triangular-ovate, (8–)15–20 × 1–2 mm; middle phyllaries narrowly ovate-elliptic, 1.5–2 × 0.2–0.3 cm; inner phyllaries narrowly elliptic-linear, 1.8–2.5 × 0.2–0.3 cm. Receptacle bristles subulate, 5–12 mm. Corolla dark blackish purple, 1.5–2 cm, tube 7–12 mm, limb 7–10 mm, lobes 4–5 mm. Achene brown with black spots, obconic to cylindric, 6–8 mm, apically wrinkled, apex with a crenulate or dentate crown. Pappus straw-colored, 1.2–1.7 cm. Fl. and fr. May–Aug. $2n = 36$.

Cultivated in Anhui, Fujian, Guangxi, Guizhou, Shaanxi, Sichuan, Yunnan, and Zhejiang [native to and also cultivated in NW India, Kashmir, and NE Pakistan].

The roots of *Aucklandia costus* are used medicinally.

21. HEMISTEPTIA Bunge ex Fischer & C. A. Meyer, Index Sem. Hort. Petrop. 2: 38. 1836.

泥胡菜属 ni hu cai shu

Shi Zhu (石铸 Shih Chu); Eckhard von Raab-Straube

Herbs, annual. Involucre campanulate to hemispheric. Phyllaries imbricate; outer and middle phyllaries apically with a purplish red crista. Receptacle densely covered with subulate alveolate bristles. Corolla glabrous. Anther tails sagittate, lacerate or undivided. Style branches short, divergent, apex truncate. Achene obovoid, laterally compressed, with 10–16 distinct ribs, glabrous, with apical rim forming a crenulate crown. Pappus heteromorphic, in 2 rows; outer pappus row of small scales; inner pappus row of plumose bristles, basally connate into a ring.

One species: E and S Asia, E Australia.

1. *Hemisteptia lyrata* (Bunge) Fischer & C. A. Meyer, Index Sem. Hort. Petrop. 2: 38. 1836.

泥胡菜 ni hu cai

Cirsium lyratum Bunge, Enum. Pl. China Bor. 36. 1833; *Aplotaxis australasica* F. Mueller; *A. bungei* Candolle, nom. illeg. superfl.; *A. carthamoides* Candolle; *A. multicaulis* Candolle; *Hemisteptia carthamoides* (Candolle) Kuntze; *Saussurea carthamoides* (Candolle) Benthams; *S. lyrata* (Bunge) Franchet; *Serratula carthamoides* Buchanan-Hamilton ex Roxburgh (1832), not (Willdenow) Poiret (1805).

Herbs 20–150 cm tall, annual. Stems solitary or rarely several, erect, apically branched or rarely simple. Basal leaves usually withered at anthesis. Lower and middle stem leaves petiolate; leaf blade narrowly elliptic to narrowly obovate, 4–15 × 1.5–5 cm, lyrate pinnately divided, abaxially grayish white and ± tomentose, adaxially green and glabrous, margin dentate or entire; segments 1–6 pairs, narrowly obovate to narrowly

ovate; terminal segment rhombic, triangular, or ovate, larger than lateral ones. Upper stem leaves sessile, narrowly ovate-elliptic to linear, gradually smaller upward on stem. Capitula many, in a lax corymbiform synflorescence or rarely solitary, long pedunculate. Involucre 1.5–3 cm in diam. Phyllaries in 4–10 rows, apex acuminate and purplish red; outer phyllaries triangular-ovate, 2–3 × 1–1.5 mm; middle phyllaries ovate-elliptic to elliptic, 3–7 × 1.3–1.5 mm; inner phyllaries elliptic to linear-elliptic, 7–13 × 1.5–1.8 mm. Receptacle bristles white, 2–4 mm. Corolla rose-purple, 1.2–1.4 cm, tube 1–1.1 cm, limb 2.5–3 mm, lobes 2–2.5 mm. Achene brown, 2.2–3 mm, glabrous. Pappus white; outer pappus row of 3–9 minute flat rectangular scales on abaxial side of achene, 0.2–0.5 mm, persistent; inner pappus row of plumose bristles, 1–1.3 cm, caducous. Fl. and fr. Mar–Aug. $2n = 36^*$.

Forests, forest margins, grasslands, wastelands, farmlands, riversides, roadsides; near sea level to 3300 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Si-

chuan, Taiwan, Yunnan, Zhejiang [?Bangladesh, Bhutan, India, Japan, Korea, Laos, Myanmar, Nepal, Thailand, Vietnam; E Australia].

The earlier publication of the name "*Hemistepta* [sic!] *lyrata*" by Bunge in Ledebour (Dorpat. Jahrb. Litt. 1: 221. 1833) was not valid because the generic name had not been previously validly published (*Vienna Code*, Art. 43.1); nor were the generic and specific names si-

multaneously validated there (Art. 42.1: "Reference to an earlier description is not acceptable in place of a descriptio generico-specifica").

"*Saussurea affinis* Spreng." and "*S. stricta* Spreng." (Candolle, Prodr. 6: 540. 1838) both belong here but were not validly published because they were merely cited as synonyms of *Aplotaxis carthamoides* and *A. multicaulis*, respectively (*Vienna Code*, Art. 34.1(c)).

22. SAUSSUREA Candolle, Ann. Mus. Natl. Hist. Nat. 16: 156, 198. 1810, nom. cons., not *Saussuria* Moench (1794).

风毛菊属 feng mao ju shu

Shi Zhu (石铸 Shih Chu); Eckhard von Raab-Straube

Herbs, usually perennial or sometimes biennial, sometimes subshrubs, cauliferous or stemless, often with woody caudex. Capitulum solitary or to very numerous and in a corymbiform, hemispheric, paniculiform, or racemiform synflorescence, sessile or pedunculate. Involucre campanulate, globose, ovoid, cylindrical, or tubular. Phyllaries imbricate, sometimes with an apical appendage. Receptacle flat or convex, usually with subulate bristles or sometimes with short papillae, rarely naked. Corolla usually purple, often bluish or reddish, sometimes brownish, blackish, or pink, rarely white, usually glabrous, sometimes with sessile glands or papillae. Anthers dark purple, dark blue, or black; anther tails sagittate, entire, lacerate, or lanate. Achene straw-colored, sometimes with black spots, brown or black, ± ribbed, smooth or transversely wrinkled, usually glabrous, rarely with glands, papillae, or hairs; apical rim inconspicuous, entire or sometimes forming a short crown. Pappus in 2 rows, heteromorphic, dirty white, yellowish, straw-colored, brown, dark gray, or black; outer bristles usually more numerous and shorter than inner ones, often of different lengths, scabrid, very rarely barbellate or plumose, individually caducous, very rarely lacking; inner bristles fewer and longer than outer ones, usually of same length, basally connate into a ring, always plumose, caducous or persistent.

About 415 species: Asia, C, E, and N Europe, W North America; 289 species (191 endemic) in China.

By far, the greatest diversity of the genus is in high mountains of temperate Asia, particularly in Siberia, C Asia, the Himalaya, and the Qinghai-Xizang Plateau. In China, the Hengduan Shan area is the center of diversity of *Saussurea*, with more than one hundred species, many of them endemic.

The taxonomy of the genus *Saussurea* in this treatment follows largely the monograph by Lipschitz (Rod *Saussurea*, 1–284. 1979), although it is quite clear that his infrageneric taxa do not represent natural groups. Despite some recent attempts to clarify the evolution of *Saussurea*, also with the help of molecular methods (Raab-Straube, Willdenowia 33: 379–402. 2003; Kita et al., Taxon 53: 679–690. 2004; Y. J. Wang & J. Q. Liu, Biochem. Syst. Ecol. 32: 1009–1023. 2004; Y. J. Wang et al., Biol. J. Linn. Soc. 97: 893–903. 2009), a well-supported phylogeny of the whole genus is still lacking. Therefore, and because of the pragmatic need to subdivide the large genus into manageable and recognizable groups, we still adopt to a large extent the infrageneric subdivision by Lipschitz, keeping in mind that this classification is a highly artificial one. However, those species placed by him in *Saussurea*, which are now thought to belong to *Aucklandia*, *Frolovia*, and *Himalaiella* (see Raab-Straube, loc. cit.), are excluded from this treatment and can be found under the respective segregate genera. *Saussurea* is divided here into four subgenera: *S.* subg. *Eriocoryne*, *S.* subg. *Amphilaena*, *S.* subg. *Theodorea*, and *S.* subg. *Saussurea*. *Saussurea* subg. *Saussurea* is further divided into eight sections: *S.* sect. *Jurineiformes*, *S.* sect. *Jacea*, *S.* sect. *Gymnocline*, *S.* sect. *Laguranthera*, *S.* sect. *Lagurostemon*, *S.* sect. *Strictae*, *S.* sect. *Rosulascentes*, and *S.* sect. *Saussurea*. Some of the sectional names used by Lipschitz have to be replaced by older ones that have priority at this rank.

Many *Saussurea* species are used medicinally, as for example: *S. arenaria*, *S. epilobioides*, *S. involucreta*, *S. laniceps*, *S. leucoma*, *S. medusa*, *S. obvallata*, and *S. stella*. Some of them are collected and marketed in large quantities and need strong protection in their natural habitats.

- 1a. Capitula or synflorescence enclosed, half-enclosed, or subtended by yellowish, red, or purple, membranous uppermost leaves; leaves always undivided 2. *S.* subg. *Amphilaena* (p. 67)
- 1b. Capitula or synflorescence not enclosed, half-enclosed, nor subtended by colored, membranous uppermost leaves; leaves undivided to pinnatisect.
 - 2a. Capitula usually clustered in densely congested hemispheric or rarely an interrupted spiciform or corymbiform synflorescence, rarely solitary terminal on stem or in rosette of leaves, usually surrounded or half-surrounded by densely lanate subtending leaves or subtended and exceeded by stellately arranged uppermost leaves; stems usually hollow, apically widened and club-shaped 1. *S.* subg. *Eriocoryne* (p. 57)
 - 2b. Capitula in a corymbiform, paniculiform, or racemiform synflorescence or solitary terminal on stem, not surrounded by densely lanate subtending leaves nor by stellately arranged uppermost leaves; stems solid or hollow but not apically widened.
 - 3a. Phyllaries or at least inner phyllaries with a conspicuous appendage; appendage often colored and membranous, or herbaceous and callose-serrulate, or cartilaginous spiniform; herbs mostly biennial, rarely perennial 3. *S.* subg. *Theodorea* (p. 75)
 - 3b. Phyllaries without an appendage or with a green herbaceous appendage but neither callose-serrulate nor spiniform, rarely with a long cusp or pectinate; plants always perennial 4. *S.* subg. *Saussurea* (p. 82)

1. *Saussurea* subg. *Eriocoryne* (Wallich ex Candolle) J. D. Hooker, Fl. Brit. India 3: 376. 1881.

雪兔子亚属 xue tu zi ya shu

Aplotaxis sect. *Eriocoryne* Wallich ex Candolle, Prodr. 6: 541. 1838.

Herbs, perennial or rarely biennial, monocarpic or polycarpic, cauliferous, stemless, or substemless, often densely lanate, rarely glabrous or subglabrous. Stem erect, usually hollow, apex usually club-shaped and inflated. Leaves densely lanate, cottony, sericeous, tomentose, or glabrous, margin entire, denticulate, dentate, pinnately lobed, or pinnately divided. Capitula numerous or rarely solitary, usually aggregated in a densely congested hemispheric synflorescence in center of leaf rosette or terminal on stem, enclosed or subtended by uppermost stem leaves or rarely in an interrupted spiciform or corymbiform synflorescence. Phyllaries without an appendage. Receptacle usually with subulate bristles, sometimes with short papillae, or naked. Corolla usually glabrous, sometimes papillose. Achene smooth or wrinkled, usually glabrous, sometimes papillose, rarely thinly arachnoid or gland-dotted, usually without apical crown (in *Saussurea stella* with dentate crown). Pappus dirty white, straw-colored, light to dark brown, gray, or blackish, usually in 2 rows; outer bristles usually scabrid or rarely plumose, sometimes lacking.

Thirty-four species: Afghanistan, Bhutan, China, India, Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia (Siberia), Tajikistan; 30 species (14 endemic) in China.

Saussurea subg. *Eriocoryne* occurs mainly on the Qinghai-Xizang Plateau and adjacent areas.

- 1a. Plants stemless or shortly stemmed, monocarpic; caudex simple, bearing a single terminal rosette.
- 2a. Leaves yellowish green or grayish green, densely sericeous or lanate.
- 3a. Leaves spatulate or elliptic, more than 5 mm wide; receptacle without bristles; pappus in 1 row 11. *S. dehsangensis*
- 3b. Leaves narrowly triangular or linear, usually less than 5 mm wide; receptacle with bristles; pappus in 2 rows.
- 4a. Leaves densely lanate in basal part, glabrous in apical part, apex long acuminate 9. *S. wellbyi*
- 4b. Leaves densely sericeous or lanate throughout, apex obtuse 10. *S. aster*
- 2b. Leaves green and often with a red or purplish base or reddish, glabrous or sparsely arachnoid floccose.
- 5a. Capitulum solitary, large, 3–4 cm in diam., in center of leaf rosette 6. *S. grandiceps*
- 5b. Capitula numerous, much smaller, in a clustered hemispheric synflorescence.
- 6a. Leaves pinnately lobed to pinnately divided 5. *S. thordii*
- 6b. Leaves undivided, margin entire or crenulate.
- 7a. Leaves sessile, narrowly triangular to linear, 2.5–20 cm, apex very long acuminate 7. *S. stella*
- 7b. Leaves petiolate, elliptic, ovate, or spatulate, 1–2.5 cm, apex obtuse or rounded 8. *S. thomsonii*
- 1b. Plants usually with a developed stem, monocarpic or polycarpic, if almost stemless then polycarpic with branched caudex bearing several sterile leaf rosettes and flowering shoots.
- 8a. Leaves glabrous or sparsely pilose or tomentose and glabrescent.
- 9a. Plants 40–90 cm tall, not caespitose; capitula in a ± congested corymbiform synflorescence 1. *S. uliginosa*
- 9b. Plants 10–20 cm tall, caespitose; capitula in a densely clustered hemispheric synflorescence 2. *S. fistulosa*
- 8b. Leaves densely lanate, villous, sericeous, or tomentose, sometimes adaxially glabrous.
- 10a. Annuals or biennials; stem diffusely branched; capitula in a lax corymbiform synflorescence 4. *S. kingii*
- 10b. Perennials; stem simple; capitula in a densely congested corymbiform, hemispheric, or spiciform synflorescence or rarely solitary (in *S. conaensis* and *S. tridactyla* var. *maiduoganla* and sometimes in *S. paxiana*).
- 11a. Stem 15–35 cm tall, not hidden by leaves or lanate indumentum 3. *S. delavayi*
- 11b. Stem usually less than 15 cm tall, if taller then entirely hidden by leaves and lanate indumentum.
- 12a. Synflorescence at anthesis concealed in lanate indumentum; capitula surrounded and much exceeded by densely lanate bracts.
- 13a. Capitulum solitary 28. *S. conaensis*
- 13b. Capitula numerous, in a ± aggregated synflorescence.
- 14a. Synflorescence interrupted spiciform; capitula not clustered on stem apex 25. *S. laniceps*
- 14b. Synflorescence hemispheric; capitula clustered on stem apex.
- 15a. Capitula loosely clustered on obovoid stem apex 29. *S. topkegolensis*
- 15b. Capitula densely aggregated on flat or convex stem apex.
- 16a. Phyllaries in 3–6 rows, unequal in length 26. *S. gossipiphora*
- 16b. Phyllaries in 1–4 rows, almost equal in length.
- 17a. Plants monocarpic, not caespitose; caudex simple; leaves with white hairs; phyllaries in 3 or 4 rows 27. *S. nishiokae*
- 17b. Plants polycarpic, caespitose; caudex branched; leaves with yellowish golden hairs; phyllaries in 1 row 30. *S. bhutkesh*

- 12b. Synflorescence at anthesis not concealed in lanate indumentum; capitula exposed on stem apex, not exceeded by densely lanate bracts.
- 18a. Pappus dull dark brown, mouse-gray, or blackish.
- 19a. Plants not caespitose; caudex long, creeping, fragile, branched below ground level; leaf blade elliptic to narrowly elliptic, pinnately lobed to pinnately divided, 5–15 mm wide 16. *S. quercifolia*
- 19b. Plants usually caespitose; caudex short, branched at ground level; leaf blade obovate, spatulate, or linear-oblong, undivided, 2–8 mm wide.
- 20a. Rosette and lower stem leaves green, glabrescent; petioles green, elongated; leaf margin obtusely sinuate-dentate; outer pappus bristles always reflexed and appressed on achene 13. *S. inversa*
- 20b. Rosette and lower stem leaves whitish, densely tomentose; petioles purple, short; leaf margin entire or shallowly crenate; outer pappus bristles usually erect 14. *S. gnaphalodes*
- 18b. Pappus white, dirty white, straw-colored, light brown, or brown.
- 21a. Plants shortly stemmed, less than 10 cm tall.
- 22a. Leaf blade very small, less than 1 cm 15. *S. sugongii*
- 22b. Leaf blade larger, more than 1 cm.
- 23a. Upper stem leaves elliptic, not reflexed, apex obtuse to rounded 12. *S. glacialis*
- 23b. Upper stem leaves linear, reflexed, apex acuminate 19. *S. gyacaensis*
- 21b. Plants with a distinct elongate erect flowering stem, usually more than 10 cm tall.
- 24a. Rosette and lower stem leaves adaxially densely yellowish or white lanate throughout.
- 25a. Leaf margin apically 3–6-lobed; corolla glabrous 22. *S. tridactyla*
- 25b. Leaf margin pinnately lobed or dentate; corolla ± papillose.
- 26a. Lower stem leaves fan-shaped to rhombic, more than 1 cm wide, margin dentate or pinnately lobed; achene glabrous or sparsely papillose on rim 23. *S. medusa*
- 26b. Lower stem leaves narrowly spatulate, less than 1 cm wide, margin pinnately lobed; achene densely papillose on rim 24. *S. namikawae*
- 24b. Rosette and lower stem leaves adaxially dark green or purplish, arachnoid floccose, tomentose, or glabrescent, sometimes only lanate toward base.
- 27a. All leaves deeply pinnatisect 20. *S. leucoma*
- 27b. Leaves denticulate, dentate, or pinnately lobed.
- 28a. Rosette and lower stem leaves abaxially often reddish, glabrous; stem leaves erect or spreading; capitula solitary or 2–5; involucre 1–2 cm in diam. 18. *S. paxiana*
- 28b. Rosette and lower stem leaves abaxially dark green, arachnoid; stem leaves reflexed; capitula numerous (8–20); involucre 0.4–0.9 cm in diam.
- 29a. Plants not caespitose; leaves elliptic, to 3 cm; upper stem leaves arachnoid; achene glabrous 17. *S. georgei*
- 29b. Plants usually caespitose; leaves narrowly elliptic to linear, to 6 cm; upper stem leaves densely white lanate; achene sparsely papillose 21. *S. simpsoniana*

1. *Saussurea uliginosa* Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 16. 1925.

湿地雪兔子 shi di xue tu zi

Herbs 40–90 cm tall, perennial, polycarpic. Caudex stout, simple or few branched. Stem solitary, 5–7 mm in diam., erect, simple or apically branched. Basal and lower stem leaves sessile, narrowly ovate-elliptic to linear, 20–30(–40) × 0.8–4 cm, abaxially light green, gland-dotted, and thinly tomentose but glabrescent, adaxially dark green and sparsely pilose but glabrescent, margin remotely denticulate, apex acuminate. Middle

and upper stem leaves narrowly elliptic to linear, 8–20 × 1–2.5 cm. Uppermost stem leaves linear, 4–8 × 0.2–1.2 cm. Capitula 6–17, in a densely congested or laxly corymbiform synflorescence, sessile or pedunculate. Involucre obovoid to globose, (0.8–)1–1.3 cm in diam. Phyllaries in 5 or 6 rows; outer phyllaries triangular-ovate, (7–)10–17 × 2–3.5 mm, apex long acuminate; middle phyllaries narrowly ovate, 6–8 × 1.5–2.5 mm, apex acute to obtuse; inner phyllaries linear, 9–10 × 1–1.5 mm, apex obtuse. Receptacle bristles 6–7 mm. Corolla blackish purple, 1–1.1 cm, tube 5–6 mm, limb 5–5.5 mm, lobes 2.5–3 mm. Achene (ripe) unknown. Pappus light brown; outer bristles 2–3 mm; inner bristles 8–9 mm. Fl. and fr. Jul–Aug.

• Grasslands on stony mountain slopes, forests, forest margins, thickets, marshes; 2000–4200 m. SW Sichuan, NW Yunnan.

- 1a. Leaves (1.5–)2–4 cm wide; capitula in a densely congested hemispheric corymbiform synflorescence, sessile or shortly pedunculate 1a. var. *uliginosa*
 1b. Leaves 0.8–1.5 cm wide; capitula in an ample widely spreading corymbiform synflorescence, long pedunculate 1b. var. *vittifolia*

1a. Saussurea uliginosa var. *uliginosa*

湿地雪兔子(原变种) shi di xue tu zi (yuan bian zhong)

Saussurea dumetorum J. Anthony.

Leaves narrowly ovate-elliptic, (1.5–)2–4 cm wide. Capitula terminal on stem, in a densely congested hemispheric corymbiform synflorescence, sessile or shortly pedunculate with basalmost ones to 2.5 cm, overtopped by stellately arranged uppermost leaves.

• Grasslands on stony mountain slopes, forests, forest margins, thickets, marshes; 3600–4200 m. SW Sichuan (Muli), NW Yunnan (?Dêqên, Lijiang, Zhongdian).

1b. Saussurea uliginosa var. *vittifolia* (J. Anthony) Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 649. 1937.

线叶湿地雪兔子 xian ye shi di xue tu zi

Saussurea vittifolia J. Anthony, Notes Roy. Bot. Gard. Edinburgh 18: 215. 1934.

Leaf blade linear, 0.8–1.5(–1.7) cm wide. Capitula in apical third of stem, in an ample widely spreading corymbiform synflorescence, long pedunculate with basalmost ones to 8 cm, subtended by uppermost leaves.

• Grasslands on stony mountain slopes; 2000–3400 m. NW Yunnan (Lijiang, Zhongdian).

2. Saussurea fistulosa J. Anthony, Notes Roy. Bot. Gard. Edinburgh 18: 206. 1934.

管茎雪兔子 guan jing xue tu zi

Herbs 10–20 cm tall, perennial, polycarpic, caespitose. Caudex stout, branched, covered with dark remains of petioles. Stem solitary, 7–10 mm in diam., erect, simple, hollow and clavate at apex. Basal and lower stem leaves petiolate; leaf blade narrowly elliptic to linear, 3–10 × 0.3–1 cm, abaxially pale green and scabrous, adaxially dark green and sparsely pilose but glabrescent, margin dentate, apex acute. Middle and upper stem leaves sessile, 3–6 × 1–1.5 cm. Uppermost stem leaves stellately arranged, overtopping synflorescence, sessile, narrowly triangular-ovate, 2–6 × 1–2 cm. Capitula 10–15, in a hemispheric synflorescence 4–5 cm in diam., sessile. Involucre narrowly campanulate or cylindrical, 6–9 mm in diam. Phyllaries in ca. 4 rows, narrowly ovate to obovate, apically villous, apex caudate; outer phyllaries 10–12 × 3–4 mm; middle phyllaries 8–10 × 2–3 mm; inner phyllaries 8–9 × 1.5–2 mm. Receptacle bristles 2–3 mm. Corolla reddish purple, 7–8 mm, tube 3–4 mm, limb 3.5–4 mm, lobes 1–1.5 mm. Achene obconic, ca. 3

mm, smooth, glabrous. Pappus brown; outer bristles 2–3 mm; inner bristles 6–7 mm. Fl. and fr. Aug–Sep.

• Grasslands on mountain slopes; 3400–4300 m. NW Yunnan (Dêqên, Zhongdian).

3. Saussurea delavayi Franchet, J. Bot. (Morot) 2: 355. 1888.

大理雪兔子 da li xue tu zi

Herbs (10–)15–35 cm tall, perennial, polycarpic. Caudex stout, simple or few branched, covered with remains of petioles. Stem solitary, 4–6 mm in diam., erect, simple. Basal and lower stem leaves petiolate; petiole to 4 cm; leaf blade linear, 5–18 × 0.2–0.8 cm, abaxially light or grayish green, sericeous, tomentose, and gland-dotted, adaxially dark green and glabrous or sericeous-villous, margin slightly revolute and entire or denticulate, apex acuminate. Middle and upper stem leaves sessile, linear, 5–10 × 0.2–0.8 cm. Uppermost stem leaves stellately arranged, overtopping synflorescence, narrowly triangular-linear, 1.5–6 × 0.4–0.8 cm, apex acuminate. Capitula 10–15, in a hemispheric synflorescence 3–6 cm in diam., sessile. Involucre campanulate, 0.8–1.2 cm in diam. Phyllaries in 4 or 5 rows, blackish, apex caudate to acuminate; outer phyllaries narrowly triangular-ovate, 9–11 × 2.5–3 mm; middle phyllaries narrowly elliptic, 7–9 × 2–2.5 mm; inner phyllaries linear, 8–9 × 1–1.5 mm. Receptacle bristles 5–6 mm. Corolla bluish purple, 7–9 mm, tube 4–5 mm, limb 3–4 mm, lobes ca. 2 mm. Achene dark brown, obconic, 3–5 mm, smooth, glabrous. Pappus brown; outer bristles 2–4 mm; inner bristles 6–8 mm. Fl. and fr. Aug–Oct. $2n = 34^*$.

• Grasslands on mountain slopes; 3300–4400 m. NW Yunnan.

- 1a. Leaves adaxially glabrous; basal leaves usually less than 5 mm wide 3a. var. *delavayi*
 1b. Leaves adaxially sericeous-villous; basal leaves usually more than 5 mm wide 3b. var. *hirsuta*

3a. Saussurea delavayi var. *delavayi*

大理雪兔子(原变种) da li xue tu zi (yuan bian zhong)

Stem appressed sericeous. Leaves abaxially light green, appressed sericeous, tomentose, and gland-dotted, adaxially glabrous. Basal leaves 2–5 mm wide.

• Grasslands on mountain slopes; 3300–4000 m. NW Yunnan (Dali, Gongshan, Lijiang).

3b. Saussurea delavayi var. *hirsuta* (J. Anthony) Raab-Straube, *stat. nov.*

硬毛大理雪兔子 ying mao da li xue tu zi

Basionym: *Saussurea delavayi* f. *hirsuta* J. Anthony, Notes Roy. Bot. Gard. Edinburgh 18: 205. 1934; *S. hirsuta* (J. Anthony) Handel-Mazzetti.

Stem densely sericeous-villous. Leaves abaxially grayish green, sericeous-villous, tomentose, and gland-dotted, adaxially sericeous-villous. Basal leaves 5–8 mm wide.

• Grasslands on mountain slopes; 4300–4400 m. NW Yunnan (Fugong, Lijiang).

4. *Saussurea kingii* C. E. C. Fischer, Bull. Misc. Inform. Kew 1937: 98. 1937.

拉萨雪兔子 la sa xue tu zi

Saussurea erecta S. W. Liu, J. T. Pan & J. Quan Liu.

Herbs 2–15(–25) cm tall, biennial or annual, monocarpic. Stem solitary, 2–4 mm in diam., sometimes erect, diffusely branched from base, apically branched or stem almost absent. Rosette leaves petiolate; petiole 0.5–5 cm; leaf blade narrowly oblong-elliptic to linear, 2–14 × 0.3–1.7 cm, pinnately lobed, both surfaces green, abaxially gland-dotted and arachnoid tomentose but glabrescent, adaxially sparsely arachnoid and gland-dotted, apex mucronate; lateral lobes 5–10 pairs, margin dentate or entire. Capitula 8–25, in a corymbiform synflorescence 3–15 cm in diam.; peduncle 0.3–1 cm. Involucre narrowly campanulate, 7–10 mm in diam. Phyllaries in 3 or 4 rows, apically purple, arachnoid, gland-dotted, apex acute and mucronate; outer phyllaries ovate to narrowly ovate-elliptic, 6–9 × 3–3.5 mm, appendage rhombic-spatulate and tridentate; middle and inner phyllaries narrowly ovate-elliptic, 5.5–9 × 1.5–2.5 mm. Receptacle without bristles. Corolla purplish red, rose, or white, 7–11 mm, tube 2.5–5.5 mm, limb 4–5.5 mm, lobes 3–4 mm and gland-dotted. Achene grayish with a dark wavy pattern, obconic, 3–4 mm, wrinkled, with thin long crisp hairs, glabrescent. Pappus white; outer bristles 2–2.5 mm; inner bristles (6–)8–9 mm, basally straw-colored. Fl. and fr. Aug–Sep. $2n = 34^*$.

• Sandy river edges and mountain slopes, sand dunes; 2900–5000 m. Xizang.

Saussurea erecta, described from a single specimen, differs from *S. kingii* only by its more erect habit and glabrous achenes. *Saussurea kingii* is variable in growth habit, and glabrous achenes have been observed in some specimens of *S. kingii* as well. As long as these characters are not found to be stable in a larger population, we regard *S. erecta* as synonymous with *S. kingii*.

5. *Saussurea thoroldii* Hemsley, J. Linn. Soc., Bot. 30: 115. 1894.

草甸雪兔子 cao dian xue tu zi

Herbs 2–6 cm tall, perennial, monocarpic, stemless or shortly stemmed. Taproot 1–3 mm in diam. Caudex densely covered with fibrous remains of petioles. Rosette leaves shortly petiolate; petiole purplish, basally widened; leaf blade narrowly triangular-ovate to linear, 2–10 × 0.2–1.5 cm, both surfaces green but purple in basal part, glabrous, pinnately lobed to pinnately divided, margin entire or sparsely dentate, apex acute and mucronate; lateral lobes 5–10 pairs, narrowly elliptic to linear, 1–4(–10) mm, recurved or patent. Capitula 8–40, clustered in a corymbiform to hemispheric synflorescence 2–8(–15) cm in diam., subsessile or on a peduncle to 3 cm. Involucre cylindrical, 5–7 mm in diam. Phyllaries in ca. 4 rows, glabrous, margin apically ciliate, apex obtuse; outer phyllaries elliptic, 4–7 × 1.5–2 mm; middle and inner phyllaries oblong, 6–8 × 1.5–2 mm. Receptacle bristles 1–2 mm. Corolla rose to bluish purple, 8–11 mm, tube 3.5–6 mm, limb 4–6 mm, lobes 2–3 mm. Achene ivory-colored with a dark wavy pattern, cylindrical to obconic, 2–3 mm, wrinkled, glabrous, apex with a lacerate

crown to 2 mm. Pappus pale brown; outer bristles 2–4 mm; inner bristles (6–)8–10 mm. Fl. and fr. Jul–Sep. $2n = 32^*$.

• Sandy and gravelly soil by lakes, river terraces, open steppes, saline marshlands; 3100–5200 m. Gansu, Qinghai, S Xinjiang, Xizang.

6. *Saussurea grandiceps* S. W. Liu, Acta Biol. Plateau Sin. 3: 69. 1984.

硕首雪兔子 shuo shou xue tu zi

Herbs 7–12 cm tall, perennial, monocarpic, stemless or shortly stemmed. Taproot conic, fleshy. Caudex covered with remains of petioles. Rosette and stem leaves petiolate; petiole 0.5–3.5 cm, straw-colored with purple wings, widened at base; leaf blade narrowly elliptic-oblong to linear, 2–8 × 0.2–0.8 cm, abaxially pale or grayish green and thinly arachnoid to densely villous, adaxially green and glabrous, margin often revolute and entire or sparsely dentate, apex acuminate. Capitulum solitary, in center of leaf rosette. Involucre hemispheric to broadly campanulate, 3–4(–5) cm in diam. Phyllaries in 4 or 5 rows, straw-colored, apically and near margin dark purple, sparsely pilose, apex acuminate; outer phyllaries narrowly triangular-ovate, 1.5–1.7 × 0.4–0.6 cm; middle phyllaries narrowly elliptic, 1.8–2 × 0.3–0.4 cm; inner phyllaries narrowly elliptic, 2–2.3 × 0.2–0.3 cm. Receptacle bristles brownish, subulate, 2–3 mm, hyaline. Corolla bluish purple, 1.9–2.1 cm, tube 1.3–1.4 cm, limb 6–7 mm, lobes 3–4.5 mm. Achene brown with a blackish wavy pattern, rectangular, 7–8 mm, 4-angled, wrinkled, glabrous. Pappus straw-colored; outer bristles (2–)4–6 mm; inner bristles 1.4–1.6 cm. Fl. and fr. Aug.

• Alpine scree slopes; 5000–5300 m. S Xizang (Saga).

7. *Saussurea stella* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 490. 1882.

星状雪兔子 xing zhuang xue tu zi

Herbs 2–5 cm tall, perennial, monocarpic, stemless. Rosette leaves sessile; leaf blade very narrowly triangular-ovate to linear but basally ovately widened, 2.5–20 × 0.3–1.3 cm, both surfaces glabrous, adaxially purplish red in basal part but green in apical part, margin entire, apex long acuminate. Capitula 2–6 cm in diam., sessile. Involucre cylindrical, 8–10 mm in diam. Phyllaries in ca. 5 rows, glabrous, basally hyaline, apically purple, apex rounded to obtuse and ciliate; outer phyllaries oblong or spatulate, 6–9 × 2–3(–5) mm; middle phyllaries narrowly oblong, 7–12 × 1.5–2 mm; inner phyllaries linear, 12–14 × 1–1.5 mm. Receptacle bristles white, 1–3 mm. Corolla purple, 1.3–1.7 cm, tube 0.8–1.2 cm, limb 5–6 mm, lobes 3–3.5 mm. Achene ivory-colored with dark spots, obconic, 2–3(–5) mm, obtusely 5-ribbed, glabrous, apex with a few-dentate ca. 1 mm crown. Pappus dirty white to light brown, in 1 row; bristles 0.9–1.3 cm, unequal in width, plumose, persistent. Fl. and fr. Jul–Sep.

Alpine grasslands, marshlands near rivers and lakes, wet meadows, bogs; 2000–5400 m. Gansu, Qinghai, W Sichuan, Xizang, NW Yunnan [Bhutan, India (Sikkim)].

8. *Saussurea thomsonii* C. B. Clarke, Compos. Ind. 227. 1876.

肉叶雪兔子 rou ye xue tu zi

Saussurea acaulis Klatt; *S. amblyophylla* C. Winkler.

Herbs 1–4 cm tall, perennial, monocarpic, stemless. Taproot 1–2 mm in diam. Caudex short, with brown remains of petioles. Rosette leaves petiolate; petiole 5–10(–30) mm, basally widened; leaf blade elliptic, ovate, or spatulate, 1–3 × 0.5–1.7 cm, fleshy but leathery and rigid when dry, both surfaces green, abaxially glabrous, adaxially sparsely arachnoid but glabrescent, base cuneate-attenuate, margin crenulate to subentire, apex obtuse, rounded, or rarely acute. Uppermost leaves suborbicular. Capitula 2–10, in center of leaf rosette, in a hemispheric synflorescence 1.5–3 cm in diam., sessile. Involucre campanulate, (6–)8–10 mm in diam. Phyllaries in 3 or 4 rows, membranous, purplish red, glabrous, apex obtuse to rounded; outer phyllaries elliptic to obovate, 5–6(–8) × 2.5–3 mm; middle phyllaries obovate, 6–7 × 2.5–3 mm; inner phyllaries narrowly elliptic, 7–8 × 1.5–2 mm. Receptacle bristles brown, 0.2–0.8 mm. Corolla bluish purple, 6–7 mm, tube 3–3.5 mm, limb 3.5–4 mm, lobes 1.5–2 mm. Achene brown, cylindrical to obconic, ca. 4 mm, wrinkled, glabrous. Pappus brown; outer bristles 2–4 mm, plumose, corkscrewlike twisted; inner bristles 6–7 mm. Fl. and fr. Jun–Sep.

High mountain pastures and meadows by rivers and lakes, marshlands; 4000–5200 m. Qinghai, S Xinjiang, Xizang [NW India, Kashmir, ?Pakistan].

9. *Saussurea wellbyi* Hemsley, Hooker's Icon. Pl. 26: t. 2588. 1899.

羌塘雪兔子 qiang tang xue tu zi

Saussurea hyperiophora Handel-Mazzetti.

Herbs 2–7 cm tall, perennial, monocarpic, stemless or shortly stemmed. Taproot conic, fleshy. Caudex 0.5–1.5 cm in diam., simple, covered with remains of leaf bases; leaf bases brown, adaxially white sericeous-villous. Rosette leaves sessile, narrowly ovate-linear but base ovately widened, 2–5(–7) × 0.1–0.8(–1) cm, abaxially sericeous, adaxially sericeous-villous to densely lanate in basal part and glabrous in apical part, margin entire, apex long acuminate to caudate. Capitula 8–30, in center of leaf rosette, in a hemispheric synflorescence 2.5–4 cm in diam., sessile or shortly pedunculate. Involucre cylindrical, ca. 6 mm in diam. Phyllaries in 3 or 4 rows, membranous, apically purple, apex acute; outer phyllaries narrowly obovate to oblong, 7–10 × 3–4 mm, apically villous; middle and inner phyllaries narrowly elliptic to linear, 10–12 × 2–2.5 mm, glabrous. Receptacle bristles 1–3 mm. Corolla purplish red, 8–10 mm, tube 3–5 mm, limb 4–6 mm, lobes 2–3 mm. Achene gray with some dark spots or blackish brown, cylindrical to obconic, 3–5 mm, smooth, glabrous. Pappus brown; outer bristles 2–4 mm; inner bristles 7–10 mm. Fl. and fr. Jul–Sep. $2n = 28^*$.

• Alpine scree slopes, alpine meadows; 4300–5500 m. Qinghai, W Sichuan, S Xinjiang, Xizang.

10. *Saussurea aster* Hemsley, J. Linn. Soc., Bot. 30: 115. 1894.

云状雪兔子 yun zhuang xue tu zi

Herbs 2–7 cm tall, perennial, monocarpic, stemless or shortly stemmed. Taproot conic, fleshy. Caudex 0.5–1.5 cm in diam., simple, covered with remains of petioles. Rosette leaves

petiolate; leaf blade narrowly elliptic, spatulate, or linear, 0.5–2(–4) × 0.1–0.4(–1) cm, abaxially white and densely sericeous to lanate, adaxially grayish green or yellowish green, base attenuate, margin entire, apex obtuse. Capitula 5–25, in center of leaf rosette, in a hemispheric synflorescence 2.5–5 cm in diam., sessile. Involucre cylindrical to campanulate, 5–8 mm in diam. Phyllaries in 3 or 4 rows, apically purple and villous, margin purplish, hyaline, and entire or apically with 1 or 2 lateral teeth, apex acute to acuminate; outer phyllaries narrowly oblong to obovate, 8–10 × 2.5–3 mm; middle and inner phyllaries linear, 9–10 × 0.5–2 mm. Receptacle bristles 1–2 mm. Corolla rose-purple, 7–9 mm, tube 3–4 mm, limb 4.5–5 mm, lobes 1.5–2 mm. Achene brown or gray with dark spots, cylindrical to fusiform, 4–6 mm, glabrous. Pappus in 2 rows; outer bristles dirty white, 3–4 mm; inner bristles brown, 7–8 mm. Fl. and fr. Jun–Aug.

Alpine scree slopes; 3900–5400 m. Qinghai, W Sichuan, Xizang [?NW India, Kashmir].

11. *Saussurea depsangensis* Pampanini, Lav. Ist. Bot. Reale Univ. Cagliari 22 [Aggiunte Fl. Caracorùm]: 176. 1934.

昆仑雪兔子 kun lun xue tu zi

Herbs 2–5 cm tall, perennial, monocarpic, stemless or shortly stemmed. Taproot slender, fleshy. Rosette leaves shortly petiolate; leaf blade obovate, spatulate, or suborbicular, 1–3 × 0.5–1.4 cm, abaxially sparsely whitish lanate but glabrescent, adaxially densely lanate with yellowish brown or whitish articulate matted hairs in basal part but arachnoid floccose and glabrescent in apical part, base cuneate-attenuate, margin entire or sparsely denticulate, apex rounded to obtuse. Capitula numerous, in center of leaf rosette, in a hemispheric synflorescence 2–4 cm in diam., sessile. Involucre cylindrical to campanulate, 4–8 mm in diam. Phyllaries in ca. 3 rows, subequal, apex acuminate; outer phyllaries narrowly ovate-oblong, 8–9 × 2–3 mm, herbaceous, apically densely yellowish brown lanate; middle and inner phyllaries narrowly oblong to linear, 7–9 × 1–2 mm, light brown, scarious, glabrous. Receptacle without bristles. Corolla rose-purple to purplish red, 9–10(–13) mm, tube 3.5–4 mm, limb 5–6 mm, lobes 2–2.5 mm. Achene (ripe) unknown, ca. 4 mm, glabrous. Pappus yellowish brown, in 1 row; bristles plumose, 0.9–1.1 cm. Fl. and fr. Aug–Sep.

Alpine scree slopes; 4800–5400 m. Qinghai, S Xinjiang, Xizang [Kashmir].

12. *Saussurea glacialis* Herder, Bull. Soc. Imp. Naturalistes Moscou 40(3–4): 144. 1867.

冰川雪兔子 bing chuan xue tu zi

Saussurea chtonocephala Bornmüller; *S. pamirica* C. Winkler; *S. violacea* Pampanini.

Herbs 2–6(–10) cm tall, perennial, polycarpic, shortly stemmed. Caudex slender, branched, with several leaf rosettes and flowering stems, covered with remains of petioles. Stem solitary, 1–3 mm in diam., erect, simple. Rosette and stem leaves shortly petiolate; leaf blade narrowly elliptic to obovate, 1.5–4 × 0.4–1 cm, abaxially white lanate, adaxially yellowish or white lanate, base cuneate-attenuate, margin crenate or entire, apex obtuse. Capitula 3–15, in a hemispheric synflorescence

1.5–4 cm in diam., sessile. Involucre cylindric to narrowly campanulate, (5–)7–10 mm in diam. Phyllaries in 3 or 4 rows, scarious, apically purple or blackish, apex acute to acuminate; outer phyllaries narrowly ovate-elliptic, 9–13 × 2.5–3 mm, apically lanate; middle phyllaries narrowly oblong, 8–13 × 1.5–2.5 mm; inner phyllaries narrowly elliptic to linear, 9–13 × 1–1.5 mm, glabrous. Receptacle bristles white, 0.5–2.5 mm. Corolla purple, 9–10 mm, tube 3–4 mm, limb 6–6.5 mm, lobes 2–2.5 mm. Achene cylindric to obconic, 3–4 mm, glabrous. Pappus in 2 rows; outer bristles dirty white, 2–5 mm, scabrid to plumose, sometimes lacking; inner bristles basally brown, apically dirty white, 8–11 mm. Fl. and fr. Jul–Aug.

Alpine scree slopes; 3800–5200 m. Qinghai, Xinjiang, Xizang [E Afghanistan, NW India, Kashmir, E Kazakhstan, Kyrgyzstan, Mongolia, N Pakistan, Russia (Siberia), Tajikistan].

13. *Saussurea inversa* Raab-Straube, Willdenowia 41: 92. 2011.

黑毛雪兔子 *hei mao xue tu zi*

Saussurea sorocephala (Schrenk ex Fischer & C. A. Meyer) Schrenk var. *glabrata* J. D. Hooker, Fl. Brit. India 3: 377. 1881, not *S. glabrata* (Candolle) C. Shih (1999); *S. gnaphalodes* (Royle ex Candolle) Schultz Bipontinus var. *glabrata* (J. D. Hooker) Handel-Mazzetti; *S. hypsipeta* Diels var. *glabrata* (J. D. Hooker) Lipschitz.

Herbs 3–15 cm tall, perennial, polycarpic, sometimes caespitose. Caudex simple or branched at ground level. Stem solitary, 2–5 mm in diam., erect, simple. Rosette and lower stem leaves long petiolate; petiole green; leaf blade narrowly obovate-spatulate, elliptic, or oblong, 1–3 × 0.3–1 cm, both surfaces green but sometimes tinged purple and glabrous or sparsely white arachnoid, base attenuate, margin obtusely dentate or entire, apex obtuse. Upper stem leaves sessile, narrowly triangular-ovate, usually reflexed, both surfaces white and blackish lanate, margin crenate or entire, apex obtuse to acuminate. Capitula 5–15, in a hemispheric synflorescence 2–4 cm in diam., sessile. Involucre cylindric, 5–6 mm in diam. Phyllaries in ca. 3 rows, membranous; outer phyllaries narrowly elliptic-linear, 8–9 × 1.5–2 mm, densely black and white lanate, apex subacute; middle and inner phyllaries obovate-elliptic, 8–9 × 2–3 mm, apex acute. Receptacle bristles 0.5–1.5 mm. Corolla rose-purple, 7–8(–9) mm, tube 3–4(–5) mm, limb 3.5–4(–5) mm, lobes (1.2–)1.5–2 mm. Achene brown, cylindric to obconic, 4–5 mm, smooth, glabrous. Pappus mouse-gray to blackish; outer bristles 1–3 mm, reflexed and appressed on achene; inner bristles 7–8 mm. Fl. and fr. Jul–Sep.

Alpine scree slopes, alpine meadows; 3700–5400 m. Qinghai, S Xinjiang, Xizang [Kashmir].

The type material of *Saussurea hypsipeta*, now present at WRSL and WU, was not seen by Lipschitz, who assumed that the type had been lost at B, though that was not the case. His choice of a neotype is therefore superseded (*Vienna Code*, Art. 9.17). Unfortunately, the type of *S. hypsipeta* differs taxonomically from the neotype. The original material of *S. hypsipeta* belongs in part to *S. gnaphalodes* and in part to *S. quercifolia*, both of which have priority over *S. hypsipeta*, so the taxon formerly widely known as *S. hypsipeta* (e.g., in Lipschitz, *Rod Saussurea*, 30. 1979; Y. L. Chen, *Fl. Xizang*, 4: 876. 1985; S. W. Liu, *Fl.*

Qinghai, 3: 458. 1996; C. Shih & S. Y. Jin, *FRPS* 78(2): 11. 1999) had to be given a new name at the species level, which cannot be “*glabrata*” as this name is already occupied in *Saussurea*.

14. *Saussurea gnaphalodes* (Royle ex Candolle) Schultz Bipontinus, *Linnaea* 19: 331. 1846.

鼠曲雪兔子 *shu qu xue tu zi*

Aplotaxis gnaphalodes Royle ex Candolle, *Prodr.* 6: 542. 1838; *A. sorocephala* Schrenk ex Fischer & C. A. Meyer; *Saussurea sorocephala* (Schrenk ex Fischer & C. A. Meyer) Schrenk.

Herbs 1.5–6(–10) cm tall, perennial, polycarpic, caespitose. Caudex branched at ground level, usually with many leaf rosettes and flowering shoots. Stem solitary, 1–3 mm in diam., erect, simple. Rosette and stem leaves shortly petiolate; petiole purple; leaf blade obovate, spatulate, or linear-oblong, 5–20 × 2–8 mm, abaxially whitish with dark midvein and arachnoid tomentose, adaxially white or brownish arachnoid lanate, base cuneate-attenuate, margin entire, crenate, or obtusely dentate, apex obtuse to rounded. Capitula 5–20, in a hemispheric synflorescence 2–4 cm in diam., sessile. Involucre cylindric, (3–)5–8 mm in diam. Phyllaries in 3 or 4 rows, membranous, straw-colored to light brown, apically dark brown strigose, apex obtuse to acuminate; outer phyllaries ovate-oblong, 7–8 × 2–3.5 mm; middle and inner phyllaries narrowly ovate-elliptic to linear, 6–9 × 1–2 mm. Receptacle bristles 0.5–1.5 mm. Corolla rose-purple, 8–9 mm, tube 4–5 mm, limb 4–4.5 mm, lobes 2–2.5 mm. Achene brown to dirty white with dark spots, cylindric to obconic, 3–4 mm, smooth, glabrous or gland-dotted. Pappus mouse-gray to blackish; outer bristles 2–4 mm, sometimes reflexed; inner bristles 8–9 mm. Fl. and fr. Jun–Sep. *2n* = 48*.

Alpine scree slopes; 2700–5800 m. Gansu, Qinghai, W Sichuan, S and W Xinjiang, Xizang [NE Afghanistan, NW India, Kashmir, E Kazakhstan, Kyrgyzstan, W Nepal, N Pakistan, Tajikistan].

The basionym was not validly published by Royle (*Ill. Bot. Himal. Mts.* 251, t. 59, f. 1. 1835). There was no written description or diagnosis, or reference to such, and the illustration was lacking an analysis (*Vienna Code*, Art. 32.1(d), 44.1, 42.4).

15. *Saussurea sugongii* S. W. Liu & T. N. Ho, *Novon* 20: 174. 2010.

武素功雪兔子 *wu su gong xue tu zi*

Herbs 1.5–2 cm tall, perennial, polycarpic, almost stemless. Caudex slender, trailing, usually branched, usually with several sterile leaf rosettes and flowering stems, apically covered with remains of petioles. Rosette leaves petiolate; petiole purple, base widened; leaf blade ovate, fan-shaped, spatulate, or orbicular, (1–)3–10 × (1–)2–7 mm, abaxially grayish green and densely arachnoid tomentose, adaxially green and sparsely arachnoid or glabrous, base cuneate, margin entire or crenulate, apex rounded. Capitula 3–8, terminal in center of leaf rosette, in a hemispheric synflorescence 1–2.5 cm in diam., sessile. Involucre narrowly campanulate, 3–5 mm in diam. Phyllaries in 2 or 3 rows, membranous, apically purple or brown, apex acute to acuminate and dentate; outer phyllaries narrowly elliptic-oblong, 6–7 × 2–3 mm, apically sparsely arachnoid; middle and inner phyllaries narrowly elliptic to narrowly obovate, 6–8 × 1–

2.5 mm. Receptacle without bristles. Corolla 6–8 mm, tube 3–4 mm, limb 3–4 mm, lobes 1.5–2 mm. Achene dark brown, obconic, 3.5–4 mm, smooth, glabrous. Pappus pale yellowish brown, in 1 row; bristles 6–7 mm, plumose. Fl. Jul–Aug.

• Scree slopes, gravelly or sandy areas; 4800–5200 m. SE Xinjiang (Ruoqiang).

16. *Saussurea quercifolia* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 8: 115. 1913.

榭叶雪兔子 hu ye xue tu zi

Saussurea chionophora Handel-Mazzetti; *S. hypsipeta* Diels; *S. quercifolia* var. *major* J. Anthony.

Herbs 4–15(–22) cm tall, perennial, polycarpic. Caudex 3–5 mm in diam., creeping, branched, with sterile leaf rosettes and flowering stems. Stem solitary, 0.5–1.5 cm in diam., erect, simple, hidden by reflexed leaves. Rosette and lower stem leaves petiolate; leaf blade elliptic to narrowly elliptic, 0.8–4.5(–8) × 0.5–1.5 cm, abaxially whitish with dark veins, tomentose, and gland-dotted, adaxially green and sparsely arachnoid, base cuneate-attenuate, margin obtusely dentate to pinnately divided, apex acute to obtuse. Upper stem leaves oblong to linear, 1–5 × 0.2–0.8 cm, abaxially and basally densely lanate, adaxially glabrescent, margin pinnately divided or entire, apex acuminate. Capitula 10–20, in a hemispheric synflorescence 2.5–5 cm in diam., sessile. Involucre cylindric, 5–8 mm in diam. Phyllaries in 3 or 4 rows, apically grayish villous, apex acute; outer phyllaries narrowly ovate-elliptic, 6–10 × 2.5–4 mm; middle and inner phyllaries narrowly elliptic to linear, (6–)9–12 × 1.5–4 mm. Corolla bluish purple, 0.8–1.2 cm, tube 4–6 mm, limb 4–6 mm, lobes 2–3 mm. Achene brown, obconic, 4–6 mm, smooth, glabrous. Pappus mouse-gray; outer bristles 1–5 mm, barbellate to plumose; inner bristles 7–12 mm. Fl. and fr. Jul–Oct.

• Alpine scree slopes; 3300–5300 m. Qinghai, W Sichuan, EC and SE Xizang, NW Yunnan (Dêqên, Gongshan, Zhongdian).

Comparison of type material of *Saussurea chionophora* and *S. quercifolia* has shown that this is in fact a single species. No characters could be found to separate the two. *Saussurea quercifolia* is very variable in leaf size and division; the large specimens described as *S. quercifolia* var. *major* are included here.

For a synonymization of *Saussurea hypsipeta* see the discussion under *S. inversa*.

17. *Saussurea georgei* J. Anthony, Notes Roy. Bot. Gard. Edinburgh 18: 207. 1934.

川滇雪兔子 chuan dian xue tu zi

Herbs 5–15 cm tall, perennial, polycarpic. Caudex 3–10 mm in diam., creeping, branched, with sterile leaf rosettes and flowering stems. Stem solitary, 2–5 mm in diam., erect, simple, hidden by reflexed leaves. Rosette and stem leaves petiolate; leaf blade elliptic, 1.5–3 × 0.5–1.5 cm, both surfaces dark green, abaxially arachnoid but glabrescent, adaxially arachnoid but lanate in proximal part, margin dentate to subentire, apex acute. Uppermost stem leaves sessile, linear, 1–3 × 0.2–0.5 cm, reflexed, margin entire, apex acuminate. Capitula 8–20, in a hemispheric synflorescence 2.5–6 cm in diam., sessile. Involucre narrowly campanulate, 7–9 mm in diam. Phyllaries in 3 or

4 rows, light brown but apically blackish purple, margin hyaline; outer phyllaries obovate-oblong, 14–15 × 4–4.5 mm, apically arachnoid, apex acuminate; middle and inner phyllaries narrowly elliptic, (13–)15–16 × 3–4 mm, glabrous, apex acute. Receptacle bristles straw-colored, 4–5 mm. Corolla purplish red, 1.2–1.4 cm, tube 6–7 mm, limb 6–7 mm, lobes 3–3.5 mm. Achene brown, cylindric, 5–6 mm, smooth, glabrous. Pappus light brown; outer bristles few, 1.5–4 mm, scabrid or smooth, sometimes lacking; inner bristles 1.2–1.3 cm. Fl. and fr. Jul–Aug.

• Alpine scree slopes; 3400–5300 m. S Qinghai (Yushu), SW and W Sichuan (Litang, Muli), ?Xizang, NW Yunnan (Dêqên, Zhongdian).

18. *Saussurea paxiana* Diels, Repert. Spec. Nov. Regni Veg. Beih. 12: 512. 1922.

红叶雪兔子 hong ye xue tu zi

Herbs 5–15 cm tall, perennial, polycarpic. Caudex 1–4 mm in diam., branched, with sterile leaf rosettes and flowering stems. Stem solitary, 2–3 mm in diam., erect, simple. Rosette and lower stem leaves distinctly petiolate; leaf blade obovate, elliptic, ovate, or orbicular, 1.5–10 × 0.5–3(–5) cm, green but becoming purplish red, abaxially usually reddish and glabrous, adaxially sparsely white arachnoid but glabrescent, base cuneate-attenuate, margin dentate, apex rounded to acuminate. Uppermost stem leaves sessile, narrowly elliptic to linear, both surfaces white and brownish lanate, apex acuminate and usually reflexed. Capitula (1 or)2–5(–13), in a hemispheric synflorescence 2–5 cm in diam. or rarely solitary, sessile. Involucre campanulate, 1–1.5(–2) cm in diam. Phyllaries in ca. 4 rows, straw-colored, apically white and brown lanate, apex acuminate; outer phyllaries narrowly triangular-ovate, 10–12(–18) × 3–4 mm; middle and inner phyllaries narrowly elliptic-linear, 12–14(–18) × 1.5–3 mm. Receptacle bristles filiform, to 1 mm. Corolla dark red or pink, 1.2–1.7 cm, tube 6–11 mm, limb 6–7 mm, lobes 3–4 mm. Achene ivory-colored, cylindric, (5–)7–8 mm, 5-ribbed, smooth, glabrous. Pappus straw-colored; outer bristles 0.5–1.5 mm; inner bristles 1–1.3(–1.6) cm. Fl. and fr. Jun–Sep. $2n = 28^*$.

• Alpine scree slopes and meadows; 3500–5000 m. Gansu, Qinghai, W Sichuan, E Xizang, NW Yunnan.

19. *Saussurea gyacaensis* S. W. Liu, Acta Biol. Plateau Sin. 3: 69. 1984.

加查雪兔子 jia cha xue tu zi

Herbs 6–10 cm tall, perennial, polycarpic, caespitose. Caudex slender, branched, with several sterile leaf rosettes and flowering stems. Stem solitary, 2–5 mm in diam., erect or ascending, simple. Rosette and lower stem leaves petiolate; leaf blade spatulate to linear, 0.4–2 × 0.5–1.1 cm, white lanate, base attenuate, margin entire or crenate, apex obtuse to acuminate. Upper stem leaves linear, 1.5–3 × 0.2–0.3 cm, both surfaces densely white or yellowish lanate, margin entire or apically lobed, apex acuminate. Uppermost stem leaves narrowly triangular to linear, 1.5–3 × 0.2–0.3 cm, reflexed, both surfaces densely white or yellowish lanate, base purplish and widened, margin entire, apex acuminate. Capitula numerous, in a hemispheric synflorescence 3.5–4.5 cm in diam., sessile. Involucre

cylindric, ca. 5 mm in diam. Phyllaries in several rows, narrowly obovate-linear, 1–1.4 cm, dark purple, subglabrous, apex acute. Receptacle without bristles. Corolla bluish purple, ca. 1.2 cm, tube 6–7 mm, limb ca. 5 mm, lobes ca. 2 mm. Achene black, 6–6.5 mm. Pappus pale brown, in 1 row; bristles ca. 1.1 cm, plumose. Fl. and fr. Jul–Aug.

- Alpine scree slopes; ca. 4800 m. Xizang (Gyaca).

Saussurea gyacaensis is known only from the type collection.

20. *Saussurea leucoma* Diels, Notes Roy. Bot. Gard. Edinburgh 5: 197. 1912.

羽裂雪兔子 yu lie xue tu zi

Saussurea franchetiana H. Léveillé.

Herbs 10–18 cm tall, perennial, monocarpic. Caudex to 2 cm in diam., unbranched. Stem solitary, erect, simple, hidden by leaves. Lower and middle stem leaves petiolate; leaf blade narrowly elliptic, 3–5 × 0.5–2.5 cm, pinnatisect, abaxially grayish white, arachnoid tomentose to lanate, and gland-dotted, adaxially green and arachnoid to glabrescent; lobes 5–10 pairs, linear, 5–10 × 1–2 mm, margin entire, apex acute. Uppermost stem leaves sessile, linear, 2–3 × 0.1–0.2 cm, reflexed, both surfaces densely yellowish white lanate, margin entire, apex acute. Capitula numerous, in a hemispheric synflorescence 4–6 cm in diam., sessile. Involucre cylindric, 0.5–0.8 mm in diam. Phyllaries in 3 or 4 rows; outer phyllaries narrowly triangular-ovate, 10–15 × 3–5 mm, apically yellowish lanate, apex acuminate; middle and inner phyllaries narrowly elliptic to linear, 9–15 × 2–3 mm, apically sparsely pilose, margin membranous, apex acute. Receptacle bristles brown, 1–3 mm. Corolla blackish purple, 1–1.4 cm, tube 7–8 mm, limb 6–7 mm, lobes 2–3 mm. Achene black, obconic, 4–5 mm, smooth, glabrous. Pappus straw-colored; outer bristles 3–4 mm; inner bristles 1–1.3 cm. Fl. and fr. Aug–Oct.

- Alpine scree slopes; 3200–5300 m. SW Sichuan (Muli), SE Xizang, NW Yunnan (Dèqên, Lijiang, Zhongdian).

21. *Saussurea simpsoniana* (Fielding & Gardner) Lipschitz, Novosti Sist. Vyssh. Rast. 1964: 319. 1964.

小果雪兔子 xiao guo xue tu zi

Aplotaxis simpsoniana Fielding & Gardner, Sert. Pl. t. 26. 1844; *A. gossypina* Candolle var. *minor* Candolle; *Saussurea sacra* Edgeworth; *S. yushuensis* S. W. Liu & T. N. Ho.

Herbs 2–12[–25] cm tall, perennial, caespitose, polycarpic. Caudex stout, branched, with several sterile leaf rosettes and flowering stems. Stem solitary, ca. 6 mm in diam., erect, simple, usually hidden by leaves. Rosette and lower stem leaves petiolate; leaf blade narrowly oblong or narrowly elliptic to linear, 2–6 × 0.3–0.6[–1.2] cm, both surfaces green or purplish and sparsely arachnoid, base cuneate-attenuate, margin dentate to pinnately lobed, apex acute. Uppermost stem leaves linear, 10–25 × 1–2 mm, usually reflexed, both surfaces densely white lanate, margin entire or denticulate, apex acute. Capitula numerous, in a hemispheric synflorescence 2–3.5 cm in diam., sessile or shortly pedunculate. Involucre cylindric, 4–6 mm in diam. Phyllaries in 3 or 4 rows, membranous, apex acute to acuminate; outer phyllaries narrowly triangular-ovate, 11–13 ×

ca. 3 mm, apically lanate; inner phyllaries narrowly ovate-elliptic to linear, 9–10 × 1.5–2 mm, apically sparsely pilose. Receptacle bristles ca. 1.5 mm. Corolla purple, 0.9–1.1 cm, tube 3.5–5 mm, limb 5.5–6 mm, lobes 2–3 mm. Achene brown, 2–3 mm, wrinkled, apically sparsely papillose. Pappus straw-colored; outer bristles ca. 3 mm; inner bristles ca. 1 cm. Fl. and fr. Aug–Sep. $2n = 32$.

Alpine scree slopes; 3700–5800 m. S Qinghai (Chindu, Nangqên), SW Xinjiang (Taxkorgan), S and SW Xizang (Burang, Yadong, Zhongba) [?Bhutan, NE and NW India, Kashmir, Nepal].

The characters that were used to distinguish *Saussurea yushuensis* from *S. simpsoniana* fall within the range of the latter, which has a large distribution area and exhibits a considerable morphological variability.

22. *Saussurea tridactyla* Schultz Bipontinus ex J. D. Hooker, Fl. Brit. India 3: 377. 1881.

三指雪兔子 san zhi xue tu zi

Herbs 8–15[–20] cm tall, perennial, polycarpic. Caudex usually branched. Stem solitary, 3–8 mm in diam., erect, simple, hidden by reflexed leaves. Rosette and lower stem leaves petiolate; leaf blade spatulate, 5–25 × 2–6 mm, both surfaces grayish green and densely white or yellowish lanate, margin apically 3–6-lobed, apex obtuse to rounded. Middle and upper stem leaves narrowly spatulate to linear, 1–3(–4.5) × 0.3–0.7(–1) cm, margin apically 2–6-lobed or entire, apex obtuse to rounded. Capitula usually numerous, in a hemispheric synflorescence 2–3(–5.5) cm in diam. or rarely solitary, sessile. Involucre oblong to cylindric, 3.5–4(–8) mm in diam. Phyllaries in 3 or 4 rows, linear-oblong, 9–13 × 1.5–3 mm, subequal, apex acute; outer phyllaries densely villous; middle and inner phyllaries membranous, apically sparsely pilose. Receptacle bristles 0.2–0.5(–1.5) mm. Corolla dark to blackish purple, 1–1.4 cm, tube 5–7.5 mm, limb 5–6 mm, lobes 1.5–2.7 mm. Achene brown, cylindric to obconic, [3.2–]5–7 mm, smooth, glabrous. Pappus straw-colored to light brown; outer bristles thin, plumose, 2–4 mm; inner bristles 1–1.2 cm. Fl. and fr. Aug–Sep. $2n = 36^*$.

Alpine scree slopes, among boulders, grasslands on mountain slopes; 4300–5300 m. S Xizang [Bhutan, India (Sikkim), Nepal].

- 1a. Capitula numerous; involucre oblong 22a. var. *tridactyla*
- 1b. Capitulum solitary; involucre hemispheric 22b. var. *maiduoganla*

22a. *Saussurea tridactyla* var. *tridactyla*

三指雪兔子(原变种) san zhi xue tu zi (yuan bian zhong)

Plants with a single flowering stem. Capitula numerous in a hemispheric synflorescence. Involucre oblong.

Alpine scree slopes, among boulders, grasslands on mountain slopes; 4300–5300 m. S Xizang [Bhutan, India (Sikkim), Nepal].

22b. *Saussurea tridactyla* var. *maiduoganla* S. W. Liu, Acta Biol. Plateau Sin. 3: 71. 1984.

丛株雪兔子 cong zhu xue tu zi

Plants caespitose, with several flowering stems. Capitulum solitary. Involucre hemispheric.

- Alpine scree slopes; 4600–4700 m. S Xizang (Gyirong).

Saussurea tridactyla var. *maiduoganla* is only known from the type collection.

23. *Saussurea medusa* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 488. 1882.

水母雪兔子 shui mu xue tu zi

Saussurea dainellii Pampanini; *S. trullifolia* W. W. Smith; *S. trullifolia* var. *pinnatibracteata* J. Anthony.

Herbs 6–20 cm tall, perennial, polycarpic. Caudex 3–8 mm in diam., usually branched. Stem solitary, 0.5–1.5 cm in diam., erect, simple, hidden by reflexed leaves. Rosette and lower stem leaves petiolate; leaf blade obovate, fan-shaped, rhombic, or orbicular, 1–7.5 × (0.5–)1–5 cm, both surfaces grayish green and white or yellowish arachnoid lanate, margin dentate to pinnately lobed, apex obtuse. Middle and upper stem leaves ovate-elliptic, pinnately lobed or divided, both surfaces densely lanate, apex acute to acuminate. Uppermost stem leaves narrowly ovate to linear, both surfaces densely lanate, margin dentate. Capitula numerous, in a hemispheric synflorescence 3–7 cm in diam., sessile. Involucre cylindric, 5–8 mm in diam. Phyllaries in 3 or 4 rows; outer phyllaries narrowly ovate-triangular, 1.5–2.5 × 0.5–0.6 cm, apically white or brown lanate, apex caudate; middle and inner phyllaries narrowly obovate-oblong, 10–14 × 1–4 mm, glabrous, apex rounded and ciliate. Receptacle bristles 0.5–2 mm. Corolla bluish purple, sparsely papillose, 1–1.3 cm, tube 5–7 mm, limb 3–6 mm, lobes 1–3 mm. Achene dark brown, narrowly fusiform, 8–10 mm, sparsely papillose on apical rim or glabrous. Pappus dirty white; outer bristles 3–6 mm; inner bristles 1–1.3 cm. Fl. and fr. Jul–Sep. *2n* = 34*.

- Rocky slopes, alpine scree slopes; 3000–5600 m. Gansu, Qinghai, W Sichuan, S Xinjiang, Xizang, NW Yunnan (Dêqên, Zhongdian) [?Kashmir].

The whole plant of *Saussurea medusa* is used medicinally.

24. *Saussurea namikawae* Kitamura, Acta Phytotax. Geobot. 24: 5. 1969.

尼泊尔雪兔子 ni bo er xue tu zi

Herbs 7–9[–15] cm tall, perennial. Stem solitary, ca. 5 mm in diam., erect, simple, hidden by reflexed leaves. Lower and middle stem leaves petiolate; leaf blade spatulate, obovate, or elliptic, 8–15 × 7–8 mm, both surfaces yellowish green and densely white and yellowish lanate, base attenuate, margin pinnately lobed, apex obtuse; lobes 2 or 3 pairs, linear, 1–4 × ca. 1 mm. Uppermost stem leaves sessile, linear, 15–20 × 1–3 mm, margin sparsely dentate or entire. Capitula numerous, in a hemispheric synflorescence 3–5 cm in diam., sessile. Involucre cylindric, 5–6 mm in diam. Phyllaries in 3 or 4 rows, hyaline, apically purplish red, glabrous but apically ciliate, apex acute; outer phyllaries narrowly spatulate-linear, 10–11 × ca. 3 mm; middle and inner phyllaries linear, 13–14 × 1–2 mm. Receptacle bristles 1.5–2.5 mm. Corolla dark purple, densely papillose, 1.1–1.3 cm, tube 6–7 mm, limb 5–6 mm, lobes 1.5–2 mm. Achene brown, narrowly fusiform, 7–8 mm, densely papillose on apical rim. Pappus light brown; outer bristles 5–8 mm;

inner bristles 1.2–1.3 cm. Fl. and fr. Aug–Sep.

Alpine scree slopes; ca. 4900[–5200] m. SC Xizang (Lhasa) [W Nepal].

Saussurea namikawae from Nepal is very close to *S. medusa*, from which it is said to differ mainly by dense papillae on the corolla limb and on the apical rim of the achene; however, this kind of papillae is sometimes present in *S. medusa* as well. A specimen from C Xizang (Ludlow & Sherriff 9066) additionally differs from *S. medusa* by its much narrower leaves, which approach those of *S. tridactyla* in shape and color. This plant is therefore tentatively included here as *S. namikawae*.

25. *Saussurea laniceps* Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 657. 1937.

绵头雪兔子 mian tou xue tu zi

Herbs 15–45 cm tall, perennial, monocarpic. Caudex to 2 cm in diam., unbranched. Stem solitary, to 2 cm in diam., erect, simple, hidden by leaves, basally covered with fibrous remains of petioles. Rosette and stem leaves petiolate; leaf blade narrowly obovate-elliptic, 5–15 × 1–2 cm, both surfaces green or blackish purple, abaxially brownish white tomentose, adaxially arachnoid in basal part but glabrous in apical part, margin dentate, apex acute. Uppermost stem leaves narrowly ovate-elliptic to linear, 3–6 × 0.2–0.5 cm, both surfaces densely yellowish white or blackish lanate, margin entire, apex acute. Capitula numerous, in an interrupted spiciform synflorescence to 8 cm in diam., hidden in lanate indumentum, pedunculate. Involucre campanulate, 1.5–2 cm in diam. Phyllaries in 3 or 4 rows, apically lanate, apex acuminate-caudate; outer phyllaries subulate, 2–2.5 × 0.2–0.3 cm; middle and inner phyllaries subulate-linear, 15–20 × 1–2 mm. Receptacle bristles 1–2 mm. Corolla dark purple, 0.9–1.3 cm, tube 1.5–3 mm, limb 7–8 mm, lobes 1.5–3 mm. Achene dark brown, obconic, 2.5–3(–5.5) mm, smooth, glabrous. Pappus light brown or blackish; outer bristles 2–5 mm; inner bristles 1–1.2 cm. Fl. and fr. Aug–Oct.

Alpine scree slopes; 3200–5500 m. SW Sichuan, SE Xizang, NW Yunnan [India (Sikkim), ?N Myanmar].

The whole plant of *Saussurea laniceps* is used medicinally, and the species is threatened in many regions by over-collecting.

26. *Saussurea gossipiphora* D. Don, Mem. Wern. Nat. Hist. Soc. 3: 414. 1821.

雪兔子 xue tu zi

Aplotaxis gossipina (Wallich) Candolle; *Saussurea gossipiphora* var. *lilliputa* Lipschitz; *S. gossipiphora* subsp. *luxuriosa* Lipschitz; *S. gossipina* Wallich.

Herbs 9–30[–48] cm tall, perennial, monocarpic. Caudex unbranched. Stem solitary, ca. 1 cm in diam., erect, simple. Rosette and lower stem leaves petiolate; leaf blade linear-oblong to narrowly obovate, 5–22 × 0.6–2.8 cm, both surfaces green and sparsely pilose or glabrous, margin sparsely denticulate, apex acute. Middle and upper stem leaves sessile, narrowly ovate-elliptic to linear, gradually smaller upward on stem, both surfaces densely white or pale yellowish lanate, apex acute or acuminate. Capitula numerous, densely clustered on flat stem apex in a synflorescence [4–]7–10 cm in diam., hidden at anthesis in

a lanate indumentum, sessile. Involucre cylindric to campanulate, 5–10 mm in diam. Phyllaries in 3–6 rows, apex acute; outer phyllaries ovate, ca. 4 × 3 mm; inner phyllaries narrowly ovate-elliptic to linear, ca. 7.5 × 1.5 mm. Receptacle bristles ca. 2 mm. Corolla bright purple to reddish purple, 7–12.5 mm, tube 2–5.5 mm, limb 5–7 mm, lobes 1.5–2 mm. Achene cylindric, 2–4.5 mm, apically sparsely papillose or glabrous. Pappus pale brown; outer bristles 4–5 mm; inner bristles 8–10 mm. Fl. and fr. Aug–Oct. $2n = 36$.

Alpine scree slopes, rock crevices; 4200–5000 m. S Xizang (Yadong), ?Yunnan [Bhutan, NE and NW India, ?Kashmir, Nepal].

The whole plant of *Saussurea gossipiphora* is used medicinally.

No specimens of *Saussurea gossipiphora* from China were seen by the present authors, and this description is based on material from outside the Flora area and on the revision by Fujikawa (Makinoa, n.s., 8: 46–51. 2010). The record from Yunnan relies only on a picture, which was not seen by the authors, and not on an actual specimen. Also, from a chorological point of view, such a record is improbable and is probably due to a confusion with *S. laniceps*.

27. *Saussurea nishiokae* Kitamura, Acta Phytotax. Geobot. 24: 6. 1969.

须弥雪兔子 xu mi xue tu zi

Herbs 9–30 cm tall, perennial, monocarpic. Caudex unbranched. Stem solitary, ca. 6.5 mm in diam., erect, simple. Rosette and lower stem leaves petiolate; leaf blade narrowly elliptic to oblong, 3.5–11.5 × 0.8–2.5 cm, both surfaces dark reddish green to blackish purple and arachnoid, margin dentate, apex acute. Upper stem leaves linear, both surfaces densely white lanate, margin entire, apex acute. Capitula numerous, densely clustered on flat stem apex in a synflorescence ca. 4 cm in diam., hidden at anthesis in a lanate indumentum, sessile. Involucre cylindric, 5–6 mm in diam. Phyllaries in 3 or 4 rows, membranous; outer phyllaries spatulate to narrowly obovate, 8–8.5 × ca. 2.5 mm, densely pilose and glandular, apex apiculate; inner phyllaries narrowly ovate to linear, 8–8.5 × ca. 1.5 mm, sparsely pilose, apex acute to apiculate. Receptacle densely papillose; papillae ca. 0.5 mm. Corolla bright purple to reddish purple, 1–1.3 cm, glabrous, tube 5.5–6.5 mm, limb 4.5–6.5 mm, lobes 1.5–2 mm. Achene purplish black, cylindric, 4–7 mm, densely papillose. Pappus dirty white; outer bristles 2.5–4.5 mm; inner bristles 1.1–1.3 cm. Fl. and fr. Aug–Sep. $2n = 36^*$.

Alpine scree slopes; ca. [3900–]4900[–5500] m. S Xizang (Nyalam) [?Bhutan, India (Sikkim), Nepal].

No specimens of *Saussurea nishiokae* were seen by the present authors. This treatment is based on the original description and on the revision by Fujikawa (Makinoa, n.s., 8: 53–55. 2010).

28. *Saussurea conaensis* (S. W. Liu) Fujikawa & H. Ohba, Makinoa, n.s., 8: 73. 2010.

错那雪兔子 cuo na xue tu zi

Saussurea gossipiphora D. Don var. *conaensis* S. W. Liu, Acta Biol. Plateau Sin. 3: 71. 1984.

Herbs 12–20[–30] cm tall, perennial, monocarpic. Caudex unbranched. Stem solitary, ca. 1 cm in diam., erect, simple. Lower and middle stem leaves petiolate; leaf blade narrowly

obovate or narrowly oblong, 5–10[–17] × [0.5–]1–2[–3] cm, both surfaces green and sparsely arachnoid but glabrescent, margin sinuate-dentate, apex obtuse to acute. Upper stem leaves linear, 2–5 × 0.5–1.5 cm, both surfaces purplish black and densely white lanate, margin entire, apex acute to acuminate. Capitulum solitary, on flat stem apex, sessile, hidden at anthesis by lanate indumentum. Involucre broadly campanulate, [1–]2–3[–6?] cm in diam. Phyllaries not seen. Receptacle without bristles or papillae. Corolla bright purple to purple, 7–12.5 mm, tube 2–5 mm, limb 5–7.5 mm. Achene cylindric, 3–5 mm, smooth, glabrous. Pappus dirty white; outer bristles ca. 5 mm; inner bristles ca. 1 cm. Fl. and fr. Aug–Sep.

Alpine scree slopes; 4000–4700 m. S Xizang (Cona) [Bhutan].

29. *Saussurea topkegolensis* H. Ohba & S. Akiyama, Univ. Mus. Univ. Tokyo Nat. Cult. 4: 68. 1992.

藏南雪兔子 zang nan xue tu zi

Herbs 4–20 cm tall, perennial, monocarpic. Caudex unbranched. Stem solitary, 8–10 mm in diam., erect, simple. Rosette and lower stem leaves petiolate; leaf blade narrowly ovate-oblong to linear, 4.5–16 × 0.5–1.5 cm, both surfaces green and sparsely pilose or glabrous, margin sparsely dentate to pinnately lobed, apex acute. Upper stem leaves sessile, linear, both surfaces purplish black and densely white lanate, margin sparsely denticulate, apex acute. Capitula numerous, loosely clustered on obovoid stem apex in a synflorescence 3–4.5 cm in diam., hidden at anthesis in a lanate indumentum, very shortly pedunculate. Involucre campanulate, ca. 1 cm in diam. Phyllaries in 3 or 4 rows, margin membranous, apex acute; outer phyllaries narrowly ovate, ca. 13 × 3 mm, apically blackish purple, densely pilose and glandular; inner phyllaries narrowly ovate to linear, ca. 11 × 2.5 mm, apically densely pilose. Receptacle bristles ca. 1.5 mm. Corolla bright purple to reddish purple, 7–8.5 mm, tube 2.5–3.5 mm, limb 4.5–5 mm, lobes 1.3–2 mm. Achene ca. 2.5 mm, wrinkled, apically sparsely papillose. Pappus dirty white; outer bristles ca. 4 mm; inner bristles ca. 8 mm. Fl. and fr. Aug–Sep. $2n = 32$.

Alpine meadows, sandy or stony places, scree slopes; 4500–5200 m. S Xizang [Bhutan, NW India, Nepal].

No specimens of *Saussurea topkegolensis* were seen by the present authors. This treatment is based on the original description and on the revision by Fujikawa (Makinoa, n.s., 8: 66–67. 2010).

30. *Saussurea bhutkesh* Fujikawa & H. Ohba, Edinburgh J. Bot. 59: 283. 2002.

定日雪兔子 ding ri xue tu zi

Herbs 10–30 cm tall, perennial, polycarpic, caespitose. Caudex branched. Stem solitary, 3–15 mm in diam., erect, simple. Rosette and lower stem leaves petiolate; leaf blade spatulate, narrowly elliptic, or oblong, 2–25 × 0.5–2.8 cm, both surfaces green and densely golden yellow and white tomentose, margin dentate, apex acute. Upper stem leaves sessile, gradually shorter upward on stem. Capitula densely clustered on flat stem apex in a synflorescence 1.3–5.5 cm in diam., hidden at anthesis in a lanate indumentum, sessile. Involucre tubular, 0.5–1.5 cm in diam. Phyllaries in 1 row, narrowly elliptic to linear,

5–9.5 × 0.5–1.5 mm, apically pilose and glandular, margin membranous, apex acute. Receptacle sparsely papillose; papillae ca. 0.3 mm. Corolla pale purple to bright purple, 0.8–1.2 cm, tube 1.5–4 mm, limb 5.5–8.5 mm, lobes 1.5–2.5 mm. Achene cylindric to fusiform, 2.4–3.8 mm, smooth, densely papillose. Pappus dirty white; outer bristles 1–4 mm; inner bristles 8–11 mm. Fl. and fr. Aug–Sep. $2n = 36$.

Alpine rock crevices, scree slopes; ca. [4400–]5300 m. S Xizang (Tingri) [E Nepal].

The only record of *Saussurea bhutkesh* from China is a picture from Langma La in Tingri Xian (Fujikawa & Springate, *Newslett. Himalayan Bot.* 39: 38. 2007). This treatment is based on the original description and on the revision by Fujikawa (*Makinoa*, n.s., 8: 53–55. 2010).

2. *Saussurea* subg. *Amphilaena* (Stscheglejew) Lipschitz, Trudy Moskovsk. Obshch. Isp. Prir., Biol. Ser. 3: 182. 1960.

雪莲亚属 xue lian ya shu

Saussurea sect. *Amphilaena* Stscheglejew, Bull. Soc. Imp. Naturalistes Moscou 21(3): 244. 1848.

Herbs, perennial or rarely biennial, polycarpic or rarely monocarpic, cauliferous, rarely substemless or stemless. Stems erect or ascending, simple or apically branched, leafy. Leaves elliptic, oblong, ovate, obovate, or linear, undivided, margin entire, denticulate, or sinuate-dentate. Uppermost stem leaves and bracts boat-shaped and keeled or flat, membranous or papery, enclosing, half-enclosing, or subtending and surrounding synflorescence or capitulum, colored pale yellow, yellowish green tinged purple, purple, or red. Capitula 1 to many, terminal on stem, solitary or in a lax or condensed corymbiform or hemispheric synflorescence. Phyllaries without an appendage. Receptacle usually with many subulate bristles, rarely papillose or naked. Corolla glabrous. Anther tails lacerate or sometimes simple. Achene smooth or ribbed, sometimes wrinkled, glabrous, usually without an apical crown. Pappus dirty white, yellowish, straw-colored, or light brown, always in 2 rows; outer bristles scabrid.

Twenty-eight species: Bhutan, China, N India, Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, N Myanmar, Nepal, Pakistan, Russia (Siberia); 25 species (18 endemic) in China.

- 1a. Uppermost leaves and bracts pale yellow, membranous, usually more than 3 cm wide.
- 2a. Capitula (1 or)2–5, in a laxly paniculiform synflorescence or rarely solitary, nodding, with a long (to 7 cm) peduncle; uppermost stem leaves and bracts not aggregated but distant from each other 41. *S. wettsteiniana*
- 2b. Capitula numerous (5–30), in a condensed corymbiform or hemispheric synflorescence, erect, sessile or with a short (to 3 cm) peduncle; uppermost stem leaves aggregated below synflorescence.
- 3a. Uppermost stem leaves connivent and enclosing synflorescence; synflorescence laxly corymbiform; stem 0.4–1.4 cm in diam. 44. *S. obvallata*
- 3b. Uppermost stem leaves stellately spreading; synflorescence strongly condensed corymbiform hemispheric; stem 1.5–3 cm in diam.
- 4a. Stem base covered with band-shaped remains of leaf sheaths; outer phyllaries linear-subulate, 1.1–1.8 cm, densely sericeous 42. *S. orgaadayi*
- 4b. Stem base densely covered with fibrous remains of leaf sheaths; outer phyllaries narrowly triangular-ovate, 0.8–1.1 cm, glabrescent 43. *S. involucrata*
- 1b. Uppermost leaves and bracts yellowish or greenish tinged with purple, yellowish rose, or purple, membranous or papery, usually less than 3 cm wide.
- 5a. Capitula (1 or)2–9(–13), in a corymbiform synflorescence or rarely solitary.
- 6a. Leaves abaxially grayish white and sericeous-tomentose, adaxially green 34. *S. phaeantha*
- 6b. Leaves concolorous, green, glabrescent.
- 7a. Phyllaries obtuse or rounded at apex.
- 8a. Uppermost stem leaves large, 1–2.5 cm wide, half-enclosing synflorescence; capitula usually 3–6 54. *S. iodostegia*
- 8b. Uppermost stem leaves small, 0.2–1 cm wide, not enclosing synflorescence; capitula 1–3 53. *S. nigrescens*
- 7b. Phyllaries acute or acuminate at apex.
- 9a. Colored uppermost stem leaves not aggregated below synflorescence, distant from each other, not covering capitula.
- 10a. Involucre obconic, 1–2 cm in diam.; phyllaries glabrescent; leaves green, abaxially ± densely glandular 50. *S. erubescens*
- 10b. Involucre broadly obconic, 2–2.5 cm in diam.; phyllaries densely villous; leaves blackening when dry, subglabrous, without glands 51. *S. taipaiensis*
- 9b. Colored uppermost stem leaves aggregated below synflorescence, surrounding and covering at least basal part of capitula.
- 11a. Leaves smooth, sparsely villous and without glands 55. *S. veitchiana*
- 11b. Leaves scabrid, glabrescent and usually with sessile or stalked glands.
- 12a. Leaf margin subentire to minutely denticulate 52. *S. gymnocephala*
- 12b. Leaf margin sinuate-dentate.

- 13a. Capitula in a clustered synflorescence, sessile or subsessile; plants usually less than 20 cm tall; leaves usually less than 7 cm 45. *S. tangutica*
- 13b. Capitula in a corymbiform synflorescence, pedunculate; plants usually more than 20 cm tall; leaves usually more than 10 cm.
- 14a. Plants tufted and forming large clumps; stems many; achene distinctly ribbed, apex with a dentate crown 48. *S. luae*
- 14b. Plants not tufted; stems solitary or few; achene smooth or indistinctly ribbed, apex without a dentate crown.
- 15a. Uppermost stem leaves yellowish tinged with purple, margin irregularly dentate; involucre obconic to broadly campanulate 47. *S. schultzei*
- 15b. Uppermost stem leaves intensely red to purple, margin subentire; involucre globose 49. *S. globosa*
- 5b. Capitulum 1(or 2).
- 16a. Colored uppermost stem leaves not aggregated below capitulum, distant from each other, not covering capitulum.
- 17a. Phyllaries obtuse at apex 53. *S. nigrescens*
- 17b. Phyllaries acute or acuminate at apex.
- 18a. Leaves abaxially grayish white and densely tomentose, adaxially green 33. *S. pubifolia*
- 18b. Leaves green and ± concolorous.
- 19a. Leaf blade glabrescent, sometimes glandular, margin sinuate-dentate.
- 20a. Involucre obconic, 1.5–2 cm in diam.; phyllaries glabrescent; leaves green, abaxially ± densely glandular 50. *S. erubescens*
- 20b. Involucre broadly obconic, 2–2.5 cm in diam.; phyllaries densely villous; leaves blackening when dry, subglabrous and without glands 51. *S. taipaiensis*
- 19b. Leaf blade pubescent or sericeous, without glands, margin subentire or denticulate.
- 21a. Involucre 3–3.5 cm in diam.; outer phyllaries 1.5–2.3 cm; upper stem leaves to 2.5 cm wide; leaf blade sericeous, base attenuate and gradually tapering into winged petiole, apex acute to acuminate 39. *S. longifolia*
- 21b. Involucre 1–2.5 cm in diam.; outer phyllaries 1–1.5 cm; upper stem leaves to ca. 1.5 cm wide; leaf blade pilose or glabrescent, base asymmetric and rounded, cordate, or cuneate, abruptly narrowed into petiole, apex obtuse to subacute 40. *S. polycolea*
- 16b. Colored uppermost stem leaves aggregated below capitulum, surrounding and covering at least basal half of involucre.
- 22a. Leaves linear, 1–5 mm wide.
- 23a. Leaves grayish green, concolorous, both surfaces ± densely villous; caudex with hard tunic of pale brown persistent remains of petioles 31. *S. pilinophylla*
- 23b. Leaves adaxially dark green and glabrous; caudex with blackish brown withered remains of petioles 32. *S. hookeri*
- 22b. Leaves narrowly elliptic, narrowly ovate, or linear, more than 6 mm wide.
- 24a. Leaves on both surfaces grayish green and lanate-tomentose 35. *S. velutina*
- 24b. Leaves adaxially green and not lanate-tomentose.
- 25a. Leaves adaxially green, abaxially grayish white.
- 26a. Leaf margin sinuate-dentate; uppermost stem leaves few, purplish red, enclosing capitulum 33. *S. pubifolia*
- 26b. Leaf margin entire; uppermost stem leaves many, pale yellow, stellately spreading and subtending capitulum 36. *S. baotingensis*
- 25b. Leaves green, ± concolorous.
- 27a. Leaves abaxially with sessile glands, margin subentire to minutely denticulate 52. *S. gymnocephala*
- 27b. Leaves with stalked glandular hairs or without glands, margin sinuate-dentate.
- 28a. Leaves smooth, pilose, or sericeous 37. *S. muliensis*
- 28b. Leaves scabrid, glabrescent.
- 29a. Leaves usually more than 2 cm wide, apex usually obtuse 38. *S. uniflora*
- 29b. Leaves usually less than 2 cm wide, apex acute.
- 30a. Involucre broadly campanulate; phyllaries densely villous, subequal, 1–1.6 cm; corolla 1–1.5 cm 45. *S. tangutica*
- 30b. Involucre obconic; phyllaries pilose, glabrescent, unequal, 0.6–2.2 cm; corolla 1.5–1.8 cm 46. *S. bracteata*

31. *Saussurea pilinophylla* Diels, Repert. Spec. Nov. Regni Veg. Beih. 12: 513. 1922.

膜鞘风毛菊 mo qiao feng mao ju

Saussurea tunicata Handel-Mazzetti.

Herbs (2–)7–23 cm tall, perennial, caespitose, forming large clumps. Caudex stout, many branched near ground level, densely covered by hard tunic of pale brown persistent remains of petioles. Stems numerous, 2–4 mm in diam., erect, simple. Rosette and lower stem leaves shortly petiolate; leaf blade narrowly ovate-elliptic to linear, (1.5–)4–7 × 0.2–0.6 cm, both surfaces grayish green and ± densely villous to sericeous, margin revolute and subentire or mucronulate, apex acute. Middle and upper stem leaves sessile, both surfaces grayish green to purplish red. Uppermost stem leaves ± aggregated, narrowly ovate, ovate-elliptic, or ovate-triangular, 1.3–3 × 0.6–1 cm, membranous, covering basal part of capitulum, both surfaces purplish red or pale purple, apex acuminate. Capitulum solitary. Involucre obconic to campanulate, 1.5–2.5 cm in diam. Phyllaries in 4–6 rows, dark purple to blackish, densely sericeous, apex acuminate to caudate; outer phyllaries narrowly ovate-elliptic, 5–8 × 2–4 mm; middle phyllaries narrowly ovate-elliptic, 8–10 × 1.5–2 mm; inner phyllaries linear, 12–14 × 1–2 mm. Corolla purplish red, 1.1–1.6 cm, tube 4.5–7.5 mm, limb 5.5–6.5 mm, lobes 3.5–4.5 mm. Achene cylindrical, 3.5–4 mm, glabrous. Pappus straw-colored; outer bristles 2–3 mm; inner bristles 0.9–1.1 cm. Fl. and fr. Jul–Aug.

• Alpine scree slopes and grasslands; 4000–5300 m. Qinghai, NW Sichuan, Xizang.

Examination of rediscovered type material of *Saussurea pilinophylla* at WRSL and WU has shown that these plants from NW Sichuan are identical with those of *S. tunicata* from Xizang and Qinghai. They only differ in taller growing stems. There is a pronounced tendency toward smaller, almost stemless plants in higher and drier regions of the Qinghai-Xizang Plateau.

32. *Saussurea hookeri* C. B. Clarke, Compos. Ind. 230. 1876.

椭圆风毛菊 tuo yuan feng mao ju

Herbs 4–30 cm tall, perennial. Caudex simple or few branched, covered with blackish brown withered remains of leaf bases. Stems usually solitary, 1.5–3.5(–5) mm in diam., erect, simple. Rosette and lower stem leaves narrowly linear, 4–18 × 0.1–0.6 cm, abaxially paler green and pilose on midvein, adaxially dark green and glabrous, base attenuate, margin revolute and entire or denticulate, apex obtuse. Middle and upper stem leaves sessile, linear-subulate to narrowly ovate, 2–10 × 0.3–1 cm, both surfaces sericeous, apex acuminate. Uppermost stem leaves triangular-ovate, ovate, or elliptic, 1.3–2 × 0.4–1.1 cm, both surfaces blackish purple and densely sericeous, apex acute. Capitulum solitary. Involucre campanulate, 2–3 cm in diam. Phyllaries in 4 or 5 rows, black, sericeous; outer phyllaries narrowly triangular-ovate, 7–13 × 3–4 mm, apex obtuse; middle and inner phyllaries 11–14 × 1–2 mm, apex obtuse to acute. Receptacle bristles (0.6–)4–7 mm. Corolla purple, 0.9–1.5 cm, tube 4.5–8 mm, limb 5.5–7 mm, lobes 3–5 mm. Achene straw-colored with black spots, cylindrical, 3.5–5.5 mm, ribbed,

apex with a short crown. Pappus dirty white; outer bristles 1–6 mm; inner bristles 0.9–1.2 cm. Fl. and fr. Aug–Sep.

Alpine grasslands; 4300–5300 m. Qinghai, W Sichuan, Xizang [Bhutan, NE and NW India, Kashmir, Nepal].

33. *Saussurea pubifolia* S. W. Liu, Acta Biol. Plateau Sin. 3: 70. 1984.

毛背雪莲 mao bei xue lian

Herbs 15–45 cm tall, perennial. Caudex stout, few branched, densely covered with persistent remains of petioles. Stems usually solitary, 2–5 mm in diam., erect, simple. Rosette, basal, and lower stem leaves petiolate; leaf blade narrowly elliptic to linear, 8–25 × 0.4–1.5 cm, abaxially grayish white, densely lanate, and sometimes gland-dotted, adaxially green and sparsely pilose, base attenuate, margin revolute and sinuate-dentate, apex acute. Middle and upper stem leaves sessile, narrowly ovate to elliptic, 5–9 × 1–1.5 cm, base semiamplexicaul. Uppermost stem leaves ovate and boat-shaped, 2.5–5.5 × 1–2.6 cm, enclosing or subtending capitulum, both surfaces purplish red, base rounded, margin dentate, apex acute. Capitulum solitary. Involucre broadly campanulate, 2–2.5(–3) cm in diam. Phyllaries in ca. 4 rows, blackish brown, densely villous, apex acuminate; outer phyllaries narrowly triangular-ovate, 7.5–8.5 × ca. 2.5 mm; middle phyllaries narrowly ovate, 9–12 × 2–2.5 mm; inner phyllaries linear, 15–16 × 0.8–1.7 mm. Corolla purple, 1.2–1.6 cm, tube 7–8 mm, limb 7–8 mm, lobes 4.8–5.4 mm. Achene black, obconic, 4.4–5.8 mm. Pappus straw-colored; outer bristles 1.2–2.4 mm; inner bristles 1–1.2 cm. Fl. and fr. Jul–Sep.

• Alpine scree slopes, grasslands; 4500–5200 m. SC Xizang.

- 1a. Uppermost stem leaves large, membranous, surrounding capitulum; leaves abaxially with golden glands 33a. var. *pubifolia*
- 1b. Uppermost stem leaves small, herbaceous, not surrounding capitulum; leaves abaxially without golden glands 33b. var. *lhasaensis*

33a. *Saussurea pubifolia* var. *pubifolia*

毛背雪莲(原变种) mao bei xue lian (yuan bian zhong)

Leaves with golden glands. Uppermost stem leaves large, membranous, surrounding capitulum.

• Alpine scree slopes; 4500–5100 m. SC Xizang.

33b. *Saussurea pubifolia* var. *lhasaensis* S. W. Liu, Acta Biol. Plateau Sin. 3: 71. 1984.

小苞雪莲 xiao bao xue lian

Leaves without golden glands. Uppermost stem leaves small, herbaceous, not surrounding capitulum.

• Alpine grasslands; 4600–5200 m. SC Xizang (Lhasa).

34. *Saussurea phaeantha* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 489. 1882.

褐花雪莲 he hua xue lian

Saussurea tsarongensis J. Anthony.

Herbs 4–40 cm tall, perennial, caespitose. Caudex simple or few branched. Stems solitary or 2–4, 3–6 mm in diam., erect, simple. Rosette and basal stem leaves petiolate; leaf blade narrowly elliptic to linear, 3–15 × 0.5–1.6 cm, abaxially pale green and densely sericeous-villous, adaxially dark green and pilose but glabrescent, margin undulate or sinuate-dentate, apex acuminate. Middle and upper stem leaves sessile, 2–7.5 × 0.3–1.2 cm, base semiamplexicaul. Uppermost stem leaves narrowly elliptic or triangular-ovate, 1–2.5 × 0.2–0.6 cm, membranous, half-enclosing synflorescence, both surfaces purple, margin entire or with a few teeth. Capitula 3–10(–15), in a congested corymbiform synflorescence 2.5–5 cm in diam., shortly pedunculate or sessile. Involucre cylindric, 0.7–1.5 cm in diam. Phyllaries in 3 or 4 rows, blackish purple, densely villous; outer phyllaries triangular-ovate, (5–)7.5–12 × 2–4.5 mm, apex acute; middle and inner phyllaries narrowly ovate, 8–11 × 0.9–2.8 mm, apex obtuse. Receptacle bristles 3–4 mm. Corolla dark brownish purple, 0.8–1.2 cm, tube 3.3–5 mm, limb 4.6–6 mm, lobes 2.4–3 mm. Achene straw-colored, cylindric to obconic, 3.3–4.8 mm, obtusely 5-ribbed. Pappus dirty white to pale brown; outer bristles 0.4–2.8 mm; inner bristles 8–10 mm. Fl. and fr. Jun–Sep.

- Alpine meadows, grasslands, mountain steppes; (2300–)3000–4800 m. Gansu, Qinghai, W Sichuan, SE Xizang (Zayü), NW Yunnan (Dêqên).

35. *Saussurea velutina* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 12: 221. 1920.

毡毛雪莲 zhan mao xue lian

Herbs 17–40 cm tall, perennial, caespitose. Caudex stout, many branched, covered with persistent remains of petioles. Stems many, 5–8 mm in diam., erect, simple. Rosette and lower stem leaves petiolate; leaf blade narrowly elliptic to linear, 5.5–17 × 0.7–2 cm, both surfaces grayish green and densely lanate-tomentose, margin shallowly sinuate-denticulate to subentire, apex acute. Middle and upper stem leaves sessile, narrowly ovate to narrowly elliptic, 6.5–12.5 × 1–2 cm. Uppermost stem leaves ovate or narrowly ovate and boat-shaped, (1–)3–6 × (0.8–)1.5–3 cm, membranous, enclosing involucre, both surfaces purplish red and sparsely villous, margin denticulate or entire. Capitulum solitary. Involucre broadly campanulate, 3–4 cm in diam. Phyllaries in 4 or 5 rows, black or blackish purple, yellowish white villous, apex acuminate and often reflexed; outer phyllaries narrowly triangular-ovate, 11–14 × 3–5 mm; middle phyllaries narrowly triangular-ovate, 14–15 × 2–3 mm; inner phyllaries narrowly ovate to linear, 15–19 × 1–2.5 mm. Receptacle bristles 1.5–5.8 mm. Corolla purple, 1.2–1.5 cm, tube 6.5–8 mm, limb 6–7.5 mm, lobes 3.2–4.8 mm. Achene obovoid to cylindric, 3–5.5 mm. Pappus dirty white; outer bristles 2–6 mm; inner bristles 1–1.2 cm. Fl. and fr. Jul–Sep.

- Alpine scree slopes, mats, and pastures; (3300–)4100–5500 m. SW Sichuan, SE Xizang, NW Yunnan.

36. *Saussurea baoxingensis* Y. S. Chen, Nordic J. Bot. 28: 761. 2010.

宝兴雪莲 bao xing xue lian

Herbs 20–40 cm tall, perennial. Caudex stout, woody,

much branched. Stem solitary, 4–5 mm in diam. near base, erect, simple. Lower stem leaves sessile, linear, 6–25 × 0.6–0.9 cm, abaxially light green and densely lanate, adaxially green and sparsely villous, margin entire, apex acute. Upper stem leaves narrowly triangular-ovate, 5–12 × 1.2–1.5 cm. Uppermost stem leaves 12–14, sessile, ovate, 4.3–5 × 1.2–2.5 cm, membranous, aggregated and stellately spreading below capitulum, both surfaces yellowish white, abaxially sparsely villous, adaxially glabrous, margin entire and ciliate, apex acute. Capitulum solitary. Involucre broadly campanulate, ca. 2 cm in diam. Receptacle bristles 3–4 mm. Phyllaries in ca. 4 rows, yellowish to purplish black but with a dark brown margin, apically densely villous, margin minutely denticulate, apex acute; outer phyllaries narrowly ovate-elliptic, 11–13 × 2–2.5 mm; middle phyllaries narrowly ovate-elliptic, 10–12 × 1.5–2 mm; inner phyllaries narrowly elliptic, 9–10 × 1–1.1 mm. Corolla purple, 9–10 mm, tube 3–4 mm, limb 4.5–6 mm, lobes 1.3–1.5 mm. Achenes only seen when immature. Pappus dirty yellowish white; outer bristles 2.5–3 mm; inner bristles 7–8 mm. Fl. and fr. Aug–Sep.

- Open rock crevices; ca. 4000 m. Sichuan (Baoping).

Saussurea baopingensis is a very distinct taxon only known from the type collection and has not been observed in the field since 1936.

37. *Saussurea muliensis* Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 656. 1937.

木里雪莲 mu li xue lian

Herbs 20–30 cm tall, perennial. Caudex stout, few branched, covered with blackish remains of petioles. Stems usually solitary, 3–5 mm in diam., erect, simple. Rosette and lower stem leaves sessile or shortly petiolate; leaf blade narrowly elliptic to obovate, 10–16 × 1–2.4 cm, both surfaces green and sparsely pilose to densely villous, base attenuate, margin denticulate to subentire, apex acute. Middle and upper stem leaves sessile, narrowly ovate to ovate, 6.5–10 × 2–3.4 cm, both surfaces green to purple, base semiamplexicaul. Uppermost stem leaves ovate and boat-shaped, 4–6.5 × 2–4.8 cm, half-enclosing involucre, both surfaces purplish red. Capitulum solitary. Involucre broadly campanulate, 2.5–4 cm in diam. Phyllaries in 3–5 rows, blackish brown, villous, apex acute; outer phyllaries triangular-ovate, 8–10 × 3–3.5 mm; middle phyllaries narrowly elliptic to ovate, 11–14 × 3–3.5 mm; inner phyllaries linear, 1.6–2 × 0.2–0.3 cm. Corolla purple, 1.4–1.7 cm, tube 6–9 mm, limb 7.5–8 mm, lobes 4.6–5.7 mm. Achene (immature) cylindric, ca. 5 mm. Pappus dirty white; outer bristles 3–6.5 mm; inner bristles 1.7–1.8 cm. Fl. and fr. Aug–Sep.

- Grasslands on mountain slopes; 4300–4400 m. SW Sichuan (Muli).

38. *Saussurea uniflora* (Candolle) Wallich ex Schultz Bipontinus, Linnaea 19: 330. 1846.

单花雪莲 dan hua xue lian

Aplotaxis uniflora Candolle, Prodr. 6: 539. 1838; *Saussurea conica* C. B. Clarke; *S. uniflora* var. *conica* (C. B. Clarke) Lipschitz; *S. uniflora* var. *sinensis* J. Anthony.

Herbs 14–70 cm tall, perennial. Caudex stout, simple or few branched. Stems usually solitary, 3–7 mm in diam., erect, simple. Rosette and lower stem leaves petiolate; leaf blade oblong, elliptic, narrowly elliptic, or obovate, (3–)12–32 × (1–)2–6.5 cm, both surfaces green and glabrescent, margin sinuate-dentate, apex obtuse to acute. Middle and upper stem leaves sessile, elliptic to elliptic-ovate, 7–19 × 2–4.5(–7.5) cm, both surfaces green tinged with purple, base cuneate or auriculate-amplexicaul, apex acute to obtuse. Uppermost stem leaves sessile, elliptic, boat-shaped, 1.5–4.5 × 0.6–1.8 cm, membranous, half-enclosing capitula, both surfaces purplish red, abaxially villous and sometimes glandular hairy, adaxially glabrescent, margin entire, apex acute to acuminate. Capitulum solitary [or several in a corymbiform synflorescence]. Involucre obconic, 2.5–4 cm in diam. Phyllaries in ca. 4 rows, apically villous, apex acuminate; outer phyllaries ovate-triangular, 10–15 × 2.5–5 mm; middle and inner phyllaries narrowly ovate to linear, 1.6–2 × 0.1–0.3 cm. Receptacle bristles 5–7.5 mm. Corolla bluish purple, 1.2–1.8 cm, tube 6–9 mm, limb 6.5–8 mm, lobes 3.6–5.7 mm. Achene blackish brown, cylindric, 4.5–6 mm, indistinctly ribbed. Pappus yellowish white; outer bristles 3–8.5 mm; inner bristles 1–1.3 cm. Fl. and fr. Jul–Sep. $2n = 32$.

Forests, thickets, alpine meadows; 3600–4800 m. S Xizang, NW Yunnan [Bhutan, NE India, Nepal].

Saussurea uniflora is a very variable species. Plants with several capitula have been described as *S. conica* from N India, but there is no reason to keep them separate from *S. uniflora* at any taxonomic rank. However, the name *S. conica* has been misapplied in a number of Chinese floras for a different taxon, the recently described *S. luae* (see discussion under that species).

39. *Saussurea longifolia* Franchet, J. Bot. (Morot) 2: 354. 1888.

长叶雪莲 chang ye xue lian

Herbs 25–40 cm tall, perennial. Caudex simple or few branched. Stem solitary, 4–6 mm in diam., erect, simple. Rosette and lower stem leaves petiolate; leaf blade narrowly elliptic to linear, 10–35 × 1–5 cm, both surfaces green, abaxially densely sericeous, adaxially sparsely villous, margin subentire to denticulate, apex acute. Middle and upper stem leaves sessile, narrowly elliptic to ovate or obovate to linear and boat-shaped, 5–16 × 1.5–4 cm, both surfaces green to dark purple, base semiamplexicaul, margin entire, apex acute to acuminate. Capitulum solitary. Involucre obconic to broadly campanulate, 3–3.5(–4.5) cm in diam. Phyllaries in 3 or 4 rows, blackish brown or purple, sericeous, apex acuminate; outer phyllaries narrowly triangular-ovate, 1.5–2.3 × 0.3–0.5 cm; middle phyllaries linear-subulate, 2.2–2.3 × 0.3–0.4 cm; inner phyllaries linear, 2.1–2.3 × 0.2–0.3 cm. Receptacle bristles 4–9 mm. Corolla dark purple, 1.8–2.1 cm, tube 1.1–1.2 cm, limb 7–9 mm, lobes 4.8–5.6 mm. Achene straw-colored with some black spots, cylindric to obovoid, 5–5.5 mm. Pappus yellowish brown; outer bristles 1.5–5 mm; inner bristles 0.8–1.4 cm. Fl. and fr. Jul–Sep.

• Grasslands, thickets, alpine meadows; 3000–4700 m. ?Qinghai (Nangqên), SW Sichuan (Muli), SE Xizang, NW Yunnan.

We cannot confirm the record of *Saussurea longifolia* from Qinghai reported by S. W. Liu (Fl. Qinghai. 3: 450. 1996).

40. *Saussurea polycolea* Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 654. 1937.

多鞘雪莲 duo qiao xue lian

Saussurea nidularis Handel-Mazzetti.

Herbs (3–)6–45 cm tall, perennial. Caudex simple or few branched. Stems solitary or several, 1–4 mm in diam., erect, simple. Rosette and lower stem leaves petiolate; leaf blade narrowly ovate, elliptic, or obovate, 2–20 × 0.5–3 cm, both surfaces green and pubescent, base usually asymmetric and cuneate, rounded, or cordate, margin subentire to shallowly sinuate-denticulate, apex obtuse to acute and mucronate. Middle and upper stem leaves sessile, ovate or obovate and boat-shaped, 3–13 × 0.8–3.2 cm, both surfaces green to purple, base amplexicaul, margin entire, apex acuminate. Uppermost stem leaves boat-shaped, 1.5–6.5 × 0.3–1.6 cm, both surfaces purplish red. Capitulum solitary. Involucre obconic to campanulate, 1–2.5 cm in diam. Phyllaries in 4 or 5 rows, blackish brown or purple, sericeous-villous, apex acute to acuminate; outer phyllaries narrowly triangular-ovate, 10–15 × 2–5 mm; middle phyllaries narrowly elliptic, 12–16 × 2–3 mm; inner phyllaries linear, 12–18 × 1–2 mm. Receptacle bristles 2.5–6(–9) mm. Corolla purple, 1.5–1.7 cm, tube 7–9 mm, limb 6–9 mm, lobes 4.5–5.8 mm. Achene straw-colored to blackish, obovoid, 3.8–4.6 mm, indistinctly 5-ribbed. Pappus pale brown; outer bristles 1–5.5 mm; inner bristles (0.8–)1–1.2 cm. Fl. and fr. Jul–Oct.

• Grasslands on mountain slopes, scree slopes, thickets, rocky pastures; 3200–4700 m. W Sichuan, E Xizang, NW Yunnan.

Saussurea nidularis, only known from the type collection, was described from juvenile specimens with capitula in bud stage. It does not differ from *S. polycolea* in any developed character; its substemless growth form is most probably due to its early developmental stage.

Saussurea polycolea var. *acutisquama* is a synonym of *S. erubescens*. The name of the variety was often misapplied for a recently recognized good species, *S. acutisquama* of *S. subg. Saussurea*.

41. *Saussurea wettsteiniana* Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 57: 144. 1920.

垂头雪莲 chui tou xue lian

Herbs 30–90 cm tall, perennial. Caudex stout, simple or few branched. Stems 1–3, 3–5 mm in diam., erect, simple. Rosette and lower stem leaves petiolate; leaf blade narrowly elliptic to linear, 15–55 × 1.5–6 cm, both surfaces light green, pilose, and glandular hairy, margin undulate and usually denticulate, apex acute. Middle and upper stem leaves sessile, narrowly elliptic, 7.5–25 × 1.5–4.5 cm. Uppermost stem leaves sessile, ovate and boat-shaped, 3–15 × (1–)2.5–14 cm, membranous, half-enclosing synflorescence, both surfaces yellowish, base cordate, rounded, or cuneate and auriculate-amplexicaul, margin entire or denticulate, apex acuminate. Capitula (1 or)2–5, in a laxly paniculiform synflorescence or rarely solitary, nodding at anthesis and fruiting time, long pedunculate. Involucre campanulate, 2–3.5 cm in diam. Phyllaries in 3 or 4 rows, blackish purple, villous, apex acuminate; outer phyllaries narrowly triangular-ovate, 14–16 × 3–6 mm; middle and inner phyllaries narrowly ovate to linear, 1.6–2.2 × 0.2–0.5 cm. Receptacle bristles 5.5–9 mm. Corolla dark purple, 1.3–1.9 cm,

tube 6–9.5 mm, limb 6–9.5 mm, lobes 2.5–5.5 mm. Achene straw-colored with blackish spots, obovoid, 5.4–6.7 mm, indistinctly ribbed. Pappus light yellowish brown; outer bristles 1–5.4 mm; inner bristles 1.1–1.4 cm. Fl. and fr. Jul–Sep.

• Forest margins, grasslands, meadows near mountain rivers; 3200–4300 m. W Sichuan, NW Yunnan.

Records of *Saussurea wettsteiniana* from Xizang are due to misidentifications (see discussion under *S. luae*).

42. *Saussurea orgaadayi* Khanminchun & Krasnoborov, *Izv. Sibirsk. Otd. Akad. Nauk S.S.S.R.* 13(2): 15. 1984.

阿尔泰雪莲 a er tai xue lian

Herbs 40–65 cm tall, perennial or biennial. Stem solitary, 2.5–3 cm in diam., erect, simple, hollow, densely leafy, covered at base with band-shaped remains of petioles. Rosette and lower stem leaves petiolate; leaf blade elliptic to narrowly elliptic-obovate, 6–16 × 3–4 cm, both surfaces green, scabrous, glandular hairy, and sparsely pilose, margin sinuate-dentate to serrate, apex acute. Middle and upper stem leaves sessile, narrowly ovate, elliptic, or obovate, 8–17 × 2–5.5 cm, base auriculate. Uppermost stem leaves ovate to narrowly triangular-ovate, 4–12 × 1.5–6.5 cm, membranous, stellately surrounding synflorescence, both surfaces yellowish, margin dentate. Capitula 20–30, in a hemispheric synflorescence 12–15 cm in diam., sessile or shortly pedunculate. Involucre campanulate, 2–3 cm in diam. Phyllaries in 3–5 rows, linear-subulate, brown with dark margin, sericeous-villous, apex acuminate; outer phyllaries 11–18(–23) × 1–2.5 mm; middle and inner phyllaries 14–18 × 1.4–1.8 mm. Receptacle naked or shortly papillose. Corolla purple, 1.7–1.9 cm, tube 8.5–9.5 mm, limb 8.5–9 mm, lobes 4.2–4.6 mm. Achene straw-colored with blackish spots, cylindrical, 5–6.7 mm, obtusely 5-ribbed. Pappus straw-colored; outer bristles 1–4 mm; inner bristles 1.1–1.4 cm. Fl. Jul–Aug, fr. Aug–Oct. $2n = 32$.

N Xinjiang (Altay Shan) [Mongolia, Russia (Siberia)].

The whole plant of *Saussurea orgaadayi* is used medicinally.

See also the discussion under *Saussurea involucrata*.

43. *Saussurea involucrata* (Karelin & Kirilov) Schultz Bipontinus, *Linnaea* 19: 331. 1846.

雪莲花 xue lian hua

Aplotaxis involucrata Karelin & Kirilov, *Bull. Soc. Imp. Naturalistes Moscou* 15: 389. 1842; *Saussurea involucrata* var. *axillicalathina* J. S. Li; *S. ischnoides* J. S. Li; *S. karelinii* Stscheglejew; *S. lioui* Y. Ling; *S. polylada* J. S. Li.

Herbs 15–50 cm tall, perennial. Caudex stout, unbranched, densely covered with fibrous remains of petioles. Stem solitary, 1.5–3 cm in diam., erect, simple. Rosette and stem leaves petiolate; leaf blade narrowly ovate, elliptic, or obovate, 8–13 × 2–4 cm, both surfaces green and glandular hairy, base decurrent, margin denticulate to serrulate, apex acute to obtuse. Uppermost stem leaves sessile, ovate to elliptic, 5.5–12 × 3.5–6.5 cm, membranous, stellately surrounding synflorescence, both surfaces pale yellow. Capitula 10–20, in a hemispheric synflore-

cence 8–15 cm in diam., sessile or shortly pedunculate. Involucre hemispheric to broadly campanulate, 1–2.5 cm in diam. Phyllaries in 3 or 4 rows, dark or light brown with dark margin, sparsely pubescent, apex acute; outer phyllaries narrowly ovate-elliptic, 8–11 × 2.5–5 mm; middle and inner phyllaries narrowly elliptic to linear, 10–18 × 1.5–2 mm. Receptacle papillose; papillae 0.5–1 mm. Corolla purple, 1.3–1.8 cm, tube 7–9 mm, limb 6–9 mm, lobes 3–5 mm. Achene straw-colored with blackish spots, cylindrical, 4.8–6.7 mm, 5- or 6-ribbed. Pappus dirty white; outer bristles 0.5–3 mm; inner bristles 0.8–1.5 cm. Fl. Jul–Aug, fr. Aug–Oct. $2n = 32^*$.

Mountain slopes, mountain valleys, by water, meadows, in rock fissures; 2400–4100 m. C, N, and W Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia].

The whole plant of *Saussurea involucrata* is used medicinally, and the species is endangered in China due to over-collecting.

Most previous records from the Chinese Altay probably belong to *Saussurea orgaadayi*, but the occurrence of *S. involucrata* cannot be excluded there.

44. *Saussurea obvallata* (Candolle) Schultz Bipontinus, *Linnaea* 19: 331. 1846.

苞叶雪莲 bao ye xue lian

Aplotaxis obvallata Candolle, *Prodr.* 6: 541. 1838; *Saussurea obvallata* var. *orientalis* Diels.

Herbs 15–80 cm tall, perennial. Caudex stout, usually unbranched. Stem solitary, 4–14 mm in diam., erect, simple. Basal and lower stem leaves petiolate; leaf blade ovate, elliptic-oblong, or obovate, 7–32 × 1–6.5 cm, both surfaces pilose and glandular hairy but glabrescent, base attenuate, margin subentire to sinuate-dentate, apex obtuse to acute. Middle and upper stem leaves sessile, narrowly elliptic to ovate, 5–16 × 1.5–8 cm, base semiamplexicaul. Uppermost stem leaves elliptic or ovate, boat-shaped, 5–15 × 1.5–9 cm, membranous, enclosing synflorescence and forming a lanternlike head of 4–14 cm in diam., both surfaces pale yellow. Capitula 2–16, in a corymbiform synflorescence 3.5–9 cm in diam., pedunculate or subsessile. Involucre globose to campanulate, 1–3 cm in diam. Phyllaries in 3–5 rows, straw-colored with dark margin and apex, pilose to glabrescent, apex acute to acuminate; outer phyllaries triangular-ovate, 5–15 × 2–6 mm; middle phyllaries narrowly ovate, 7–15 × 1–4 mm; inner phyllaries linear, 8–14 × 1–2 mm. Receptacle bristles 1–5 mm. Corolla purple, 0.9–1.3 cm, tube 4–7 mm, limb 4.5–6 mm, lobes 1.8–3.3 mm. Achene straw-colored with dark spots, cylindrical, 2–5 mm, 4–7-ribbed. Pappus dirty white-yellowish; outer bristles 2–5 mm; inner bristles 7.5–11 mm. Fl. and fr. Jul–Sep. $2n = 32^*$.

Grasslands, rocky places on mountain slopes, by streams, scree slopes; 3200–5200 m. E Qinghai, W Sichuan, SE Xizang, NW Yunnan [Bhutan, NE and NW India, Kashmir, N Myanmar, Nepal].

The whole plant of *Saussurea obvallata* is used medicinally.

The combination *Saussurea obvallata* by Schultz Bipontinus preceded the same name by Edgeworth (*Trans. Linn. Soc. London* 20: 76. Aug 1846) by one month.

45. *Saussurea tangutica* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 489. 1882.

唐古特雪莲 tang gu te xue lian

Saussurea tangutica var. *bayankaraensis* W. Y. Wang.

Herbs 6–20(–30) cm tall, perennial, caespitose. Caudex simple or branched. Stems solitary or several, 2.5–4 mm in diam., erect, simple. Rosette and lower stem leaves petiolate; leaf blade narrowly elliptic, 3–9 × 0.7–2.3 cm, both surfaces green, abaxially pilose, adaxially scabrous but glabrescent, margin sinuate-dentate, apex acute and mucronate. Middle stem leaves sessile, 3.3–5 × 0.6–1.2 cm. Uppermost stem leaves ovate and boat-shaped, 3–4.5 × 1.5–2.5 cm, membranous, enclosing synflorescence and forming a lanternlike head of 3.5–7 cm in diam., both surfaces yellowish rose to purple, margin denticulate, apex acuminate. Capitula 1–5, solitary or in a condensed corymbiform synflorescence 3–7 cm in diam., subsessile. Involucre campanulate, 1–3 cm in diam. Phyllaries in ca. 4 rows, blackish purple, densely villous, apex acuminate; outer phyllaries elliptic, (5–)10–13 × 2–5 mm; middle phyllaries narrowly elliptic, 11–15 × 2–3 mm; inner phyllaries linear, 13–16 × 1–2 mm. Receptacle bristles 0.5–2 mm. Corolla purple, (1–)1.4–1.5 cm, tube (5–)6.5–8 mm, limb (5–)7–7.5 mm, lobes (2.8–)4.2–4.8 mm. Achene straw-colored, sometimes tinged purple and with blackish spots, cylindrical, 4.5–5.5 mm. Pappus dirty white; outer bristles 2–4 mm; inner bristles 0.9–1.1 cm. Fl. and fr. Jul–Sep.

• Alpine scree slopes, alpine meadows; 3600–5300 m. Gansu, Qinghai, NW Sichuan, Xizang.

46. *Saussurea bracteata* Decaisne in Jacquemont, Voy. Inde 4(Bot.): 94. 1843.

膜苞雪莲 mo bao xue lian

Saussurea nana (Pampanini) Pampanini; *S. schultzii* J. D. Hooker var. *nana* Pampanini.

Herbs 3–8(–20) cm tall, perennial, sometimes stemless. Caudex simple or few branched. Stems usually solitary, 2–3 mm in diam., erect, simple. Rosette and lower stem leaves shortly petiolate; leaf blade narrowly elliptic, 2–10 × 0.2–1 cm, abaxially glabrescent, adaxially glandular hairy, margin sinuate-dentate, apex acute. Middle and upper stem leaves sessile, narrowly ovate-elliptic, 3–5 × 0.5–1.8 cm. Uppermost stem leaves elliptic or ovate, 1.5–3.5 × 0.8–1.7 cm, membranous, half-enclosing capitulum, both surfaces yellowish green tinged purple to purplish red, margin dentate, apex acuminate. Capitulum solitary. Involucre narrowly campanulate to obconic, (1–)1.5–2.5(–3.5) cm in diam. Phyllaries in ca. 4 rows, densely villous to sparsely pilose, apex acute; outer phyllaries triangular-ovate, 6–9(–14) × 3–4 mm; middle phyllaries narrowly ovate to linear, 13–18 × 2–3 mm; inner phyllaries linear, 1.5–2.2 × 0.1–0.2 cm. Receptacle bristles 1.5–2.5 mm. Corolla purplish red, 1.5–1.8 cm, tube 6.5–8.5 mm, limb 7.5–9.5 mm, lobes 4.4–6 mm. Achene straw-colored, cylindrical to obovoid, 5–6 mm, 4- or 5-ribbed. Pappus dirty white; outer bristles 2–3.6(–5) mm; inner bristles 1.1–1.5 cm. Fl. Jul–Sep, fr. Sep–Oct.

Alpine meadows and scree slopes; 4500–5400 m. S Xinjiang, W Xizang [NW India, Kashmir].

47. *Saussurea schultzii* J. D. Hooker, Fl. Brit. India 3: 366. 1881.

克什米尔雪莲 ke shi mi er xue lian

Herbs 16–42 cm tall, perennial. Caudex usually unbranched. Stem solitary, 3–7 mm in diam., erect, simple. Basal and lower stem leaves petiolate; leaf blade narrowly elliptic, 7.5–23 × 1.2–3 cm, both surfaces green, scabrous, and densely glandular hairy, margin sinuate-dentate, apex acute. Middle and upper stem leaves sessile, 5.5–15 × 1–2.5 cm, base semiamplexicaul. Uppermost stem leaves sessile, elliptic or obovate and boat-shaped, 1.5–8 × 1–3.7 cm, membranous, half-enclosing synflorescence, both surfaces yellowish rose, margin dentate, apex acuminate. Capitula 3–8, in a condensed corymbiform synflorescence 3–10 cm in diam., pedunculate. Involucre obconic to campanulate, 1–2.5(–3) cm in diam. Phyllaries in 3–5 rows, straw-colored with dark margin and distal part, villous, apex acute to acuminate; outer phyllaries narrowly triangular, 9–12 × 1.5–3 mm; middle phyllaries narrowly elliptic to linear, 12–15 × 1–2.5 mm; inner phyllaries linear, 15–18 × 1–2 mm. Receptacle bristles (1–)3–4.5 mm. Corolla purple, 1.6–1.9 cm, tube 9–10 mm, limb 7.5–9 mm, lobes 4.2–5.2 mm. Achene brown, cylindrical to obovoid, 3.5–5 mm, obtusely 5–7-ribbed. Pappus dirty white; outer bristles 2.8–5 mm; inner bristles 1.2–1.4 cm. Fl. Jul–Aug, fr. Aug–Sep. $2n = 32$ (as *Saussurea bracteata*).

Glacier moraines, rocky slopes, scree slopes; ca. 5200 m. SW Xinjiang (Yecheng) [NW India, Kashmir, Pakistan].

The only record of *Saussurea schultzii* in China is from the N declivity of the Karakorum range, where it was collected only twice in the first half of the 20th century.

48. *Saussurea luae* Raab-Straube, Willdenowia 39: 103. 2009.

宝璐雪莲 bao lu xue lian

Herbs 30–70 cm tall, perennial, caespitose, forming large clumps. Caudex stout, much branched. Stems many, 4–6 mm in diam., erect, simple. Rosette and lower stem leaves petiolate; leaf blade narrowly elliptic, 10–35 × 0.6–3.2 cm, both surfaces green, abaxially gland-dotted, adaxially sparsely pilose to glabrescent, margin sinuate-dentate, apex acute. Middle and upper leaves sessile, narrowly elliptic to narrowly ovate, 7.5–14 × 1.4–2.8 cm. Uppermost stem leaves sessile, ovate, boat-shaped, 1.7–8 × 0.7–3.2 cm, half-enclosing synflorescence, both surfaces pale greenish yellow ± tinged purple, margin dentate, apex acuminate. Capitula (1 or)2–8, in a corymbiform synflorescence or rarely solitary, pedunculate. Involucre campanulate, 1.5–2.5 cm in diam. Phyllaries in 5 or 6 rows, blackish or purplish brown, villous, glabrescent, apex acute; outer phyllaries triangular-ovate, 7–8 × 2–3.5 mm; middle phyllaries narrowly ovate, 8–13 × 1.5–2.5 mm; inner phyllaries narrowly elliptic to linear, 13–15 × 1–2 mm. Receptacle bristles 3.5–7.5 mm. Corolla purple, 1.1–1.7 cm, tube 5.5–9 mm, limb 5–8 mm, lobes 3.2–4.4 mm. Achene blackish brown, cylindrical to obconic, 4–5.7 mm, 5–7-ribbed, apex with a denticulate crown. Pappus rose-purple; outer bristles 1.5–3.5 mm; inner bristles 1.4–1.6 cm. Fl. Aug–Sep, fr. Sep–Oct. $2n = 32^*$.

• Open gravelly and rocky slopes, stabilized boulder scree slopes, ravine beds; 4000–5000 m. NW Sichuan, E Xizang.

This taxon has been confused with *Saussurea conica* (here treated as a synonym of *S. uniflora*) and with *S. wettsteiniana*. All literature records of *S. conica* and *S. wettsteiniana* from Xizang (Y. L. Chen, Fl. Xizang, 4: 869. 1985; C. Shih & S. Y. Jin, FRPS 78(2): 29–30. 1999) belong in fact to *S. luae*.

49. *Saussurea globosa* F. H. Chen, Bull. Fan Mem. Inst. Biol., Bot. 6: 96. 1935.

球花雪莲 qiu hua xue lian

Herbs 10–70 cm tall, perennial. Caudex simple or few branched. Stems usually solitary, 2–7 mm in diam., erect, simple. Rosette and lower stem leaves petiolate; leaf blade narrowly ovate, elliptic, or linear, 12–28 × 1–4.2 cm, both surfaces green, abaxially glandular hairy, adaxially glabrescent, margin dentate, apex acute. Middle and upper stem leaves sessile, 5–16 × 1.8–3.2 cm, both surfaces green to purple. Uppermost stem leaves ovate and boat-shaped, 4–6 × 1–2 cm, membranous, half-enclosing synflorescence, both surfaces red to purple, margin entire or serrulate, apex acuminate. Capitula (1 or) 2–9(–13), in a corymbiform synflorescence or rarely solitary, pedunculate. Involucre globose, 1.5–2 cm in diam. Phyllaries in 3 or 4 rows, blackish purple or yellowish with dark margin, villous to glabrescent, apex acuminate; outer phyllaries triangular-ovate, 7.5–10 × 3–4.5 mm; middle phyllaries narrowly triangular-ovate, 9–11 × 2–3 mm; inner phyllaries linear, 12–14 × 1.5–2 mm. Receptacle bristles 3–5(–7.5) mm. Corolla purple, 1.3–1.5 cm, tube 7–8.5 mm, limb 6–7 mm, lobes 3.6–4.5 mm. Achene straw-colored to black, cylindrical to obovoid, 3–5.5 mm, indistinctly 5-ribbed. Pappus yellowish; outer bristles 1–7.5 mm; inner bristles 9–10 mm. Fl. and fr. Jul–Oct. $2n = 32^*$.

• Alpine grasslands, thickets, meadows; 3000–4800 m. W Sichuan, NW Yunnan.

50. *Saussurea erubescens* Lipschitz, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 20: 342. 1960.

红柄雪莲 hong bing xue lian

Saussurea globosa F. H. Chen var. *monocephala* Lipschitz; *S. nigrescens* Maximowicz var. *acutisquama* Y. Ling; *S. polycolea* Handel-Mazzetti var. *acutisquama* (Y. Ling) Lipschitz; *S. uniflora* (Candolle) Wallich ex Schultz Bipontinus var. *pumila* Maximowicz.

Herbs 10–30 cm tall, perennial. Caudex simple or few branched. Stems solitary or 2, 1–3 mm in diam., erect, simple. Basal and lower stem leaves petiolate; leaf blade narrowly elliptic, 1.5–10 × 0.7–2(–3.5) cm, both surfaces green, abaxially densely glandular hairy, adaxially glandular hairy but glabrescent, margin sinuate-denticulate, apex acute to acuminate. Middle and upper stem leaves sessile, 2.5–4 × 0.4–0.9 cm, both surfaces green to purple, margin sinuate-denticulate or entire. Uppermost stem leaves sessile, elliptic and boat-shaped, 1.5–3.5 × 0.3–1 cm, both surfaces purple, margin entire, apex acuminate. Capitula (1 or) 2 or 3(–5), in a corymbiform synflorescence or rarely solitary, pedunculate. Involucre obconic, 1.5–2(–3) cm in diam. Phyllaries in 4 or 5 rows, blackish purple, pilose, apex acute; outer phyllaries triangular-ovate, 8–10.5 × 2.5–5.5 mm; middle phyllaries narrowly triangular, 10–12 × 1.5–2.5 mm; inner phyllaries linear, 11–12 × 0.5–1.5 mm.

Receptacle bristles 3–5.5 mm. Corolla purple, 1.1–1.7 cm, tube 5.5–7 mm, limb 6–9 mm, lobes 3.2–5 mm. Achene straw-colored with blackish spots, obovoid to cylindrical, 3–4 mm, indistinctly ribbed. Pappus dirty white; outer bristles 1–4.5 mm; inner bristles 8.5–10 mm. Fl. Jul–Aug, fr. Aug–Oct.

• Grassy areas in marshes, by rivers, mountain valleys, meadows; 2400–4900 m. Gansu, Qinghai, NW Sichuan, Xizang.

The type of *Saussurea nigrescens* var. *acutisquama* clearly belongs to this taxon. Unfortunately, the combination of this epithet with *S. polycolea* by Lipschitz (who had no opportunity to check the type) was widely misapplied for an entirely different taxon, *S. acutisquama*, which was recently recognized as a good species.

51. *Saussurea taipaiensis* Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 3: 151. 1935.

太白山雪莲 tai bai shan xue lian

Herbs 10–22 cm tall, perennial, caespitose. Caudex stout, branched. Stems solitary or few, 2–4 mm in diam., erect, simple. Rosette and lower stem leaves petiolate; leaf blade narrowly elliptic to oblong, 4–10(–20) × 1–2 cm, both surfaces green, blackening when dry, and subglabrous, base attenuate, margin sinuate-dentate to denticulate, apex acute. Middle and upper stem leaves sessile, narrowly ovate to linear and boat-shaped, 1.5–5 × 0.3–1 cm, both surfaces dark purple, abaxially sparsely pilose near base, base semiamplexicaul, margin entire, apex acute to acuminate. Uppermost stem leaves merging into phyllaries, abaxially villous. Capitulum 1(or) 2, subsessile. Involucre broadly obconic, 2–2.5 cm in diam. Phyllaries in 4 or 5 rows, blackish purple, densely villous, apex acute to acuminate; outer phyllaries triangular-ovate, 6–7 × 2.5–3.5 mm; middle phyllaries narrowly ovate to elliptic, 8–10 × 1–2 mm; inner phyllaries linear, 10–12 × 1–1.5 mm. Receptacle bristles 2–4 mm. Corolla purple, 1.2–1.3 cm, tube 6–7 mm, limb 6–7 mm, lobes 3.5–4 mm. Achene cylindrical, 3–4 mm, smooth. Pappus straw-colored; outer bristles 1–3 mm; inner bristles 0.9–1.1 cm. Fl. Aug, fr. Sep–Oct.

• Alpine grasslands and meadows; 3200–3900 m. S Shaanxi (Taibai Shan).

52. *Saussurea gymnocephala* (Y. Ling) Raab-Straube, Willdenowia 41: 89. 2011.

裸头雪莲 luou tou xue lian

Saussurea obvallata (Candolle) Schultz Bipontinus var. *gymnocephala* Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 6: 92. 1949.

Herbs 9–35(–55) cm tall, perennial. Caudex stout, simple or few branched, apically with black fibrous remains of petioles. Stem solitary, 2–4 mm in diam., erect, simple. Rosette and lower stem leaves petiolate; leaf blade narrowly elliptic to elliptic, 4–18(–27) × 0.9–2.5(–3.8) cm, both surfaces gland-dotted, abaxially glaucous green and glabrescent, adaxially green and scabrous, base cuneate, margin subentire to minutely denticulate, apex acute to acuminate. Middle stem leaves sessile, narrowly elliptic, 4–10 × 0.8–1.5 cm. Upper stem leaves narrowly elliptic and boat-shaped, 2–6 × 0.5–1.5 cm, half-enclosing synflorescence, both surfaces purple, margin entire. Capitula 1–4,

solitary or in a congested corymbiform synflorescence, shortly pedunculate. Involucre campanulate to obconic, 1.5–2.5 cm in diam. Phyllaries in 4 or 5 rows, straw-colored to purplish but with a dark margin, sparsely pilose, glabrescent, apex acuminate; outer phyllaries triangular-ovate, 8–10 × 3–4 mm; middle phyllaries narrowly ovate-elliptic, 10–14 × 1.5–2.5 mm; inner phyllaries linear, 14–17 × 1–1.5 mm. Receptacle bristles 4–6 mm. Corolla purple, 1.3–1.7 cm, tube 5–9 mm, limb 6–8 mm, lobes 3–5 mm. Achene brown, cylindrical, 3–3.5 mm. Pappus straw-colored; outer bristles 2–5 mm; inner bristles 1.1–1.3 cm. Fl. and fr. Jul–Sep.

• Marshlands, wet meadows; 3400–4300 m. Qinghai, W Sichuan, E Xizang.

This species has frequently been confused with *Saussurea erubescens*, due to an unfortunate, questionable synonymization by the monographer of the genus, Lipschitz. It is morphologically quite different from both *S. obvallata* and *S. erubescens*.

53. *Saussurea nigrescens* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 491. 1882.

钝苞雪莲 dun bao xue lian

Herbs 8–50 cm tall, perennial. Stems solitary or few, 1–2 mm in diam., erect, simple. Basal and lower stem leaves petiolate; leaf blade narrowly elliptic, 3–15 × 0.8–2.3 cm, both surfaces green and sparsely villous but glabrescent, margin denticulate, apex acute. Middle and upper stem leaves sessile, narrowly elliptic to linear, 2.8–7.7 × 0.6–1.1 cm, base semiamplexicaul. Uppermost stem leaves sessile, narrowly ovate to linear and boat-shaped, 1.4–3 × 0.2–0.8 cm, not enclosing synflorescence, both surfaces purplish, margin entire, apex acuminate. Capitula 1–3(–6), solitary or in a corymbiform synflorescence, pedunculate. Involucre campanulate to obconic, 1–1.5 cm in diam. Phyllaries in 4 or 5 rows, straw-colored to purple and with a dark margin, sparsely pilose, glabrescent, apex obtuse; outer phyllaries triangular-ovate, 5–6 × 2.5–4 mm; middle phyllaries narrowly ovate, 6.5–12 × 2–3 mm; inner phyllaries linear, 12–16 × 1–2 mm. Receptacle bristles 5–6 mm. Corolla purple, 1.3–1.8 cm, tube 7–9 mm, limb 5.5–9 mm, lobes 3–4 mm. Achene cylindrical, ca. 3 mm. Pappus dirty white; outer bristles 1–3 mm; inner bristles 1.2–1.3 cm. Fl. and fr. Jul–Oct. $2n = 32^*$.

• Grasslands; 1900–4000 m. Gansu, W Henan, Qinghai, Shaanxi.

54. *Saussurea iodostegia* Hance, J. Bot. 16: 109. 1878.

紫苞雪莲 zi bao xue lian

Saussurea iodostegia var. *ferruginipes* J. R. Drummond ex Handel-Mazzetti; *S. iodostegia* var. *glandulifera* X. Y. Wu.

Herbs (5–)10–80 cm tall, perennial. Caudex simple or few branched. Stems solitary or 2–4, 1.5–7 mm in diam., erect, simple. Rosette and lower stem leaves petiolate; leaf blade narrowly ovate-elliptic to linear, 8–45 × 0.6–5 cm, both sur-

faces green, sometimes spotted, abaxially glabrescent, adaxially sparsely villous, margin sinuate-dentate, apex acute. Middle and upper stem leaves sessile, ovate and boat-shaped, 3–8 × 0.6–3 cm, both surfaces green to purple, base semiamplexicaul, margin dentate to subentire, apex acuminate. Uppermost stem leaves ovate to elliptic and boat-shaped, 2.5–6.5 × 0.5–2.3 cm, membranous, half-enclosing synflorescence, both surfaces purple, margin subentire. Capitula (1 or)2–10, in a corymbiform synflorescence or rarely solitary, pedunculate. Involucre cylindrical to obconic, 0.9–1.7 cm in diam. Phyllaries in 3 or 4 rows, villous, apex obtuse; outer phyllaries elliptic to suborbicular, 4.5–7.5 × 3–4.5 mm; middle phyllaries narrowly elliptic, 6–12 × 2–3 mm; inner phyllaries linear, 12–15 × 1.5–2.5 mm. Receptacle bristles 2.5–6(–10) mm. Corolla purple, 1.3–1.4 cm, tube 6–7 mm, limb 6.5–7.5 mm, lobes 4.2–5 mm. Achene dark brown, obovoid, 4.5–5.5 mm. Pappus pale brown; outer bristles 1–4 mm; inner bristles 1–1.1 cm. Fl. and fr. Jul–Sep.

• Grasslands, meadows, forests on mountain slopes; 1300–3500 m. Gansu, Hebei, Henan, Nei Mongol, Ningxia, Shaanxi, Shanxi.

The proximal part of multicellular flagellate hairs on leaves and peduncles is often remaining when the distal, long, hairlike part of the trichome is shed. These remaining basal parts are sometimes colored and are easily mistaken for glandular hairs. The two varieties of *Saussurea iodostegia*, which have been distinguished based on this misleading character, both from the same locality, are not recognized here.

55. *Saussurea veitchiana* J. R. Drummond & Hutchinson, Bull. Misc. Inform. Kew 1911: 190. 1911.

华中雪莲 hua zhong xue lian

Herbs 20–70 cm tall, perennial. Caudex simple or branched. Stem solitary, 3–6 mm in diam., erect, simple. Rosette and lower stem leaves petiolate; leaf blade narrowly elliptic, ovate, or obovate, 12–36 × 1–3 cm, both surfaces green and appressed pilose, margin undulate to shallowly sinuate-dentate, apex acute to acuminate. Middle stem leaves sessile, narrowly ovate, 8–16 × 1–3 cm, both surfaces green, tinged rose-purple, base semiamplexicaul. Bracts ovate, boat-shaped, 3.5–9 × 0.8–2.5 cm, membranous, half-enclosing synflorescence, both surfaces purple, margin entire or dentate in basal part, apex acuminate. Capitula 2–10, in a corymbiform synflorescence, pedunculate. Involucre campanulate, 1–1.5(–2) cm in diam. Phyllaries in 3–5 rows, straw-colored to purplish brown, sparsely villous, apex acute; outer phyllaries triangular-ovate, 5.5–8.5 × 2.5–4.5 mm; middle phyllaries narrowly ovate, 9–15 × 2–3 mm; inner phyllaries linear, 14–18 × 1.5–2.5 mm. Receptacle bristles 6–9 mm. Corolla dark purplish red, 1.2–1.4 cm, tube 5.5–7 mm, limb 6.5–7.5 mm, lobes 4.2–5.4 mm. Achene light brown with black spots, cylindrical to obovoid, 4.4–5.2 mm, obtusely 5-ribbed. Pappus pale brown; outer bristles 0.5–5 mm; inner bristles 8–11 mm. Fl. and fr. Jul–Sep.

• Montane grasslands, meadows, thickets, forest margins; 1600–3000 m. E Chongqing, W Hubei, SE Shaanxi.

3. *Saussurea* subg. *Theodorea* Cassini, Bull. Sci. Soc. Philom. Paris 1818: 168. 1818.

附片风毛菊亚属 fu pian feng mao ju ya shu

Theodorea (Cassini) Cassini.

Herbs, biennial or perennial. Stems usually tall, many branched, leafy. Capitula usually numerous to very numerous, in a corym-

biform or paniculiform synflorescence. Phyllaries imbricate, margin sometimes dentate, all or only middle and inner phyllaries with colored and membranous or green and herbaceous apical appendage; appendage sometimes inconspicuous or apex spiniform-acuminate. Receptacle with subulate or filiform bristles. Corolla limb deeply cleft (more than 2/3–4/5), usually gland-dotted. Achene smooth or ribbed, sometimes wrinkled, glabrous or gland-dotted, without a conspicuous apical crown. Pappus white, straw-colored, or pale brown, always in 2 rows; outer bristles scabrid or rarely plumose.

Twenty species: China, Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Russia, Tajikistan, Uzbekistan; Europe; 17 species (seven endemic) in China.

- 1a. Phyllaries without a conspicuous appendage, apex cartilaginous, spiniform, and usually reflexed.
- 2a. Capitula numerous; plants biennial or perennial, without woody caudex 66. *S. malitiosa*
- 2b. Capitulum solitary; plants perennial, with a stout woody caudex 67. *S. jurineoides*
- 1b. Phyllaries with a ± widened, membranous, or callose-serrulate appendage, apex not spiniform but sometimes needlelike or ± long acuminate.
- 3a. Phyllaries or at least inner ones with a small herbaceous callose-serrulate apical appendage.
- 4a. Leaf blade undivided, margin entire 72. *S. chinampoensis*
- 4b. Leaf blade pinnatisect, pinnately lobed, or margin sinuate-lobate.
- 5a. Leaf blade adaxially green, sparsely pubescent, abaxially pale grayish green, sparsely arachnoid; inner phyllaries apically not barbellate 70. *S. nematolepis*
- 5b. Leaf blade green, concolorous, sparsely strigose; inner phyllaries apically densely barbellate 71. *S. ladyginii*
- 3b. Phyllaries or at least inner ones with a purple membranous apically widened but sometimes inconspicuous appendage.
- 6a. Outer phyllaries with an apical cartilaginous mucro.
- 7a. Plants biennial 68. *S. pseudomalitiosa*
- 7b. Plants perennial.
- 8a. Stems wingless or wing inconspicuous 62. *S. runcinata*
- 8b. Stems conspicuously winged.
- 9a. Basal leaves bipinnately parted; apex of outer phyllaries reflexed 63. *S. laciniata*
- 9b. Basal leaves pinnately parted to undivided; apex of outer phyllaries not or barely reflexed.
- 10a. Basal leaves lyrate-pinnately lobed to undivided and with sinuate-dentate or subentire margin 64. *S. grubovii*
- 10b. Basal leaves pinnately lobed or pinnately parted 65. *S. alata*
- 6b. Outer phyllaries without an apical cartilaginous mucro.
- 11a. Outer phyllaries with a long needlelike recurved apex 60. *S. robusta*
- 11b. Outer phyllaries without a needlelike apex.
- 12a. Involucre cylindric, narrowly obconic, or narrowly campanulate; outer phyllaries without a membranous appendage.
- 13a. Stem usually wingless 56. *S. amara*
- 13b. Stem winged.
- 14a. Middle and upper stem leaves ovate, base amplexicaul, margin entire and undivided 57. *S. chingiana*
- 14b. Middle and upper stem leaves narrowly elliptic to linear, base not amplexicaul, margin pinnately lobed or dentate 61. *S. prostrata*
- 12b. Involucre globose, ovoid, or campanulate; all phyllaries usually with a membranous appendage.
- 15a. Involucre globose, 10–15 mm in diam.; phyllary appendages showy, 2–3 mm wide, usually overlapping 59. *S. pulchella*
- 15b. Involucre campanulate, 4–10 mm in diam.; phyllary appendages not showy, 1–2 mm wide, not overlapping.
- 16a. Stem usually wingless; involucre cylindric to narrowly campanulate; outer phyllaries sometimes without an appendage 58. *S. japonica*
- 16b. Stem narrowly winged; outer phyllaries with an appendage.
- 17a. Involucre tubular to narrowly campanulate, 4–6 mm in diam.; capitula numerous in a large corymbiform synflorescence 58. *S. japonica*
- 17b. Involucre campanulate, 8–10 mm in diam.; capitula solitary or few at branch ends 69. *S. pinnatidentata*

56. *Saussurea amara* (Linnaeus) Candolle, Ann. Mus. Nat. Hist. Nat. 16: 200. 1810.

草地风毛菊 cao di feng mao ju

Herbs 9–70 cm tall, perennial. Stem solitary, 3–7 mm in diam., erect, branched, usually wingless. Lower stem leaves petiolate; leaf blade narrowly elliptic, oblong, or narrowly ovate, 4–20 × 0.7–6 cm, both surfaces green, sparsely pubescent or

glabrous, and gland-dotted, base cuneate-attenuate, margin entire or obtusely sinuate-dentate, apex acute to obtuse. Middle and upper stem leaves shortly petiolate or sessile, elliptic to narrowly ovate, gradually smaller upward on stem, base cuneate and rarely auriculate. Capitula numerous, in a corymbiform or paniculiform synflorescence, pedunculate. Involucre narrowly campanulate to narrowly obconic, 0.8–1.2 cm in diam. Phyllaries in 4–6 rows, sparsely pubescent, sometimes gland-dotted; outer phyllaries ovate to narrowly ovate, 3–5 × 1–1.5 mm, apex blackish and acuminate or tricuspidate; middle and inner phyllaries narrowly elliptic to linear, 5–14 × 1–1.5 mm, appendage purple, orbicular, 0.5–1.5 mm wide, and membranous or rarely appendage lacking. Receptacle bristles 8–10 mm. Corolla pale purple, rarely white, 1.3–1.8 cm, gland-dotted, tube 8–10 mm, limb 5–7 mm, lobes 3–5 mm. Achene brown, cylindrical, 3–3.5 mm, 4-ribbed. Pappus dirty white; outer bristles 1–5 mm; inner bristles 1.2–1.7 cm. Fl. and fr. Jul–Oct. $2n = 26$.

Wastelands, by trails, forest steppes, steppes, saline and alkaline soils, dikes of streams, dunes, river and lake shores, sandy soils; 500–3200 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Uzbekistan; E Europe].

The type of *Saussurea tenuicaulis* has the upper stem leaves with a widened auriculate base, a character not found in typical specimens of *S. amara*. Such plants may deserve separate taxonomic status.

- 1a. Middle and inner phyllaries with a purple appendage; corolla pale purple 56a. var. *amara*
 1b. All phyllaries acuminate at apex and without an appendage; corolla white 56b. var. *exappendiculata*

56a. *Saussurea amara* var. *amara*

草地风毛菊(原变种) cao di feng mao ju (yuan bian zhong)

Serratula amara Linnaeus, Sp. Pl. 2: 819. 1753; *Saussurea amara* var. *glomerata* (Poir.) Trautvetter; *S. amara* f. *microcephala* Franchet; *S. glomerata* Poir.; *S. tenuicaulis* Y. Ling.

Middle and inner phyllaries with a purple membranous appendage. Corolla pale purple.

Wastelands, by trails, forest steppes, steppes, saline and alkaline soils, dikes of streams, dunes, river and lake shores; 500–3200 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Uzbekistan; E Europe].

56b. *Saussurea amara* var. *exappendiculata* H. C. Fu in Ma, Fl. Intramongol., ed. 2, 4: 848. 1993.

尖苞草地风毛菊 jian bao cao di feng mao ju

All phyllaries without an apical appendage, apex acuminate. Corolla white.

- Sandy soils. Nei Mongol (Dalad Qi, Ih Ju Meng).

57. *Saussurea chingiana* Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 647. 1937.

抱茎风毛菊 bao jing feng mao ju

Herbs 45–100 cm tall, ?perennial. Stem solitary, 5–10 mm

in diam., erect, apically much branched, narrowly winged. Lower stem leaves petiolate; leaf blade narrowly elliptic to narrowly ovate, 5–20 × 1–4 cm, runcinate-pinnatifid or undivided, both surfaces green, sparsely strigose or glabrescent, and gland-dotted, base decurrent; lateral lobes (if present) narrowly triangular to linear, margin entire, apex acuminate. Middle and upper stem leaves ovate to linear, 1–6 × 0.2–2.5 cm, undivided, base auriculate and amplexicaul, margin entire, apex acuminate. Capitula numerous, clustered at end of branches, in a corymbiform synflorescence, subsessile or pedunculate. Involucre campanulate, 1–1.5 cm in diam. Phyllaries in 5 or 6 rows, straw-colored to green, distinctly striate, sparsely arachnoid or glabrous; outer phyllaries narrowly ovate-triangular, 2–3 × 1–1.5 mm, apex acuminate; middle and inner phyllaries narrowly ovate-elliptic to linear, 3–10 × 1–1.7 mm, appendage purple, orbicular, widened, and membranous. Receptacle bristles whitish, to 8 mm. Corolla reddish purple, 1.3–1.4 cm, tube 4–6 mm, limb 7–8 mm, lobes 3–3.5 mm. Achene obovoid, ca. 3 mm, glabrous. Pappus dirty white; outer bristles ca. 3 mm; inner bristles ca. 1.4 cm. Fl. and fr. Jul–Aug.

- Forests, gravelly open soil near rivers, by trails and ditches; ca. 2400 m. Gansu.

Saussurea chingiana is only known from the incomplete type, which lacks basal and underground parts. The plants from Qinghai (S. W. Liu, Fl. Qinghai. 3: 461. 1996) do not belong here but are winged forms of *S. japonica* (see *S. japonica* var. *pteroclada*).

58. *Saussurea japonica* (Thunberg) Candolle, Ann. Mus. Natl. Hist. Nat. 16: 203. 1810.

风毛菊 feng mao ju

Herbs (0.2–)0.5–2 m tall, biennial. Stem solitary, 3–10 mm in diam., erect, much branched. Lower stem leaves petiolate; leaf blade elliptic to narrowly ovate-elliptic, 7–30 × 3.5–9 cm, pinnately lobed, both surfaces green, scabrous, and gland-dotted; lateral lobes 5–8 pairs, obliquely triangular to linear-oblong, margin usually entire, apex obtuse; terminal lobe narrowly ovate-elliptic to linear. Middle and upper stem leaves shortly petiolate or sessile, gradually smaller upward on stem, pinnately lobed or undivided. Capitula very numerous, in a corymbiform or paniculiform synflorescence, shortly pedunculate. Involucre narrowly campanulate, 5–8(–10) mm in diam. Phyllaries in 5 or 6 rows, green with a dark purple midvein, arachnoid to glabrescent, gland-dotted, apical appendage purple, orbicular, 1–2 mm wide, and membranous; outer phyllaries ovate to narrowly triangular-ovate, 2–3 × 1–1.5 mm, apex acute or with a small appendage; middle and inner phyllaries narrowly elliptic to linear, 4–10 × 0.8–1.5 mm, apex with a larger appendage. Receptacle bristles 5–6 mm. Corolla purple, 1–1.4 cm, gland-dotted, tube 6–8 mm, limb 4–6 mm, lobes 4–5 mm. Achene straw-colored with dark spots, cylindrical to obconic, 3–4 mm. Pappus dirty white; outer bristles ca. 2 mm; inner bristles 7–9 mm. Fl. and fr. Jun–Nov. $2n = 26, 28$.

Mountain slopes, forests, thickets, loess slopes, roadsides, wastelands, fallow fields; 200–2900 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Korea, Mongolia].

Saussurea japonica has often been confused with *S. amara* (e.g., S. W. Liu, Fl. Yunnan. 13: 538. 2004), mainly because many herbarium specimens lack underground and basal parts. *Saussurea amara* is a perennial species with undivided basal leaves of steppe and often saline and alkaline soils in N and W parts of the country, whereas *S. japonica* is a very widespread tall biennial plant with pinnatifid to pinnatisect basal leaves in a variety of habitats but usually not on saline soils. *Saussurea japonica* seems to be absent from Xinjiang and Xizang. Plants in the SE part of the country tend to have smaller capitula (matching *S. microcephala*) and may deserve separate taxonomic status.

- 1a. Stem not winged; leaf blade base not
or very shortly decurrent 58a. var. *japonica*
1b. Stem with conspicuous entire or
dentate wings; leaf blade base
decurent 58b. var. *pteroclada*

58a. *Saussurea japonica* var. *japonica*

风毛菊(原变种) feng mao ju (yuan bian zhong)

Serratula japonica Thunberg in Murray, Syst. Veg., ed. 14, 723. 1784; *Saussurea amara* (Linnaeus) Candolle var. *microcephala* (Franchet) Lipschitz (1979), not *S. amara* f. *microcephala* Franchet (1883); *S. glomerata* Poirlet var. *chinensis* F. H. Chen; *S. intermedia* Turczaninow; *S. japonica* var. *intermedia* (Turczaninow) Lipschitz; *S. japonica* f. *leucocephala* (Nakai & Kitagawa) Nakai & Kitagawa; *S. japonica* var. *longicephala* Hayata; *S. japonica* var. *maritima* Kitagawa; *S. linearis* Champion ex Benth; *S. microcephala* Franchet; *S. microcephala* var. *aptera* Nakai & Kitagawa; *S. microcephala* f. *leucocephala* Nakai & Kitagawa; *S. taquetii* H. Léveillé & Vaniot.

Stem not winged. Leaf blade base not or very shortly decurrent.

Mountain slopes, forests, thickets, loess slopes, roadsides, wastelands, fallow fields; 200–2800 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Korea, Mongolia].

58b. *Saussurea japonica* var. *pteroclada* (Nakai & Kitagawa) Raab-Straube, **comb. nov.**

翼茎风毛菊 yi jing feng mao ju

Basionym: *Saussurea microcephala* var. *pteroclada* Nakai & Kitagawa, Rep. Exped. Manchoukuo Sect. IV, 1: 63. 1934; *S. glomerata* f. *alata* F. H. Chen; *S. japonica* f. *alata* (F. H. Chen) Kitagawa; *S. japonica* var. *alata* (F. H. Chen) Nakai & Kitagawa (1936), not (Regel) Komarov (1907).

Stem conspicuously winged; wings entire or dentate. Leaf blade base decurrent.

• Mountain slopes, forests, thickets, loess slopes, roadsides, wastelands, fallow fields; 200–2900 m. Gansu, Hebei, Heilongjiang, Nei Mongol, Ningxia, Qinghai, Shandong, Sichuan.

Saussurea japonica var. *pteroclada* with winged stems is treated under the name *S. japonica* var. *alata* (Regel) Komarov in some provincial floras (H. C. Fu & D. S. Wen in Ma, Fl. Intramongol., ed. 2, 4: 720. 1993; W. Wang & C. Y. Li, Fl. Pl. Herb. Chin. Bor.-Orient. 9: 331. 2004; D. Z. Ma et al., eds., Fl. Ningxia. 2: 368. 2007). However, that

name is based on *S. pulchella* var. *alata* Regel, a taxon which clearly belongs to *S. pulchella* and can only be used for the winged variety of that species (see also the discussion under *S. pulchella*). A name for the winged forms of *S. japonica* at the varietal level is not yet available and is therefore validated here. The variety probably has a wider distribution in China than indicated above.

Saussurea chingiana in the sense of S. W. Liu (Fl. Qinghai. 3: 461. 1996) is a misapplied name for this taxon.

59. *Saussurea pulchella* (Fischer) Fischer in Colla, Herb. Pedem. 3: 234. 1834.

美花风毛菊 mei hua feng mao ju

Heterotrichum pulchellum Fischer, Mém. Soc. Imp. Naturalistes Moscou 3: 71. 1812; *Saussurea japonica* (Thunberg) Candolle var. *alata* (Regel) Komarov; *S. japonica* var. *subtomentosa* Komarov; *S. pulchella* var. *alata* Regel; *S. pulchella* f. *subintegra* (Regel) Kitagawa; *S. pulchella* var. *subintegra* Regel; *S. pulchella* f. *subtomentosa* (Komarov) Kitagawa.

Herbs 25–120 cm tall, biennial. Stem solitary, 3–6 mm in diam., erect, apically branched. Basal, lower, and middle stem leaves petiolate; leaf blade oblong to elliptic, 10–25 × 4–14 cm, pinnately lobed to pinnatisect, both surfaces green, scabrous, strigose, and gland-dotted, sometimes abaxially grayish white tomentose; segments 4–8 pairs, narrowly ovate-elliptic to linear, margin entire or dentate, apex acuminate. Upper stem leaves sessile, narrowly ovate-elliptic to linear, 4–12 × 0.1–2 cm, pinnately lobed to pinnatisect or undivided. Capitula numerous, in a corymbiform or paniculiform synflorescence, pedunculate. Involucre globose, 0.8–1.5 cm in diam. Phyllaries in 6 or 7 rows, subglabrous and gland-dotted, all with an apical appendage; appendage purple, orbicular, 2–3 mm wide, membranous; outer phyllaries narrowly triangular-ovate to linear, 2–3 × 0.5–1.5 mm; middle and inner phyllaries narrowly ovate-elliptic to linear, 4–11(–15) × 1–3 mm. Receptacle bristles 4–6 mm. Corolla pale purple, 1.1–1.3 cm, gland-dotted, tube 5–8 mm, limb 4–6.5 mm, lobes 4–5 mm. Achene ivory-colored with dark spots, obconic, 3–5 mm, obtusely 5-angled. Pappus dirty white; outer bristles 0.5–2.5 mm; inner bristles 7–8(–13) mm. Fl. and fr. Aug–Oct. $2n = 26, 28$.

Forest steppes, thickets, meadows; 300–2200 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shanxi [Japan, Korea, Mongolia, Russia (Far East, E Siberia)].

Winged forms of *Saussurea pulchella* (*S. pulchella* var. *alata*) have not been distinguished in China.

60. *Saussurea robusta* Ledebour, Icon. Pl. 1: 16. 1829.

强壮风毛菊 qiang zhuang feng mao ju

Herbs 30–80 cm tall, biennial or perennial. Stem solitary, 5–6 mm in diam., erect, branched, narrowly winged. Basal and lower stem leaves sessile, oblong, 6–20 × 1–6 cm, both surfaces green, scabrous, and gland-dotted, base semiamplexicaul and decurrent, margin entire or sparsely dentate, apex acuminate. Middle and upper stem leaves sessile, narrowly ovate-elliptic to linear, 5–8 × 0.5–1.5 cm, margin entire, apex acuminate. Capitula numerous, in a corymbiform or paniculiform synflorescence, pedunculate. Involucre campanulate, (0.6–)1–2(–3) cm in diam. Phyllaries in ca. 5 rows; outer phyllaries narrowly tri-

angular-subulate, 8–11 × 1–2 mm, basally arachnoid lanate, apically glabrous, apex needlelike and reflexed; middle and inner phyllaries subulate to linear, 10–14 × 1–2 mm, densely arachnoid lanate and gland-dotted, appendage narrowly triangular to ovate, 0.5–1 mm wide, and membranous. Receptacle bristles filiform, 7–9 mm, hyaline. Corolla purple, 1.6–1.9 cm, gland-dotted, tube 0.9–1.2 cm, limb 6–7 mm, lobes 3.5–4.5 mm. Achene blackish brown, cylindrical to obconic, 3–3.5 mm. Pappus dirty white; outer bristles 1–4 mm; inner bristles 1–1.4 cm. Fl. and fr. Jul–Sep.

Grassy shores, salt marshes, wastelands, saline soils; 700–2000 m. NW Xinjiang [Kazakhstan, Mongolia, Russia (Siberia)].

61. *Saussurea prostrata* C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 9: 518. 1886.

展序风毛菊 zhan xu feng mao ju

Herbs 10–60 cm tall, biennial or perennial. Stems solitary or several, procumbent, ascending, or erect, simple or branched in upper half, distinctly winged. Stem leaves narrowly elliptic to linear, 1.5–2.5 × 0.3–0.7 cm, both surfaces green, scabrid, and pilose, base long decurrent, margin pinnately lobed or dentate, apex acute. Capitula 1–8, solitary or clustered in a corymbiform synflorescence, sessile or shortly pedunculate. Involucre campanulate, (0.5–)1–1.5 cm in diam. Phyllaries in 4 or 5 rows, greenish with dark midvein, villous to glabrescent; outer phyllaries narrowly elliptic, 2–4 × 1–2 mm, erect or slightly recurved, apex acuminate; middle phyllaries narrowly elliptic, 4–8 × 1–2 mm, appendage dark, widened, and cuspidate; inner phyllaries linear, 8–11 × 1–1.5 mm, appendage purple, sub-orbicular, widened, membranous, and denticulate. Receptacle bristles 7–8 mm. Corolla purple, 1.7–1.8(–2) cm, tube ca. 1 cm, lobes ca. 5 mm. Achene dark brown, cylindrical, ca. 3.5 mm, ribbed, glabrous. Pappus white; outer bristles to 5 mm; inner bristles ca. 1.2 cm. Fl. and fr. Jul–Aug.

Salt meadows, saline and alkaline sandy soils; 500–2500 m. Xinjiang [Kazakhstan, Kyrgyzstan].

62. *Saussurea runcinata* Candolle, Ann. Mus. Natl. Hist. Nat. 16: 202. 1810.

倒羽叶风毛菊 dao yu ye feng mao ju

Herbs (5–)15–60 cm tall, perennial. Stems solitary or few, erect, apically branched, covered with fibrous lacerate remains of petioles at base, wingless or narrowly winged; wings entire or dentate. Basal and lower stem leaves petiolate; petiole 1–5 cm; leaf blade narrowly obovate, narrowly ovate-elliptic, or linear, 4–20 × 0.5–7 cm, lyrate, pinnately parted, pinnatisect, or undivided, both surfaces green and glabrous. Middle and upper stem leaves sessile, narrowly elliptic to linear, undivided, margin entire or basally dentate. Capitula few to numerous, in a corymbiform or paniculiform synflorescence, shortly pedunculate. Involucre tubular to campanulate, 4–10 mm in diam. Phyllaries in 4–6 rows, glabrous or sparsely pubescent; outer phyllaries ovate to narrowly ovate, ca. 3.5 × 1.5 mm, appendage widened, herbaceous, and with a cartilaginous mucro; middle and inner phyllaries narrowly elliptic to linear, 7–10 × 1–1.8 mm, appendage red, widened, membranous, and denticulate. Corolla purplish red, 1–1.5 cm, gland-dotted, tube 7–8 mm,

limb 6–8 mm, lobes 3–4 mm. Achene blackish brown, cylindrical, 2–3 mm. Pappus pale yellowish brown; outer bristles 2–3 mm; inner bristles 7–9 mm. Fl. and fr. Jul–Sep.

River and lake shores, rock fissures near moist places, saline lowlands, saline and alkaline soils, salt and alkaline marshes; 700–1300 m. Hebei, Heilongjiang, Jilin, Nei Mongol, Ningxia, Shaanxi, Shanxi [Mongolia, Russia (Siberia)].

- 1a. Basal and lower stem leaves lyrate to pinnatisect; involucre campanulate to tubular-campanulate, 5–10 mm in diam. 62a. var. *runcinata*
 1b. Basal and lower stem leaves undivided; involucre narrowly tubular, 4–5 mm in diam. 62b. var. *integrifolia*

62a. *Saussurea runcinata* var. *runcinata*

倒羽叶风毛菊(原变种) dao yu ye feng mao ju (yuan bian zhong)

Saussurea alata Candolle var. *runcinata* (Candolle) Herder; *S. crepidifolia* Turczaninow.

Basal and lower stem leaves lyrate, pinnately parted, or pinnatisect; lateral lobes 1–7 pairs, narrowly triangular, elliptic, falcate, or linear, recurved to patent, margin usually entire or sometimes dentate, apex acute to obtuse and with a cartilaginous mucro; terminal lobe narrowly ovate, narrowly triangular, or linear, margin entire or dentate, apex acute to obtuse. Involucre campanulate to tubular-campanulate, 5–10 mm in diam.

River and lake shores, rock fissures near moist places, saline lowlands, saline and alkaline soils; 700–1300 m. Hebei, Heilongjiang, Jilin, Nei Mongol, Ningxia, Shaanxi, Shanxi [Mongolia, Russia (Siberia)].

62b. *Saussurea runcinata* var. *integrifolia* H. C. Fu & D. S. Wen in Ma, Fl. Intramongol. 6: 329. 1982.

全叶石碱地风毛菊 quan ye shi xian di feng mao ju

All leaves undivided, margin entire. Involucre narrowly tubular, 4–5 mm in diam.

- Salt and alkaline marshes. Nei Mongol.

63. *Saussurea laciniata* Ledebour, Icon. Pl. 1: 16. 1829.

裂叶风毛菊 lie ye feng mao ju

Saussurea alata Candolle var. *laciniata* (Ledebour) Herder; *S. laciniata* var. *pygmaea* Lipschitz.

Herbs 15–50 cm tall, perennial. Stems solitary or few, erect, simple or branched from base, narrowly winged; wings dentate. Basal and lower stem leaves petiolate; leaf blade narrowly elliptic, 3–12 × 1.5–2.5 cm, bipinnately parted, both surfaces green, sparsely pubescent, and gland-dotted; primary lobes 5–10 pairs; secondary lobes obliquely triangular, narrowly triangular-ovate, or toothlike, margin dentate; teeth and apex cartilaginous mucronate. Middle and upper stem leaves sessile, narrowly elliptic to linear, pinnately divided, pinnately lobed, or undivided. Capitula numerous, in a corymbiform synflorescence, subsessile to shortly pedunculate. Involucre campanulate, 0.8–1.5 cm in diam. Phyllaries in 4 or 5 rows; outer

phyllaries narrowly ovate, 4–5 × 1.5–2 mm, appendage green, herbaceous, ± reflexed, and mucronate; middle phyllaries narrowly ovate-elliptic, 6–8 × 1.5–2 mm, appendage green, herbaceous, widened, margin dentate, and apex mucronate; inner phyllaries narrowly elliptic to linear, 9–11 × 1.5–2 mm, appendage purplish, membranous, villous and gland-dotted, and margin erose-denticulate. Corolla reddish purple, 1–1.4 cm, tube 6–7 mm, limb 4–6 mm, lobes 3–4 mm. Achene dark brown, cylindrical to obconic, (2–)3–4 mm. Pappus yellowish white; outer bristles 1–5 mm, scabrid to plumose; inner bristles 9–10 mm. Fl. and fr. Jul–Aug. $2n = 28$.

Desert steppes, saline and alkaline soils; 1300–2200 m. Gansu, Nei Mongol, Ningxia, Shaanxi, Xinjiang [Kazakhstan, Mongolia, Russia (Siberia)].

64. *Saussurea grubovii* Lipschitz, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 21: 366. 1961.

蒙新风毛菊 meng xin feng mao ju

Saussurea paradoxa Lipschitz.

Herbs 30–80 cm tall, perennial. Stems solitary or few, erect, simple or branched in upper part, narrowly winged. Basal and lower stem leaves petiolate; leaf blade ovate, elliptic, obovate, or oblong, 5–20 × 2.5–5 cm, thick, fleshy, lyrate, pinnately lobed, or undivided, both surfaces green, scabrous, and appressed pubescent, base cuneate, margin sinuate-dentate or entire, apex acute. Middle and upper stem leaves shortly petiolate or sessile, narrowly ovate, obovate, elliptic, or linear, 2.5–5 × 0.5–2 cm, margin entire. Capitula clustered 2–6 at end of stem and branches, in a corymbiform synflorescence, shortly pedunculate. Involucre campanulate, 5–10 mm in diam. Phyllaries in 5 or 6 rows; outer phyllaries narrowly ovate, 2–4 × 1–2 mm, apex acuminate with a cartilaginous mucro; middle and inner phyllaries narrowly elliptic to linear, 3–8 × 1–2 mm, appendage pink, widened, and membranous. Receptacle densely bristly. Corolla pink, 1.2–2 cm, tube 6–12 mm, limb 6–8 mm, lobes ca. 5 mm. Achene light brown, cylindrical, ca. 3.5 mm, ribbed. Pappus white; outer bristles 0.5–3 mm; inner bristles [0.8–]1.2–1.4 cm. Fl. and fr. Jul–Sep.

Salt meadows, alkaline soils; 400–1900 m. N Xinjiang [Kazakhstan, Mongolia].

No specimens of *Saussurea grubovii* from China were seen by the present authors. The description here is based on images of the type specimens and on the treatments by Lipschitz (Fl. URSS 27: 506. 1962) and G. M. Shen (Fl. Xinjiang. 5: 272. 1999).

65. *Saussurea alata* Candolle, Ann. Mus. Natl. Hist. Nat. 16: 202. 1810.

具翅风毛菊 ju chi feng mao ju

Saussurea runcinata Candolle var. *dentata* Ledebour.

Herbs, perennial, 20–70 cm tall. Stem solitary, erect, apically branched, winged; wings entire or dentate. Basal leaves petiolate; leaf blade narrowly elliptic, 10–20 × 1–6 cm, lyrate, pinnately lobed, pinnatisect, or rarely undivided, both surfaces green, strigose, and gland-dotted; lateral lobes triangular to narrowly ovate-elliptic, margin sinuate-dentate or entire, apex with cartilaginous mucro. Lower and middle stem leaves petiolate or

sessile, gradually smaller upward on stem. Upper stem leaves sessile, narrowly elliptic to linear, margin entire. Capitula numerous, in a corymbiform or paniculiform synflorescence, sessile or pedunculate. Involucre cylindrical to ovoid, 8–10 mm in diam. Phyllaries in ca. 5 rows; outer phyllaries narrowly ovate-elliptic, ca. 4 × 1.5 mm, apex acute to obtuse; middle phyllaries narrowly elliptic, 5–6 × ca. 2 mm, apex obtuse to rounded; inner phyllaries narrowly elliptic to linear, ca. 8 × 2 mm, appendage purple, widened, membranous, and denticulate. Receptacle bristles 4–5 mm. Corolla purplish red, 1.1–1.6 cm, tube ca. 6 mm, limb ca. 8 mm, lobes ca. 3 mm. Achene dark brown, obconic to cylindrical, 3–4 mm. Pappus straw-colored; outer bristles 2–5 mm; inner bristles 8–10 mm. Fl. and fr. Jul–Sep.

Salt marshes, fallow and cultivated fields, sandy soils; 500–1200 m. Nei Mongol, Xinjiang [Mongolia, Russia (Siberia)].

66. *Saussurea malitiosa* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 493. 1882.

尖头风毛菊 jian tou feng mao ju

Herbs 10–40 cm tall, biennial or perennial. Stem solitary, 3–10 mm in diam., erect, simple or branched, usually wingless. Basal leaves petiolate; leaf blade narrowly obovate, oblong, or narrowly elliptic, 2–12 × 0.5–2.5 cm, pinnately lobed or pinnatisect, both surfaces green, strigose, gland-dotted, and scabrous; lateral lobes linear, narrowly ovate-elliptic, or narrowly triangular, recurved, margin entire or dentate, apex acute to acuminate and with cartilaginous mucro. Middle and upper stem leaves sessile, base semiamplexicaul. Capitula usually 3–15, clustered in a terminal corymbiform synflorescence or sometimes solitary on lower branch ends, sessile or pedunculate. Involucre campanulate, 1–2 cm in diam. Phyllaries in 5–7 rows, densely villous, apex long acuminate to spiniform and with a cartilaginous tip; outer phyllaries ovate to narrowly ovate-elliptic, 8–12 × 3–4 mm, apical part usually reflexed; middle phyllaries narrowly ovate-elliptic, 10–20 × 2–3 mm, apical part reflexed to patent; inner phyllaries linear, 2–2.5 × 0.1–0.2 cm, appressed. Receptacle bristles 0.8–1.4 cm. Corolla pink, 2–2.5 cm, gland-dotted, tube 1–1.2 cm, limb 1.3–1.4 cm, lobes 5–6 mm. Achene obconic, ca. 2 mm, wrinkled, gland-dotted. Pappus white; outer bristles 1–2 mm; inner bristles 1.8–2 cm. Fl. and fr. Jun–Sep.

• Sandy and gravelly mountain slopes; 3000–4300 m. W Gansu, Qinghai.

67. *Saussurea jurineoides* H. C. Fu in Ma, Fl. Intramongol., ed. 2, 4: 847. 1993.

阿右风毛菊 a you feng mao ju

Herbs 10–20 cm tall, perennial. Caudex stout, densely covered with dark brown remains of petioles. Stems solitary or few, erect, simple. Lower stem leaves petiolate; petiole 2–3 cm; leaf blade elliptic to narrowly ovate-elliptic, 5–8 × 1.5–2 cm, pinnately lobed or pinnatisect, both surfaces green, pilose, and gland-dotted; lateral lobes 4–8, narrowly ovate to linear, margin entire or sparsely dentate, apex acuminate and mucronate; terminal lobe linear to narrowly ovate-elliptic, margin entire, apex acuminate. Middle and upper stem leaves narrowly ovate-elliptic to linear, gradually smaller upward on stem, pinnately lobed

or margin dentate. Capitulum solitary. Involucre broadly campanulate, 1.5–2 cm in diam. Phyllaries in ca. 5 rows, yellowish green, densely villous and gland-dotted, apex spiniform, reflexed, and with a cartilaginous tip; outer phyllaries ovate to narrowly ovate; middle phyllaries narrowly ovate; inner phyllaries narrowly ovate to linear. Receptacle bristly. Corolla purple, ca. 1.8 cm, tube ca. 1 cm, limb ca. 8 mm, lobes ca. 3 mm. Achene brown, cylindrical, 3–4 mm, sparsely puberulent and glandular. Pappus white; inner bristles ca. 1.7 cm. Fl. and fr. Jul–Aug.

- Stony mountain slopes; 2400–2500 m. Nei Mongol (Alxa Meng).

No specimens of *Saussurea jurineoides* were seen by the present authors, and the description here is based on the original publication. It is very close to *Saussurea malitiosa*, differing from that species only in the stout caudex and the solitary capitulum with somewhat smaller florets.

68. *Saussurea pseudomalitiosa* Lipschitz, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 59(6): 76. 1954.

类尖头风毛菊 lei jian tou feng mao ju

Herbs (7–)25–50 cm tall, biennial. Stems solitary or few, 3–7 mm in diam., erect, simple or branched from base, narrowly winged; wings dentate. Basal and lower stem leaves petiolate; leaf blade narrowly ovate-elliptic to linear, 6–11 × 1–4 cm, runcinate-pinnately lobed or pinnatisect, both surfaces green and sparsely pubescent; lateral lobes triangular to linear, margin entire or dentate, teeth and apex with cartilaginous mucro. Middle and upper stem leaves sessile, base ± decurrent. Capitula very numerous, 3–6 ± clustered at end of branches in a corymbiform or paniculiform synflorescence, subsessile to pedunculate. Involucre campanulate, 0.8–1.5 cm in diam. Phyllaries in 4 or 5 rows, villous and gland-dotted, apically dark purple, apex long acuminate; outer phyllaries narrowly ovate-elliptic, 8–10 × ca. 1 mm, apex acuminate and sometimes recurved; middle phyllaries narrowly elliptic, 10–11 × 1–2 mm, apex acuminate; inner phyllaries linear, 10–12 × 1–2 mm, apical appendage dark purple and somewhat widened. Receptacle bristles 1–2 mm. Corolla purplish red, 1.1–1.5 cm, gland-dotted, tube 5–7 mm, limb 6–7 mm, lobes 3–4 mm. Achene obconic, ca. 3 mm, wrinkled, gland-dotted. Pappus straw-colored; outer bristles 1–2 mm; inner bristles 1–1.1 cm. Fl. and fr. Aug.

- *Juniperus* and *Picea* forests, open mountain slopes; 3300–4200 m. Qinghai.

69. *Saussurea pinnatidentata* Lipschitz, Bot. Zhurn. (Moscow & Leningrad) 57: 524. 1972.

羽裂风毛菊 yu lie feng mao ju

Saussurea runcinata Candolle var. *pinnatidentata* (Lipschitz) A. C. Fu & D. C. Wen.

Herbs 20–25(–80) cm tall, biennial. Stem solitary, erect, branched apically or from base, narrowly winged; wings dentate. Basal and lower stem leaves petiolate; leaf blade narrowly ovate-elliptic to narrowly obovate, 5–11 × 0.5–2 cm, pinnately divided, pinnately lobed, or dentate, scabrous, strigose, or glabrous; lateral lobes 1–6 pairs, linear-oblong, margin entire, apex

acuminate and with a cartilaginous mucro; terminal lobe narrowly triangular, apex acute to acuminate. Upper stem leaves sessile, narrowly ovate-elliptic to linear, undivided, margin entire or basally few dentate. Capitula numerous, solitary or few at end of branches in a corymbiform or paniculiform synflorescence, long pedunculate. Involucre campanulate, (5–)8–10 mm in diam. Phyllaries in 4 or 5 rows, sparsely arachnoid, glabrescent; outer phyllaries ovate, ca. 4 × 2 mm, apical appendage herbaceous with a callose-serrulate margin; middle and inner phyllaries narrowly elliptic to linear, 7–10 × 0.8–2 mm, apical appendage purplish red, membranous, and with denticulate margin. Corolla purple, ca. 1.1 cm. Achene only seen as immature. Pappus pale brown; outer bristles short; inner bristles ca. 1 cm. Fl. and fr. Aug–Oct.

- Grasslands on mountain slopes, fields, saline and alkaline soils; 2200–3200 m. Gansu, Nei Mongol, Qinghai.

70. *Saussurea nematolepis* Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 6: 67. 1949.

钻状风毛菊 zuan zhuang feng mao ju

Herbs 30–90 cm tall, perennial. Stem erect, apically branched, winged; wings ± dentate. Lower stem leaves unknown. Upper stem leaves sessile, oblong, narrowly elliptic, or linear-oblong, 3–13 × 0.7–2 cm, pinnately lobed or undivided, abaxially pale green to grayish green and sparsely arachnoid, adaxially dark green and sparsely pubescent; lateral lobes 1 or 2 pairs, broadly triangular, base decurrent or auriculate-semiamplexicaul, margin entire or sinuate. Capitula numerous, in a lax paniculiform synflorescence, pedunculate. Involucre campanulate to globose, (0.7–)1–1.5 cm in diam. Phyllaries in 5–7 rows, arachnoid; outer phyllaries narrowly triangular-ovate, 4–5 × ca. 1 mm, apically dark purple, apex subulate and reflexed; middle phyllaries narrowly ovate-elliptic, 5–10 × 1–2 mm, apex acuminate to shortly subulate and erect or reflexed; inner phyllaries linear, 10–13 × ca. 1 mm, appendage herbaceous and villous. Receptacle bristles ca. 5 mm. Corolla pale purple or white, 0.8–1.2 cm, tube 5–6 mm, limb 5–6 mm. Achene brown, obconic, ca. 3.5 mm, angulate, wrinkled. Pappus dirty white; outer bristles ca. 4 mm; inner bristles ca. 8 mm. Fl. and fr. Aug–Oct.

- By trails on mountain slopes; 1500–3800 m. Gansu, Qinghai, NW Sichuan.

71. *Saussurea ladyginii* Lipschitz, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 59(6): 77. 1954.

拉氏风毛菊 la shi feng mao ju

Herbs 30–40 cm tall, biennial. Stems solitary or several, erect, usually branched, narrowly winged; wings dentate. Basal and lower stem leaves petiolate; leaf blade narrowly elliptic, 10–15 × 2–3.5 cm, runcinate-pinnately lobed or pinnatisect, both surfaces green, scabrid, sparsely strigose, and gland-dotted, midvein prominent and straw-colored; lateral segments 6–10 pairs, margin entire or few dentate, apex acute. Middle and upper stem leaves sessile, gradually smaller upward on stem, base decurrent. Capitula numerous, clustered at end of branches in a corymbiform synflorescence, shortly pedunculate. Involucre campanulate, 1–1.2 cm in diam. Phyllaries in 4 or 5 rows; outer phyllaries ovate, 3–5 × 1–1.5 mm, apex subulate;

middle and inner phyllaries narrowly ovate to narrowly elliptic, 6–9 × 1.8–2 mm, appendage greenish, herbaceous, gland-dotted, and densely villous. Receptacle bristles ca. 4 mm. Corolla purplish red, 9–10 mm, gland-dotted, tube 3–4 mm, limb ca. 6 mm. Achene dark brown, obconic, 3.5–4 mm. Pappus pale brown; outer bristles 2–3 mm; inner bristles 7–8 mm. Fl. and fr. Aug.

- About 3500 m. Qinghai.

Saussurea ladyginii is only known from the type. It is morphologically very close to *S. pseudomalitiosa* but differs from that species in the shape and color of the phyllaries.

72. *Saussurea chinampoensis* H. Léveillé & Vaniot, Bull. Acad. Int. Géogr. Bot. 20: 145. 1909.

京风毛菊 jing feng mao ju

Saussurea chinampoensis var. *gracilis* H. C. Fu & D. S. Wen; *S. peipingensis* F. H. Chen.

Herbs 10–60(–100) cm tall, biennial. Stem solitary, erect, branched from base. Basal leaves shortly petiolate; leaf blade

linear, narrowly ovate, narrowly elliptic, or narrowly obovate, 4–13 × 0.4–1 cm, thick, scabrous, gland-dotted, base attenuate-cuneate, margin revolute, subentire, mucronulate, apex acute to obtuse. Lower and middle stem leaves sessile, gradually smaller upward on stem, base semiamplexicaul. Capitula solitary or few on ends of branches in a corymbiform or paniculiform synflorescence, pedunculate. Involucre broadly campanulate to hemispheric, 1–2 cm in diam. Phyllaries in 4–6 rows, narrowly ovate-elliptic to linear, green, gland-dotted; outer phyllaries 4–8 × 1.5–2 mm, apex cartilaginous mucronate; middle phyllaries 8–10 × 1.5–2 mm, appendage green, herbaceous, margin and apically cartilaginous mucronate; inner phyllaries 10–13 × 1–1.5 mm, appendage green to purple, herbaceous, brownish tomentose, acuminate, and recurved. Receptacle bristles white, filiform, 6–9 mm. Corolla pale purple, 1.2–1.6 cm, gland-dotted, tube 8–11 mm, limb 5–6 mm, lobes 4–4.5 mm. Achene cylindrical, ca. 3 mm, ribbed. Pappus pale yellowish brown; outer bristles 3–5 mm; inner bristles 7–10 mm. Fl. and fr. Jul–Oct.

Salt marshes, moist meadows; near sea level to 1200 m. Hebei, Liaoning, Nei Mongol, N Shaanxi [Korea].

4. *Saussurea* subg. *Saussurea*

风毛菊亚属 feng mao ju ya shu

Perennial herbs or rarely subshrubs, cauliferous or stemless. Leaves undivided or pinnately divided. Uppermost stem leaves herbaceous, green, not densely lanate. Capitula usually in a corymbiform or paniculiform synflorescence or sometimes solitary. Phyllaries usually without an appendage but sometimes with a green herbaceous appendage, apex obtuse, acute, acuminate, or caudate and usually appressed or sometimes reflexed. Receptacle usually densely bristly, rarely paleate, papillose, or naked. Corolla usually glabrous, rarely gland-dotted. Anther tails ± lacerate, lanate, or entire. Achene cylindrical, oblong, or fusiform, obtusely 4- or 5-angled, smooth or wrinkled, usually glabrous, rarely gland-dotted or sericeous, usually without a conspicuous apical crown. Pappus dirty white, straw-colored, or yellowish brown, usually in 2 rows; outer bristles scabrid or rarely plumose, rarely lacking.

About 333 species: Asia, C, E, and N Europe, W North America; 217 species (152 endemic) in China.

- 1a. Subshrubs, repeatedly virgately branched from base 1. *S.* sect. *Jurineiformes*
- 1b. Perennial herbs or rarely subshrubs, never virgately branched.
 - 2a. Phyllaries straw-colored, with a black or brown membranous margin; receptacle with paleae as long as or longer than inner phyllaries; pappus bristles in 1 row 2. *S.* sect. *Jacea*
 - 2b. Phyllaries straw-colored, greenish, yellow, brown, purple, or black, without a black or brown membranous margin; receptacle with bristles shorter than inner phyllaries or naked; pappus bristles usually in 2 rows.
 - 3a. Plants stemless or substemless and sometimes forming dense cushions; leaves undivided, usually less than 2 cm wide, if wider then margin dentate or serrate; capitula usually solitary, rarely few or numerous 3. *S.* sect. *Gymnocline*
 - 3b. Plants usually with well-developed stem, if stemless then leaves either pinnately lobed to pinnately divided or leaf blade more than 2 cm wide and with an entire margin; capitula in a corymbiform, paniculiform, or racemiform synflorescence or solitary.
 - 4a. Roots and caudex fibrously split; capitula usually numerous, in a corymbiform or paniculiform synflorescence; involucre cylindrical, tubular, or narrowly campanulate, usually less than 1 cm in diam. 4. *S.* sect. *Laguranthera*
 - 4b. Roots and caudex not fibrously split; capitula solitary to numerous; involucre usually campanulate, more than 1 cm in diam.
 - 5a. Anther tails cottony or lanate, rarely lacerate; capitula mostly solitary and usually more than 1.5 cm in diam.
 - 5b. Anther tails ciliate or lacerate, not cottony or lanate; capitula usually numerous and less than 1.5 cm in diam.
 - 6a. Leaf blade undivided, narrowly linear and grasslike, or narrowly oblong, narrowly ovate-elliptic to narrowly obovate-elliptic 5. *S.* sect. *Lagurostemon*
 - 6b. Leaf blade usually pinnately lobed to pinnately divided, if rarely undivided then not narrowly linear and grasslike but elliptic, obovate, or oblong 6. *S.* sect. *Strictae*

- 7a. Plants scapiform or subscapiform; basal leaves rosulate; stem leaves much reduced 7. *S.* sect. *Rosulascentes*
 7b. Plants not scapiform; basal leaves not rosulate (often withered at anthesis); stem leaves usually well developed 8. *S.* sect. *Saussurea*

1. *Saussurea* sect. *Jurineiformes* (Lipschitz) Lipschitz in Schischkin & Bobrov, Fl. URSS 27: 512. 1962.

木质风毛菊组 mu zhi feng mao ju zu

Saussurea ser. *Jurineiformes* Lipschitz, Bot. Zhurn. (Moscow & Leningrad) 43: 452. 1958.

Subshrubs, virgate, much branched. Leaves few, narrowly elliptic to linear, small. Capitula numerous, in an ample paniculiform synflorescence. Phyllaries sometimes pilose, apex acuminate, cartilaginous, and stiff. Receptacle with dense subulate long bristles. Achene with a short crown, glandular. Pappus in 2 rows, white; outer bristles barbellate or plumose, sometimes lacking.

Three species: Afghanistan, China, N Pakistan, Tajikistan, Uzbekistan; one species in China.

73. *Saussurea chondrilloides* C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 11: 169. 1889.

木质风毛菊 mu zhi feng mao ju

Jurinea chondrilloides (C. Winkler) O. Fedtschenko; *Saussurea aphylla* K. H. Rechinger; *S. rupestris* Hemsley & Lace.

Subshrubs 60–80 cm tall. Stem green, erect, strongly and repeatedly branched. Leaves elliptic to linear, 1–7.5 × 0.2–0.5(–1) cm, both surfaces green or glaucous, sparsely pubescent, and gland-dotted, margin entire or with few teeth, apex acute. Uppermost stem leaves linear, ca. 10 × 2–3 mm. Capitula numerous, solitary on branch ends in a lax paniculiform synflorescence. Involucre campanulate to obconic, (3–)6–10 mm in diam. Phyllaries in 5–7 rows, arachnoid tomentose and gland-

dotted, apex acuminate; outer phyllaries triangular-ovate, 2–3 × 1–1.5 mm; middle phyllaries narrowly elliptic, 3–10 × 1.5–2 mm; inner phyllaries linear, 10–12 × 1–1.5 mm. Receptacle bristles silvery, subulate, 6–8 mm. Corolla pale reddish purple, 1.1–1.6 cm, glandular, tube 5–8 mm, limb 6–8 mm, lobes 2.5–3 mm. Achene brown, cylindric, 2.5–6 mm, gland-dotted, ribbed, apex with a dentate and lacerate crown. Pappus white or dirty white; outer bristles 1–4[–6] mm, barbellate to plumose, sometimes lacking; inner bristles ca. 1 cm. Fl. and fr. Jul–Sep.

Stony slopes; 1800–2800 m. W Xinjiang [Afghanistan, N Pakistan, Tajikistan, Uzbekistan].

No specimens of *Saussurea chondrilloides* from China were seen by the present authors. The description here is based on the treatment by G. M. Shen (Fl. Xinjiang. 5: 275. 1999), on material from Afghanistan, and on an image of the type specimen in LE.

2. *Saussurea* sect. *Jacea* Lipschitz, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 16: 441. 1954.

栗缘风毛菊组 li yuan feng mao ju zu

Herbs, perennial. Stem solitary, branched, densely leafy. Capitula numerous or few, solitary at stem and branch ends, supported by uppermost stem leaves. Phyllaries straw-colored, leathery, with brown or black membranous margin. Receptacle paleate; paleae 1–2 cm, approximately as long as inner phyllaries. Anther tails short, undivided. Achene ribbed, glabrous. Pappus bristles in 1 row, plumose, persistent.

Three species: Afghanistan, Bhutan, China, NE and NW India, Kashmir, N Myanmar, Nepal, N Pakistan, Tajikistan; one species in China.

The species of *Saussurea* sect. *Jacea*, including its only Chinese representative, almost certainly do not belong in *Saussurea*. In a cladogram from a recent molecular analysis (Y. J. Wang et al., Biol. J. Linn. Soc. 97: 893–903. 2009), *S. fastuosa* (= *S. forrestii*) was positioned far from the *Saussurea* clade. The affinities of *S. fastuosa* could not be further elucidated, however, and it is treated here under *Saussurea*.

74. *Saussurea fastuosa* (Decaisne) Schultz Bipontinus, Linnaea 19: 331. 1846.

奇形风毛菊 qi xing feng mao ju

Aplotaxis fastuosa Decaisne in Jacquemont, Voy. Inde 4(Bot.): 97. 1843; *A. denticulata* Candolle; *A. denticulata* var. *glabrata* Candolle; *A. denticulata* var. *hypoleuca* Candolle; *Saussurea denticulata* (Candolle) Wallich ex C. B. Clarke (1876), not Ledebour (1829); *S. forrestii* Diels; *S. glabrata* (Candolle) C. Shih; *S. wallichii* Schultz Bipontinus.

Herbs 0.6–1.5 m tall, perennial. Stem solitary, erect, simple or apically branched. Basal and lower stem leaves withered at anthesis. Middle stem leaves petiolate; petiole ca. 5 mm; leaf

blade narrowly ovate-elliptic, 6–15 × 2–4.5 cm, abaxially grayish white and densely tomentose or sometimes glabrescent, adaxially green and glabrous, base rounded to broadly cuneate, margin serrulate, apex acute to acuminate. Upper stem leaves gradually smaller upward on stem. Capitula solitary at end of stem or branches, in a lax corymbiform synflorescence, large, on a ± widened peduncle. Involucre campanulate, 1.5–2.5 cm in diam. Phyllaries in 4 or 5 rows, straw-colored, margin membranous, dark brown, and erose-lacerate, apex rounded; outer phyllaries ovate, 4–8 × 4–5 mm; middle phyllaries elliptic to narrowly elliptic, 7–13 × 2–4 mm; inner phyllaries narrowly elliptic to linear, 13–15 × 1.5–2 mm. Receptacle with paleae but without alveolate bristles; paleae 1.2–1.7 cm. Corolla purple, 1.3–1.4 cm, glabrous, tube 6–8 mm, limb 5–7 mm, lobes 2.5–3

mm. Achene pale brown, obconic, 4–5 mm, ribbed, glabrous. Pappus bristles straw-colored, 7–12 mm. Fl. and fr. Aug–Oct.

Forests, forest or thicket margins, grasslands, moist meadows; 2400–4000 m. SW Sichuan, S Xizang, NW Yunnan [Bhutan, NE and NW India, N Myanmar, Nepal].

This taxon is very variable with respect to the indumentum of the abaxial leaf surface, which ranges from grayish white and densely tomentose to green and glabrous, and to the shape of the peduncles, which

are ± inflated below the capitulum. *Saussurea forrestii*, which has less dense indumentum and barely inflated peduncles, was described from material from Yunnan and accepted by S. W. Liu (Fl. Yunnan. 13: 550. 2004); and *S. glabrata* with glabrous leaves was recognized by C. Shih (FRPS 78(2): 84. 1999). However, as no discontinuous characters could be found that would justify separation of these taxa at species level, a broad species concept is adopted here. While the rank of variety might be appropriate, we refrain from validating a name at this rank, as long as the generic affiliation of this species is not yet clear.

3. *Saussurea* sect. *Gymnocline* Franchet, J. Bot. (Morot) 2: 311. 1888.

无茎风毛菊组 wu jing feng mao ju zu

Herbs, stemless or substemless but sometimes with branched woody caudex and densely caespitose or forming dense cushions. Leaf blade margin entire, serrate, dentate, or sinuate. Capitula usually solitary in center of leaf rosette, large or medium-sized, sometimes several in a clustered synflorescence, sessile or shortly pedunculate. Receptacle with subulate, sometimes very short bristles or naked. Corolla glabrous or sometimes gland-dotted. Anther tails lacerate or lanate. Achene glabrous or glandular, without an apical crown but sometimes with a crenulate rim. Pappus usually in 2 rows; outer bristles scabrid or plumose, rarely very few or lacking.

Twenty species: Bhutan, China, NE and NW India, Japan, Kashmir, Nepal, Tajikistan; 17 species (13 endemic) in China.

Saussurea sect. *Acaules* C. B. Clarke (Compos. Ind. 220. 1876) was lectotypified by Kitamura (Acta Phytotax. Geobot. 24: 22. 1969) with *S. stoliczkae* (= *S. andryaloides*), a species now included in *S. sect. Strictae*. Lipschitz (Rod *Saussurea*, 106. 1979) explicitly excluded this lectotype from his *S. sect. Acaules* and thereby created an illegitimate later homonym (*Vienna Code*, Art. 48.1). The lectotype of *S. sect. Depressae* C. B. Clarke (loc. cit.: 221; chosen by Lipschitz, loc. cit.: 96–97) is *S. andersonii*, now also included in *S. sect. Strictae*. *Saussurea* sect. *Depressae* has often been regarded as highly artificial (Lipschitz, loc. cit.: 97). Moreover, its key character is not even very useful for grouping of species. Naked receptacles can be observed in most other sections as well and may only be used for keying out certain groups within a section. For this reason, *S. sect. Depressae* is merged here with *S. sect. Acaules*. The correct name for this section is *S. sect. Gymnocline*, typified by *S. ciliaris*.

- 1a. Receptacle naked, without bristles; outer phyllaries apically green and reflexed; leaf margin entire; capitulum solitary.
- 2a. Leaf blade narrowly linear, 1–2 mm wide 77. *S. poochlamys*
- 2b. Leaf blade narrowly obovate-elliptic to linear, 3–15 mm wide.
- 3a. Leaf blade adaxially green when dry, glabrous, rigid, and leathery; inner phyllaries acute at apex 78. *S. ciliaris*
- 3b. Leaf blade adaxially black when dry, puberulent or glabrous, soft, and herbaceous; inner phyllaries obtuse at apex 79. *S. coriolepis*
- 1b. Receptacle with sometimes very shortly subulate bristles; outer phyllaries apically not green or reflexed; leaf margin entire, dentate, or pinnately lobed; capitula solitary or several.
- 4a. Leaves long petiolate; petiole 1.5–10 cm; leaf blade elliptic, ovate, or obovate, large (more than 1.5 cm wide), margin coarsely dentate or serrate.
- 5a. Outer pappus bristles reflexed and appressed on achene; capitulum 1 (or 2–4); leaf base cuneate, margin sharply dentate or serrulate 75. *S. katochaete*
- 5b. Outer pappus bristles neither reflexed nor appressed on achene; capitula 4–18 in a corymbiform synflorescence; leaf base cordate, margin shallowly sinuate-dentate 76. *S. bella*
- 4b. Leaves shortly petiolate or sessile; petiole 0.1–2 cm; leaf blade spatulate, narrowly ovate, narrowly elliptic, or linear, small (less than 1.5 cm wide), margin entire, denticulate, sinuate-dentate, or pinnately lobed.
- 6a. Outer pappus bristles plumose but sometimes very few or lacking; leaf blade spatulate, adaxially villous or tomentose.
- 7a. Leaf blade adaxially green, sparsely villous, abaxially glaucous but glabrescent 82. *S. montana*
- 7b. Leaf blade adaxially grayish green, sparsely tomentose, abaxially grayish white densely tomentose.
- 8a. Phyllaries sparsely white or yellowish villous, apex usually acuminate; leaf margin entire 80. *S. spatulifolia*
- 8b. Phyllaries dark brown or black villous, apex usually obtuse; leaf margin sinuate-dentate with short purple mucros 81. *S. melanotricha*
- 6b. Outer pappus bristles scabrid; leaf blade narrowly elliptic, linear, sometimes narrowly obovate, adaxially glabrous or sparsely pubescent.
- 9a. Plants forming dense cushions.
- 10a. Leaf blade pinnately lobed, apex rounded to subobtusely 90. *S. pulviniformis*
- 10b. Leaf blade undivided, apex acuminate or spinulose.

- 11a. Leaf blade 2–7 cm, abaxially white and tomentose; capitulum 2–3 cm in diam. 88. *S. columnaris*
 11b. Leaf blade 0.5–1.2 cm, abaxially green and glabrous; capitulum 0.5–0.7 cm in diam. 89. *S. subulata*
 9b. Plants not forming dense cushions but sometimes densely caespitose.
 12a. Leaf blade green on both surfaces, glabrous or with glandular hairs.
 13a. Leaf blade glabrous, margin subentire 86. *S. pumila*
 13b. Leaf blade densely glandular hairy, margin conspicuously sinuate-dentate 87. *S. apus*
 12b. Leaf blade abaxially white and densely tomentose, adaxially green or brown.
 14a. Leaf blade margin dentate, crenate, or pinnate; plants densely caespitose 91. *S. werneroides*
 14b. Leaf blade margin entire or denticulate; plants not caespitose.
 15a. Leaf blade ovate to elliptic, 1–3.5 × 0.5–1.5 cm; capitula 2–5 83. *S. ovatifolia*
 15b. Leaf blade narrowly obovate to linear, 2.5–7 × 0.2–0.6 cm; capitulum solitary.
 16a. Leaf blade spatulate to narrowly obovate, 3–6 mm wide, adaxially
 arachnoid and glandular 84. *S. cochlearifolia*
 16b. Leaf blade linear to narrowly ovate-elliptic, 2–5 mm wide,
 adaxially glabrous 85. *S. minuta*

75. *Saussurea katochaete* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 491. 1882.

重齿风毛菊 *chong chi feng mao ju*

Saussurea anochoete Handel-Mazzetti; *S. katochaete* var. *caulescens* Lipschitz; *S. katochaetoides* Handel-Mazzetti; *S. rohmooana* C. Marquand & Airy Shaw.

Herbs 3–10(–20) cm tall, perennial, stemless or shortly stemmed. Caudex stout, simple or few branched. Rosette leaves petiolate; petiole 1.5–6(–10) cm; leaf blade elliptic, obovate, or ovate, 2.5–11 × 1.5–4.5 cm, abaxially white or grayish white and densely tomentose, adaxially green and glabrous, base cuneate to rounded, margin sharply and narrowly serrate-dentate, apex acuminate, acute, or obtuse. Capitulum 1(or 2–4), in center of leaf rosette, sessile or pedunculate. Involucre broadly campanulate, 2.5–4 cm in diam. Phyllaries in 4 or 5 rows, brown to black, glabrous, apex acute to acuminate; outer phyllaries triangular-ovate, 9–15 × 4–6 mm; middle phyllaries ovate to narrowly ovate-elliptic, 12–15 × 4–6 mm; inner phyllaries narrowly elliptic to linear, 1.5–2 × 0.2–0.4 cm. Receptacle bristles yellowish, subulate, 1–3 mm. Corolla purple, 1.3–1.9 cm, tube 7–12 mm, limb 6–8 mm, lobes 4–5 mm. Achene dark brown, cylindrical, 4–6 mm, obtusely 4- or 5-ribbed. Pappus pale brown; outer bristles 3–3.5 mm, usually reflexed and appressed to achene, scabrid; inner bristles 1.3–1.5 cm, erect. Fl. and fr. Jul–Oct.

Alpine meadows and pastures, scree slopes, thicket and forest margins; 2200–4800 m. Gansu, Qinghai, W Sichuan, Xizang, NW Yunnan (Dêqên) [Bhutan, India (Sikkim)].

76. *Saussurea bella* Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 6: 87. 1949.

漂亮风毛菊 *piao liang feng mao ju*

Saussurea haoi Y. Ling ex Y. L. Chen, S. Yun Liang & K. Y. Pan.

Herbs 3–10 cm tall, perennial, stemless or shortly stemmed. Caudex long, stout, usually simple. Rosette leaves petiolate; petiole 2–7 cm; leaf blade ovate, elliptic, or suborbicular, 2–7 × 1–4.5 cm, abaxially white and densely arachnoid tomentose, adaxially green and arachnoid but glabrescent, base cordate, truncate, or cuneate, margin sinuate-dentate and some-

times proximally pinnately lobed, apex rounded or obtuse to acuminate. Capitula numerous, 4–18, in a clustered corymbiform synflorescence, pedunculate. Involucre campanulate, 1.2–3 cm in diam. Phyllaries in 4 or 5 rows, green and herbaceous in distal part, arachnoid; outer phyllaries narrowly ovate-elliptic to linear, 10–15 × 3–5 mm, apex with a reflexed spiniform mucro; inner phyllaries linear, 1.6–2 × ca. 0.2 cm, yellowish, apex herbaceous and acuminate. Receptacle bristles subulate, ca. 4 mm. Corolla purple, 1.7–2 cm, tube 0.9–1.1 cm, limb 9–10 mm, lobes 5–5.5 mm. Achene gray, 4–5 mm, 4-angled, glabrous. Pappus straw-colored; outer bristles ca. 2 mm, scabrid; inner bristles ca. 1.6 cm. Fl. and fr. Aug–Sep.

• Alpine pastures, meadows, and scree slopes; 3200–4500 m. Qinghai, E Xizang.

77. *Saussurea poochlamys* Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 15. 1925.

革叶风毛菊 *ge ye feng mao ju*

Herbs 2–5 cm tall, perennial, stemless or substemless. Caudex simple or few branched. Rosette leaves sessile, linear, 2–12 × 0.1–0.2(–0.4) cm, leathery, both surfaces green, shiny, and glabrous, margin entire and revolute, apex obtuse. Innermost leaves gradually merging into phyllaries. Capitulum solitary in center of leaf rosette, sessile or on a peduncle to 4 cm. Involucre narrowly campanulate, 0.6–1.5 cm in diam. Phyllaries in 4 or 5 rows; outer phyllaries with straw-colored, leathery proximal part and with a green, herbaceous distal part, glabrous, proximal part ovate, 8–10 × 3–5 mm, distal part linear, 1–4 × 0.1–0.2 cm, margin revolute, apex obtuse; middle phyllaries with gradually reduced herbaceous part, narrowly ovate-elliptic, 11–15 × 2–3 mm, glabrescent, apex acute to obtuse; inner phyllaries narrowly elliptic to linear, 15–17 × 1–2 mm, apically purplish, margin membranous, apex obtuse and mucronate or acuminate. Receptacle usually naked, rarely with 1–2 mm yellowish bristles. Corolla bluish purple, 1.6–2.2 cm, tube 0.8–1.5 cm, limb 5–7 mm, lobes 4.5–5 mm. Achene brown, cylindrical, 3.5–4 mm, 5-ribbed, glabrous, tuberculate. Pappus dirty white; outer bristles 4–5 mm, plumose; inner bristles 1.2–1.3 cm. Fl. and fr. Aug–Oct.

• Thickets, alpine meadows and pastures; 3200–4300 m. SW and W Sichuan (Kangding, Muli), NW Yunnan (Lijiang, Zhongdian).

78. *Saussurea ciliaris* Franchet, J. Bot. (Morot) 2: 337. 1888.

尖叶风毛菊 jian ye feng mao ju

Saussurea ciliaris var. *major* Y. Ling.

Herbs 2.5–6 cm tall, perennial, stemless or shortly stemmed. Caudex short, simple or few branched. Rosette leaves sessile, narrowly obovate-elliptic to linear, 1.5–13 × 0.3–1.2 cm, rigid and leathery, glabrous, abaxially pale green, adaxially green and shiny, base cuneate-attenuate, margin entire, revolute, and ciliate, apex acute. Uppermost leaves gradually merging into phyllaries. Capitulum solitary, in center of leaf rosette, sessile. Involucre campanulate, 1–2.5 cm in diam. Phyllaries in 4 or 5 rows; outer phyllaries with brown leathery basal part and a green herbaceous reflexed apical part, glabrous, basal part ovate and 7–10 × 3–5 mm, apical part linear-oblong and 0.7–3 × 0.4–1 cm, margin revolute and ciliate, apex acute; middle phyllaries ovate-elliptic, 10–15 × 3–5 mm, with a gradually reduced herbaceous apical part, apex acute; inner phyllaries narrowly elliptic to linear, 12–18 × 2–3 mm, brown but apically purple, apex acuminate. Receptacle without bristles. Corolla bluish purple to blackish purple, 1.5–1.7(–2) cm, tube 8–9(–12) mm, limb 7–8 mm, lobes 4.5–5 mm. Achene brown, cylindrical, ca. 4 mm, glabrous. Pappus pale brown; outer bristles 4–8 mm, plumose; inner bristles 1.2–1.3 cm. Fl. and fr. Aug–Sep.

• Alpine meadows and pastures, thickets, scree slopes; 2600–4400 m. W Sichuan, NW Yunnan (Eryuan, Lijiang, Zhongdian).

79. *Saussurea coriolepis* Handel-Mazzetti, Oesterr. Bot. Z. 89: 60. 1940.

硬苞风毛菊 ying bao feng mao ju

Herbs 2–3 cm tall, perennial, stemless. Caudex short, simple. Rosette leaves sessile, narrowly obovate-oblong to linear, 3.5–6 × 0.6–1.5 cm, herbaceous, abaxially pale green and glabrous, adaxially green, black when dry and sparsely pubescent or glabrescent, margin entire, revolute, and densely ciliate, apex obtuse. Uppermost leaves usually merging into phyllaries. Capitulum solitary, in center of leaf rosette, sessile. Involucre campanulate, 1–1.5 cm in diam. Phyllaries in 3 or 4 rows, purple, glabrous, margin ciliate, apex obtuse; outer phyllaries elliptic, 8–10 × ca. 4 mm, basal part purple and leathery, apical part green and leaflike; middle phyllaries elliptic to narrowly ovate, 10–14 × 3–4 mm, purple; inner phyllaries narrowly ovate-elliptic to linear, 13–16 × 2–3 mm, purple, apex obtuse. Receptacle without bristles. Corolla bluish purple, 1.3–1.7 cm, tube 9–10 mm, limb 4–8 mm, lobes 3–5 mm. Achene ca. 3 mm, ribbed, glabrous. Pappus straw-colored; outer bristles short, scabrid; inner bristles 1.1–1.5 cm. Fl. and fr. Aug.

• Mountain slopes; ca. 4000 m. Sichuan (Baoping).

80. *Saussurea spatulifolia* Franchet, J. Bot. (Morot) 2: 338. 1888.

维西风毛菊 wei xi feng mao ju

Herbs 2–4 cm tall, perennial, stemless, sometimes laxly caespitose. Caudex simple or branched with several sterile and flowering leaf rosettes. Leaves petiolate; petiole purple, to 1 cm; leaf blade spatulate to oblong-spatulate, 0.5–3 × 0.5–1 cm,

abaxially white and densely tomentose, adaxially grayish green and tomentose, base cuneate, margin entire, apex rounded and with a small mucro. Capitulum solitary, in center of leaf rosette. Involucre campanulate, 1–1.5 cm in diam. Phyllaries in ca. 4 rows, pale brown to blackish purple, sparsely white or yellowish villous, apex acute to acuminate; outer phyllaries ovate, 8–10 × 4–5 mm; middle phyllaries narrowly ovate-elliptic, 10–12 × 3–4 mm; inner phyllaries narrowly elliptic to linear, 12–14 × 2–3 mm. Receptacle bristles brownish, subulate, 0.5–1.5 mm. Corolla purple, 1.3–1.6 cm, sparsely gland-dotted, tube 7–8 mm, limb 6–8 mm, lobes 5–6 mm. Achene dark brown, cylindrical to obconic, 4–4.5 mm, transversely rugose, glabrous or with few sessile glands, apex with a crenulate rim. Pappus dirty white to pale brown; outer bristles very few or sometimes lacking, 2–3 mm, plumose; inner bristles 1.2–1.4 cm. Fl. and fr. Jul–Oct.

• Alpine meadows and pastures, scree slopes; 3000–4600 m. SW Sichuan, NW Yunnan.

81. *Saussurea melanotricha* Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 61: 204. 1924.

黑苞风毛菊 hei bao feng mao ju

Saussurea xanthotricha Handel-Mazzetti.

Herbs 1.5–5 cm tall, perennial, stemless or substemless, laxly caespitose. Caudex usually branched with several sterile and flowering leaf rosettes. Leaves petiolate; petiole purple, to 1.5 cm; leaf blade elliptic to spatulate-elliptic, 1–3.5 × 0.4–1 cm, abaxially white, densely tomentose, and with a conspicuous midvein, adaxially grayish green and densely villous, base cuneate-attenuate, margin entire or obtusely sinuate-dentate with purple mucronulate teeth, apex rounded to obtuse with a short mucro. Capitulum solitary, in center of leaf rosette. Involucre campanulate, 1–1.5 cm in diam. Phyllaries in ca. 4 rows, purplish brown and dark brown to blackish villous in distal part, apex acute to obtuse; outer phyllaries ovate, 9–11 × 4–6 mm; middle phyllaries narrowly ovate-elliptic, 12–13 × 3–4 mm; inner phyllaries narrowly elliptic-linear, 12–14 × 2–3 mm. Receptacle bristles few, triangular-subulate, to 1 mm. Corolla purple, 1.2–1.6 cm, sparsely gland-dotted, tube 5–8 mm, limb 6–8 mm, lobes 3.5–4 mm. Achene cylindrical, 3–5 mm, gland-dotted. Pappus pale brown; outer bristles 3–5 mm, plumose; inner bristles 1.2–1.4 cm. Fl. and fr. Sep.

• Alpine scree slopes, open rocky mountain slopes; 3500–4700 m. SW Sichuan, NW Yunnan.

Saussurea melanotricha is very close to *S. spatulifolia* and probably not clearly separated at species level. The type specimen of *S. xanthotricha* from Sichuan holds an intermediate position between *S. spatulifolia* and *S. melanotricha*, combining the acuminate phyllaries with yellowish indumentum of the former with the sinuate-dentate leaf margins with purple mucros of the latter.

82. *Saussurea montana* J. Anthony, Notes Roy. Bot. Gard. Edinburgh 18: 208. 1934.

山地风毛菊 shan di feng mao ju

Herbs 3–5 cm tall, perennial, stemless, caespitose. Caudex stout, usually branched at ground level, with several sterile and

flowering leaf rosettes. Leaves petiolate; petiole purple, to 5 mm; leaf blade narrowly obovate or narrowly elliptic, 1–3 × 0.4–1 cm, abaxially glaucous and sparsely villous but glabrescent, adaxially green and villous, base cuneate-attenuate, margin entire, apex obtuse to rounded and with a short mucro. Capitulum solitary, in center of leaf rosette, sessile. Involucre campanulate, 0.8–1.2 cm in diam. Phyllaries in ca. 4 rows, purple and yellowish to brownish villous in distal part, apex usually obtuse; outer phyllaries ovate, 6–7 × 3–4 mm; middle phyllaries narrowly ovate-elliptic, 7–11 × 2–3 mm, apex acute to obtuse; inner phyllaries narrowly elliptic to linear, 11–15 × 1.5–3 mm, apex acute. Receptacle bristles subulate, ca. 1.5 mm. Corolla purple, 1.6–1.7 cm, gland-dotted, tube 7–10 mm, limb 6–10 mm, lobes 5–6 mm. Achene cylindrical, 4–5 mm, wrinkled, glabrous, apically with a crenulate rim. Pappus straw-colored; outer bristles few, 3–6 mm, plumose, often lacking; inner bristles 1–1.5 cm. Fl. and fr. Aug–Oct.

• Alpine pastures; 3600–4600 m. SW Sichuan (Muli), NW Yunnan (Lijiang).

Like *Saussurea melanotricha*, *S. montana* is also very close to *S. spatulifolia* and probably not clearly separated at species level. However, the indumentum is clearly very different, and no transient forms have been observed.

83. *Saussurea ovatifolia* Y. L. Chen & S. Yun Liang, Acta Phytotax. Sin. 19: 102. 1981.

青藏风毛菊 qing zang feng mao ju

Herbs 2–6 cm tall, perennial, stemless or shortly stemmed. Caudex elongate, 2–3 mm in diam., simple or few branched, covered with dark brown remains of petioles. Rosette leaves petiolate; petiole 3–10 mm; leaf blade ovate to elliptic, 1–3.5 × 0.5–1.5 cm, abaxially white and densely tomentose, adaxially grayish green and sparsely arachnoid, base rounded to cuneate, margin sparsely denticulate or entire, apex acute, acuminate, or obtuse. Capitula (1 or) 2–5, in a hemispherically condensed corymbiform synflorescence or rarely solitary, subsessile. Involucre campanulate, 6–10 mm in diam. Phyllaries in 3–5 rows, brownish or greenish yellow, villous, apex acute to acuminate; outer phyllaries narrowly ovate, 4–6 × 2–3 mm; middle phyllaries narrowly ovate-elliptic, 5–8 × 1.5–2 mm; inner phyllaries linear, 8–10 × 1–1.5 mm. Receptacle bristles 1–2 mm. Corolla purplish red, 1.2–1.5 cm, tube 4–6 mm, limb 5–5.5 mm, lobes ca. 3 mm. Achene 3–4 mm, glabrous. Pappus basally pale brown, apically dirty white; outer bristles scabrid. Fl. and fr. Aug–Sep.

• Alpine meadows, riverbanks; 4200–5200 m. Qinghai, Xizang.

Saussurea ovatifolia may be very closely related to the geographically distant *S. elliptica*, known from the Karakorum range and attributed to *S. sect. Saussurea*. Records of *S. ovata* in the sense of S. W. Liu (Fl. Qinghai. 3: 469. 1996) are probably referable to *S. ovatifolia*.

84. *Saussurea cochleariifolia* Y. L. Chen & S. Yun Liang, Acta Phytotax. Sin. 19: 104. 1981.

匙叶风毛菊 shi ye feng mao ju

Herbs ca. 2 cm tall, perennial, stemless. Caudex stout, few branched. Rosette leaves petiolate; petiole 1–1.5 cm; leaf blade

spatulate to narrowly obovate-oblong, 2.5–4 × 0.3–0.6 cm, abaxially grayish green and densely tomentose, adaxially green, glandular hairy, and sparsely arachnoid, base attenuate, margin entire, apex acute. Capitulum solitary, in center of leaf rosette, sessile. Involucre narrowly campanulate, 0.8–1.2 cm in diam. Phyllaries in 3 or 4 rows, margin and distally purplish black, sparsely arachnoid, apex acuminate; outer phyllaries narrowly triangular-ovate, 5–8 × 2–3 mm; middle phyllaries narrowly ovate-elliptic, 8–12 × 1–2 mm; inner phyllaries linear, 12–14 × ca. 1 mm. Receptacle not seen. Corolla purple, 1.5–1.6 cm, tube 7–8 mm, limb 7–8 mm, lobes ca. 5 mm. Achene ca. 1.5 mm, transversely rugose. Pappus pale brown; outer bristles 2–3 mm, scabrid; inner bristles ca. 1 cm. Fl. and fr. Aug–Sep.

• Moraines, alpine meadows; ca. 4000 m. S Xizang (Yadong) [?India (Sikkim)].

Saussurea cochleariifolia may occur in India (Sikkim) (see Grierson & Springate, Fl. Bhutan 2(3): 1441. 2001).

85. *Saussurea minuta* C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 13: 243. 1894.

小风毛菊 xiao feng mao ju

Saussurea lancifolia Handel-Mazzetti.

Herbs 2.5–7 cm tall, perennial, stemless or shortly stemmed. Caudex 2–3 mm in diam., creeping, usually few branched, with several sterile and flowering leaf rosettes. Rosette leaves petiolate; leaf blade narrowly elliptic to linear, 3–7 × 0.2–0.5 cm, abaxially white and densely tomentose, adaxially green and glabrous, base attenuate, margin revolute and entire, apex acute. Stem leaves (if present) similar to rosette leaves but gradually shorter upward on stem; uppermost leaves sessile, subtending and overtopping capitulum. Capitulum solitary, in center of leaf rosette or terminal on a short stem. Involucre narrowly campanulate, 0.8–1.2 cm in diam. Phyllaries in 3 or 4 rows, purple; outer phyllaries triangular-ovate, 9–11 × 3–5 mm, glabrous, apex acute; middle phyllaries ovate, 12–14 × 3–4 mm, glabrous, apex acute; inner phyllaries narrowly ovate-linear, 14–16 × 2–3 mm, apically densely villous, apex obtuse. Receptacle bristles subulate-filiform, 7–8 mm. Corolla purple, 1.2–1.4 cm, tube 5–6 mm, limb 6–7 mm, lobes 3–4 mm. Achene only seen as immature. Pappus dirty white; outer bristles ca. 2 mm, scabrid; inner bristles 1–1.1 cm. Fl. and fr. Jul–Sep.

• Alpine scree slopes; 3500–4900 m. Gansu, Qinghai, W Sichuan.

86. *Saussurea pumila* C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 13: 244. 1894.

矮小风毛菊 ai xiao feng mao ju

Herbs 2–4(–8) cm tall, perennial, stemless or shortly stemmed. Caudex 1–3 mm in diam., simple or few branched. Rosette leaves shortly petiolate; leaf blade narrowly ovate-elliptic, narrowly spatulate, or linear-elliptic, 0.8–3(–5) × 0.2–0.7(–1) cm, both surfaces green and glabrous, base cuneate-attenuate, margin subentire to minutely denticulate-serrulate, apex acute to obtuse and mucronate. Stem leaves (if present) similar to rosette leaves. Capitulum 1(–3), in center of leaf rosette or terminal on stem. Involucre campanulate, 1–1.5 cm in diam. Phyllaries in 4 or 5 rows, blackish brown or straw-

colored with dark midvein and margin, sometimes tinged purple, glabrous or sparsely villous, apex acute to acuminate; outer phyllaries narrowly ovate-triangular, 7–11 × 3–5 mm; middle phyllaries narrowly ovate-elliptic, 8–13 × 2–3 mm; inner phyllaries narrowly elliptic-linear, 13–15 × ca. 2 mm. Receptacle bristles 3–5 mm. Corolla purple, 1–1.3 cm, tube 5–7 mm, limb 5–6 mm, lobes 3–3.5 mm. Achene brown, cylindrical, ca. 3 mm, glabrous. Pappus straw-colored; outer bristles 1–3 mm, scabrid; inner bristles 1–1.1 cm. Fl. and fr. Jul–Sep. $2n = 30^*$ (as *Saussurea apus* but see discussion below).

• Alpine meadows, in turf; 3600–4700 m. Qinghai, Sichuan, Xizang.

Saussurea pumila has often been confused with *S. apus*. The two taxa are probably closely related. *Saussurea apus* differs from *S. pumila* by the usually larger size and always densely glandular, distinctly dentate leaves.

87. *Saussurea apus* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 490. 1882.

无梗风毛菊 wu geng feng mao ju

Saussurea humilis Ostenfeld; *S. koslowii* C. Winkler.

Herbs 2–6(–10) cm tall, perennial, caespitose, shortly stemmed. Caudex branched, with many sterile and flowering leaf rosettes. Rosette leaves shortly petiolate; leaf blade narrowly elliptic to linear, 2–7 × 0.2–1.5 cm, both surfaces green and densely glandular hairy, abaxially with a prominent straw-colored midvein, base cuneate-attenuate, margin sharply sinuate-dentate, apex acuminate. Stem leaves (if present) similar to rosette leaves. Uppermost stem leaves sometimes tinged purple, subtending capitulum. Capitulum solitary, in center of leaf rosette or terminal on stem, sessile. Involucre campanulate, 1.2–2(–3) cm in diam. Phyllaries in 3–5 rows, blackish purple, villous but glabrescent, apex acute to acuminate; outer phyllaries narrowly ovate, 7–12 × 3–4 mm; middle phyllaries narrowly elliptic, 10–14 × 2–3 mm; inner phyllaries narrowly elliptic-linear, 13–15 × 1–2 mm. Receptacle bristles 1.5–3 mm. Corolla purple, 1.2–1.5 cm, tube 6–8 mm, limb 5–7 mm, lobes 3.5–4.5 mm. Achene cylindrical, 2–3.5 mm, glabrous. Pappus dirty white; outer bristles 1–2(–3) mm, scabrid; inner bristles 0.9–1.1(–1.3) cm. Fl. and fr. Jul–Sep.

• Alpine steppes and pastures; 4000–5400 m. Gansu, Qinghai, Xizang.

Some populations of this taxon have purplish leaves subtending the capitulum, thereby showing similarity and possible relationship with *S. bracteata* from SW Xizang, a member of *S.* subg. *Amphilaena*.

88. *Saussurea columnaris* Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 652. 1937.

柱茎风毛菊 zhu jing feng mao ju

Herbs 4–10 cm tall, perennial, stemless or shortly stemmed. Caudex 1–1.5 cm in diam., usually much branched, with many sterile and flowering leaf rosettes forming large cushions, densely covered with persistent withered leaves. Rosette leaves sessile, linear, 2–7 × 0.1–0.2(–0.3) cm, abaxially grayish white and densely tomentose-sericeous, adaxially green to dark brown, shiny, and glabrous, base enlarged, sheathing,

and white villous, margin entire and revolute, apex acute. Uppermost leaves merging into phyllaries. Capitulum solitary, in center of leaf rosette or terminal on stem, sessile. Involucre campanulate, 2–3 cm in diam. Phyllaries in ca. 5 rows, apex acuminate to caudate; outer phyllaries narrowly ovate-triangular, 10–16 × 3–4 mm, basal part blackish purple, apical part greenish or brown, shiny, glabrous, and reflexed; middle and inner phyllaries narrowly ovate-triangular to narrowly elliptic-linear, 11–15 × 2–4 mm, basal part pale yellow, apical part blackish purple, villous, and erect. Receptacle bristles 7–8 mm. Corolla purplish red, 1.3–1.5 cm, tube 7–8 mm, limb 6–7 mm, lobes 3.5–4 mm. Achene dark brown, conic, ca. 3 mm, glabrous. Pappus in 2 rows; outer bristles white, 2–4 mm, scabrid; inner bristles pale brown, 9–10 mm. Fl. and fr. Aug–Oct.

Alpine meadows, rocky mountain slopes; 3000–4700 m. SW Sichuan, SE Xizang (Zayü), NW Yunnan [Bhutan].

The record of *Saussurea columnaris* in Bhutan (see Grierson & Springate, Fl. Bhutan 2(3): 1441. 2001) is now confirmed by more recent collections.

89. *Saussurea subulata* C. B. Clarke, Compos. Ind. 226. 1876.

钻叶风毛菊 zuan ye feng mao ju

Saussurea setifolia Klatt.

Herbs 1.5–10 cm tall, perennial, caespitose. Caudex much branched, with numerous sterile and flowering leaf rosettes forming dense cushions. Leaves sessile; leaf sheath purple, 1–1.2 cm, apically densely villous at margin; leaf blade subulate-linear, 5–12 × 0.5–1 mm, leathery, both surfaces green and glabrous, margin revolute and entire, apex with a white cartilaginous mucro to 1 mm. Uppermost leaves merging into phyllaries. Capitulum solitary, in center of leaf rosettes, very shortly pedunculate. Involucre campanulate, 5–7 mm in diam. Phyllaries in ca. 4 rows, glabrous, apex acuminate; outer phyllaries ovate, 10–14 × 3–5 mm, basal part brownish or purple, apical part green, leaflike, and subulate, apex with a white cartilaginous mucro; middle phyllaries narrowly ovate-elliptic, 6–9 × 2–3 mm, basal part pale yellow, apical part purple; inner phyllaries narrowly elliptic to linear, 6–9 × 1–2 mm. Receptacle bristles brown, to 1 mm. Corolla purplish red, 1–1.2 cm, tube 5–6 mm, limb 4–5 mm, lobes 2.5–3 mm. Achene cylindrical, 1.5–3.5 mm, smooth, glabrous. Pappus brown; outer bristles 2–3 mm, scabrid; inner bristles 7–8(–12) mm. Fl. and fr. Jul–Sep.

Gravelly and moist places near rivers, alpine grasslands and meadows, saline or alkaline sandy soils; 4100–5300 m. Gansu, Qinghai, Xinjiang, Xizang [NW India, Kashmir].

The erroneous record of *Saussurea subulata* from Yunnan by H. Léveillé (Cat. Pl. Yun-Nan, 50. 1916) must be referable to *S. werneroides*. Although S. W. Liu (Fl. Yunnan, 13: 543–544. 2004) listed *S. subulata* for this province as well, he mentioned that he did not see any specimens from there. Consequently, this species should be excluded from the flora of Yunnan.

90. *Saussurea pulviniformis* C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 11: 377. 1891.

垫状风毛菊 dian zhuang feng mao ju

Herbs to 3.5 cm tall, perennial, caespitose. Caudex thick, much branched, with many sterile and flowering leaf rosettes forming dense cushions, with fibrously split bark, densely covered with remains of leaves. Rosette leaves petiolate; petiole sheathing at base; leaf blade narrowly elliptic to obovate in outline, 1.5–2.5 × 0.3–0.8 cm, pinnately lobed, both surfaces green and glabrous; lateral lobes 3–6, ovate-elliptic to suborbicular, margin entire or obtusely dentate, apex obtuse; terminal lobe orbicular or oblong-elliptic, larger than lateral ones, apex obtuse to rounded. Capitula solitary, sessile. Involucre campanulate, 5–8 mm in diam. Phyllaries in 5 or 6 rows, straw-colored, glabrous; outer phyllaries ovate, apex subobtusate; inner phyllaries narrowly ovate-elliptic, apex subobtusate or with a short cusp. Receptacle with short bristles. Corolla pale to deep red, 1.2–1.4 cm, tube 5–7 mm, limb 6–7 mm, lobes to 4 mm. Achene brown, obconic, to 5 mm, 4-angled, glabrous. Pappus dirty white to pale brown; outer bristles 1–5 mm; inner bristles 1–1.2 cm. Fl. and fr. Jul–Aug.

• Alpine grasslands and stony slopes; 2100–3500 m. NW Xinjiang (Tian Shan).

91. *Saussurea werneroides* Schultz Bipontinus ex J. D. Hooker, Fl. Brit. India 3: 367. 1881.

4. *Saussurea* sect. *Laguranthera* (C. A. Meyer ex Endlicher) Lipschitz, Bot. Mater. Gerb. Inst. Bot. Akad. Nauk Uzbeksk. S.S.R. 15: 17. 1959.

纤维风毛菊组 *xian wei feng mao ju zu*

Saussurea [unranked] *Laguranthera* C. A. Meyer ex Endlicher, Gen. Pl. 468. 1838; *Heterotrichum* M. Bieberstein.

Perennial herbs or subshrubs, sometimes densely caespitose, with well-developed stems. Rootstock or caudex distinctly fibrous or with woody bark split in fibers. Stems solitary or several, erect or sometimes procumbent or ascending, usually branched, leafy. Leaves fleshy or herbaceous, undivided to pinnatisect. Capitula usually numerous, rarely solitary or few, solitary or in a corymbiform or paniculiform synflorescence, narrowly campanulate, tubular, or cylindrical, usually not more than 1 cm in diam. Phyllaries imbricate, appressed, margin entire, without an apical appendage, apex acute to obtuse and sometimes with a mucro or an erect or reflexed cusp. Receptacle usually with filiform or subulate bristles, rarely without bristles. Corolla glabrous or minutely gland-dotted. Anther tails lanate. Achene glabrous or rarely gland-dotted, with or without a short apical crown. Pappus always in 2 rows; outer bristles usually scabrid; inner bristles plumose.

Sixty-four species: C, E, and SW Asia, E Europe; 49 species (30 endemic) in China.

1a. Leaf blade thick, fleshy; plants usually on saline or alkaline soils.

2a. Flowering stems procumbent to ascending; receptacle usually naked 92. *S. famintziniana*

2b. Flowering stems erect; receptacle with bristles.

3a. Leaf blade bipinnately divided or pinnatisect, secondary segments linear.

4a. Leaf blade glabrous or hispidulous; capitula 6–10 mm in diam.; outer phyllaries glabrous, apex acuminate 93. *S. lacostei*

4b. Leaf blade strigose or arachnoid; capitula 4–5 mm in diam.; outer phyllaries pubescent, apex subobtusate 94. *S. turgaiensis*

3b. Leaf blade pinnately divided, pinnately lobed, lyrate-pinnately lobed, or undivided with a sinuate-dentate margin.

5a. Plants grayish green; achene with a short crown.

6a. Capitula numerous, in a densely congested corymbiform hemispheric synflorescence; stem 4–20(–30) cm tall; leaves to 3 cm wide 97. *S. daurica*

6b. Capitula solitary or few on branch ends; stem 15–50 cm tall; leaves 0.4–1.5 cm wide.

7a. Leaf blade ovate, rhombic, obovate, or elliptic 95. *S. pseudosalsa*

7b. Leaf blade linear or narrowly elliptic 96. *S. aerjingsensis*

5b. Plants green; achene without a crown.

8a. Lower stem leaves pinnately cleft or pinnately divided; outer pappus bristles persistent 99. *S. kaschgarica*

8b. Lower stem leaves lyrate-pinnately lobed or lyrate-pinnately divided; outer pappus bristles caducous.

锥叶风毛菊 *zhui ye feng mao ju*

Herbs 1–3 cm tall, perennial, caespitose, stemless. Caudex stout, fibrous, much branched, with many sterile and flowering leaf rosettes. Rosette leaves petiolate; petiole to 4 mm; leaf blade narrowly obovate or elliptic, 8–15 × 1–4 mm, abaxially grayish white and densely tomentose, adaxially green and glabrous, base cuneate-attenuate, margin with 2 or 3 acute lobes or teeth, apex acuminate. Uppermost leaves merging into phyllaries. Capitula solitary, in center of leaf rosettes, sessile. Involucre campanulate, 0.8–1.5 cm in diam. Phyllaries in 3 or 4 rows, apex acuminate; outer phyllaries narrowly triangular-ovate, 7–15 × 2–5 mm, basal part brownish or purple, glabrous, apical part leaflike and tomentose; middle phyllaries narrowly ovate-elliptic, 6–10 × 1.5–3 mm, purplish brown, apically arachnoid; inner phyllaries linear, 8–10 × 1–1.5 mm, glabrous, apically purple. Receptacle bristles light brown, 1–3 mm. Corolla purplish red, 9–10(–16) mm, tube 4–5(–8) mm, limb 4.5–5(–8) mm, lobes 3–3.5 mm. Achene pale brown, cylindrical, 2–3 mm, glabrous. Pappus pale brown; outer bristles 3–5 mm, scabrid; inner bristles 6–7(–10) mm. Fl. and fr. Aug–Oct. $2n = 32$.

Alpine pastures, meadows, and scree slopes; 4200–5400 m. W Sichuan, S Xizang, NW Yunnan (Dêqên) [Bhutan, India (Sikkim), Nepal].

- 9a. Terminal lobe of leaf blade large, triangular, sagittate, or hastate 98. *S. salsa*
 9b. Terminal lobe of leaf blade smaller, narrowly ovate to elliptic 100. *S. maximowiczii*
- 1b. Leaf blade thin, not fleshy; plants not on saline or alkaline soils.
- 10a. Leaf sheath and base of petiole adaxially densely white lanate 101. *S. pulvinata*
- 10b. Leaf sheath and base of petiole adaxially glabrous.
- 11a. Achene transversely rugose; capitula large, broadly obconic, 1–2 cm in diam.; corolla more than 1.8 cm 102. *S. pulchra*
- 11b. Achene not transversely rugose; capitula smaller, cylindrical to narrowly campanulate, usually less than 1 cm in diam.; corolla usually less than 1.5 cm.
- 12a. Phyllaries with apex acuminate and with a long conspicuous mucro.
- 13a. Leaf blade green and glabrous on both surfaces; capitula pendent 105. *S. alberti*
- 13b. Leaf blade abaxially grayish green, arachnoid or tomentose; capitula erect.
- 14a. Leaf blade narrowly ovate or narrowly ovate-oblong, pinnately lobed, or undivided and margin sinuate-dentate 106. *S. larionowii*
- 14b. Leaf blade linear, undivided, margin entire 107. *S. mucronulata*
- 12b. Phyllaries with apex obtuse, acute, or shortly acuminate or with a short mucro.
- 15a. Perennial herbs, densely or laxly caespitose, or subshrubs; caudex or rootstock woody, branched; stems several to many.
- 16a. Leaf blade pinnately lobed, pinnatisect, or bipinnatisect.
- 17a. Leaf blade clearly bipinnatisect; segments 11–13 pairs 119. *S. deserticola*
- 17b. Leaf blade pinnatisect or pinnately lobed; segments 2–5 pairs.
- 18a. Leaf blade segments subulate, linear, or narrowly triangular.
- 19a. Leaf blade of lower stem leaves sparsely gland-dotted on both surfaces otherwise glabrous; leaf blade segments 2 or 3 pairs, subulate; phyllaries in 7 or 8 rows 117. *S. yabulaiensis*
- 19b. Leaf blade of lower stem leaves sparsely arachnoid and glandular on both surfaces; leaf blade segments 3–5 pairs, linear or narrowly triangular; phyllaries in 5 or 6 rows 118. *S. mae*
- 18b. Leaf blade segments ovate, elliptic, or triangular-ovate.
- 20a. Involucre cylindric, 4–5 mm in diam. 110. *S. kanzanensis*
- 20b. Involucre campanulate, 7–10 mm in diam.
- 21a. Leaf blade elliptic, pinnately lobed to pinnatisect 109. *S. blanda*
- 21b. Leaf blade obovate, pinnately dentate to lyrate-pinnately lobed 115. *S. salemannii*
- 16b. Leaf blade undivided, margin entire, sinuate-dentate, dentate, or denticulate.
- 22a. Capitula solitary or 2, at end of stem or branches 116. *S. popovii*
- 22b. Capitula few, in a corymbiform synflorescence.
- 23a. Leaf blade grayish white and tomentose on both surfaces.
- 24a. Leaf margin entire 112. *S. cana*
- 24b. Leaf margin sinuate-dentate 114. *S. canescens*
- 23b. Leaf blade abaxially green and subglabrous or grayish white tomentose, adaxially green and subglabrous.
- 25a. Leaf blade linear or narrowly linear, 5 mm wide or less.
- 26a. Leaf blade narrowly linear, 1–4 mm wide, margin dentate 113. *S. petrovii*
- 26b. Leaf blade linear, 2–5 mm wide, margin entire 120. *S. salicifolia*
- 25b. Leaf blade narrowly elliptic, narrowly ovate, or oblong, more than 10 mm wide.
- 27a. Phyllaries not with a dark margin, apex acuminate and shortly mucronate; leaf blade abaxially pale or grayish green and glabrous or pubescent 108. *S. coronata*
- 27b. Phyllaries with a narrow dark margin, apex obtuse to rounded; leaf blade abaxially grayish white and densely arachnoid tomentose 121. *S. lomatolepis*
- 15b. Perennial herbs, not caespitose, without a woody caudex or rootstock, rhizomatous; stem solitary.
- 28a. Leaf blade green, concolorous or abaxially paler green, abaxially sparsely strigose or glabrous.
- 29a. Leaf blade pinnately dentate to pinnatisect.
- 30a. Leaf blade pinnately lobed or pinnately dentate 135. *S. tianshuiensis*

- 30b. Leaf blade pinnatisect.
- 31a. Involucre tubular, 5–8 mm in diam. 133. *S. acroura*
- 31b. Involucre campanulate to globose, 10–15 mm in diam. 134. *S. megaphylla*
- 29b. Leaf blade undivided.
- 32a. Plants shortly stemmed, at most ca. 0.2 m tall 103. *S. ovata*
- 32b. Plants with tall stems, 0.3–2 m tall.
- 33a. Plants 1–2 m tall; stem ca. 1 cm in diam. at base 111. *S. elata*
- 33b. Plants to 1.4 m tall; stem less than 1 cm in diam. at base.
- 34a. Middle stem leaves triangular-ovate with a truncate base; phyllaries arachnoid lanate, apex reflexed and herbaceous 127. *S. sutchuenensis*
- 34b. Middle stem leaves elliptic or narrowly elliptic; phyllaries glabrous, sparsely arachnoid, or only apically bearded and surface scarious, apex erect and not herbaceous.
- 35a. Leaves sessile; leaf blade narrowly ovate-elliptic to narrowly elliptic, 1–2 cm wide 124. *S. zhuxiensis*
- 35b. Leaves petiolate; leaf blade elliptic, 3–7 cm wide.
- 36a. Capitula in a diffuse corymbiform-paniculiform synflorescence, long pedunculate 128. *S. dolichopoda*
- 36b. Capitula clustered at end of branches, in congested corymbiform synflorescence, shortly pedunculate 129. *S. saligna*
- 28b. Leaf blade abaxially grayish white or grayish green and densely tomentose, arachnoid, or pubescent, adaxially green.
- 37a. Leaf blade pinnately lobed, pinnatisect, or lyrate.
- 38a. Leaf blade lyrate-pinnatisect; plants less than 15 cm tall 140. *S. bartholomewii*
- 38b. Leaf blade not lyrate-pinnatisect; plants more than 15 cm tall.
- 39a. Stem and petioles winged 136. *S. pteridophylla*
- 39b. Stem and petioles unwinged.
- 40a. Stem usually with short sterile axillary shoots 132. *S. elegans*
- 40b. Stem without short sterile axillary shoots.
- 41a. Leaf blade bipinnately divided 139. *S. chrysanthemoides*
- 41b. Leaf blade pinnately lobed to pinnatisect.
- 42a. Middle stem leaves with 2 or 3 pairs of lobes, abaxially white and densely tomentose; involucre obconic, 6–8 mm in diam. 137. *S. compta*
- 42b. Middle stem leaves with 4–14 pairs of lobes, abaxially grayish green and thinly arachnoid; involucre tubular, ca. 5 mm in diam. 138. *S. variiloba*
- 37b. Leaf blade undivided and margin entire or dentate.
- 43a. Leaf blade ovate, ovate-elliptic, elliptic, or oblong, more than 3 cm wide.
- 44a. Leaves shortly petiolate (to 1 cm); leaf blade broadly ovate, margin sharply serrate; synflorescence supported by uppermost stem leaves 104. *S. licentiana*
- 44b. Leaves long petiolate (2.5–5 cm); leaf blade ovate, elliptic, or narrowly ovate-elliptic, margin denticulate or sinuate-dentate; synflorescence not supported by uppermost stem leaves.
- 45a. Petiole unwinged; involucre narrowly cylindric, (3–)5–8 mm in diam.; phyllaries straw-colored, subglabrous, without a dark mucro 130. *S. conyzoides*
- 45b. Petiole winged; involucre narrowly campanulate, 8–10 mm in diam.; phyllaries whitish, arachnoid, with a dark mucro 131. *S. flexuosa*
- 43b. Leaf blade narrowly oblong, narrowly ovate-elliptic, narrowly elliptic, or linear, less than 3 cm wide.
- 46a. Leaf blade linear, less than 1 cm wide 126. *S. integrifolia*

- 46b. Leaf blade narrowly ovate to narrowly elliptic, 1.5–3 cm wide.
 47a. Stem winged; leaf base decurrent, margin usually entire 125. *S. virgata*
 47b. Stem unwinged; leaf base not decurrent, margin
 sinuate-dentate.
 48a. Plants 60–100 cm tall; middle stem leaves petiolate;
 capitula very numerous, in an ample paniculiform-
 corymbiform synflorescence 122. *S. polycephala*
 48b. Plants 30–75 cm tall; middle stem leaves sessile;
 capitula 10–20, in a compact corymbiform
 synflorescence 123. *S. chinensis*

92. *Saussurea famintziniana* Krasnov, Bot. Zap. 2(1): 71. 1887.

中新风毛菊 zhong xin feng mao ju

Saussurea colorata C. Winkler.

Herbs 2–12 cm tall, perennial, densely caespitose. Rootstock stout, with fibrously split bark. Caudex stout, much branched, densely covered with remains of petioles, with many sterile and flowering leaf rosettes. Stem solitary, prostrate or ascending, simple or apically branched. Rosette and lower stem leaves petiolate; petiole 0.5–2.5 cm; leaf blade narrowly ovate, 2–4(–10) × 0.3–0.5(–1.2) cm, slightly fleshy, pinnately lobed or subentire, scabrid, arachnoid or subglabrous, margin coarsely dentate. Upper stem leaves sessile, base weakly amplexicaul. Capitula 3–7, in a corymbiform synflorescence, shortly pedunculate. Involucre narrowly campanulate, 5–12 mm in diam. Phyllaries in 4 or 5 rows, arachnoid to glabrescent, apex obtuse; outer phyllaries ovate, 4–5 × 2–3 mm; middle phyllaries narrowly ovate-elliptic, 5–8 × 1.5–2.5 mm; inner phyllaries narrowly elliptic-linear, 8–11 × 1–1.5 mm. Receptacle with few bristles or naked. Corolla pale purple, 1.3–1.4 cm, gland-dotted, tube 6–7 mm, limb 6–7 mm, lobes 3.5–4 mm. Achene ca. 4 mm, smooth, glabrous, apex with a short crown. Pappus dirty white; outer bristles 3–6 mm, plumose; inner bristles 1–1.1 cm. Fl. and fr. Aug.

Saline sands, stony slopes, moraines, alpine steppes; ca. 3700[–4200] m. W Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan].

No specimens of *Saussurea famintziniana* from China were seen by the present authors. The description here is based on specimens from outside the Flora area and on the treatments by Lipschitz (Fl. URSS 27: 510. 1962) and G. M. Shen (Fl. Xinjiang. 5: 278. 1999).

93. *Saussurea lacostei* Danguy, J. Bot. (Morot) 21: 52. 1908.

高盐地风毛菊 gao yan di feng mao ju

Herbs 10–25 cm tall, perennial. Caudex stout, densely covered with remains of old leaves. Stems solitary or several, erect, branched from middle. Rosette leaves petiolate; petiole 2–4(–7.5) cm; leaf blade narrowly elliptic, 5–8 × 1–3 cm, bipinnately divided, both surfaces green and sparsely hispidulous; primary lobes 5–12 pairs, narrowly ovate to narrowly elliptic; secondary lobes 1–4 pairs, margin dentate, teeth and apex mucronate. Stem leaves similar to basal leaves, gradually smaller upward on stem. Capitula 1–6, on stem and branch ends, solitary or in a corymbiform synflorescence; peduncle 1–5 mm. Involucre obconic to narrowly campanulate, 6–10 mm in diam. Phyllaries in 4 or 5 rows, greenish or straw-colored, purplish in apical part, glabrous; outer phyllaries ovate, 4–5 × 2–3 mm,

apex acuminate; middle phyllaries narrowly elliptic, 5–10 × 2–2.5 mm, apex acute; inner phyllaries narrowly elliptic to linear, 10–12 × 1.5–2 mm, apex acute. Receptacle bristles subulate, 6–8 mm. Corolla pale purple, 1.2–2.1(–2.4) cm, tube 5.5–10(–16) mm, limb 6.5–8 mm, lobes 2.5–4 mm. Achene brown, oblong, ca. 5 mm, glabrous. Pappus dirty white; outer bristles 1–3 mm; inner bristles 0.9–1.3 cm. Fl. and fr. Jul–Sep.

• Rocky dry mountain slopes, alpine saline soils; 2600–3000 m. W Xinjiang.

94. *Saussurea turgaiensis* B. Fedtschenko, Repert. Spec. Nov. Regni Veg. 8: 497. 1910.

太加风毛菊 tai jia feng mao ju

Herbs 20–50 cm tall, perennial, caespitose. Caudex stout, branched, with many sterile and flowering leaf rosettes. Stems several, erect, branched from middle or above. Rosette and lower stem leaves shortly petiolate; leaf blade linear-oblong, 3–10 × 0.5–1.5(–2) cm, pinnately divided or bipinnately divided, both surfaces green to grayish green, scabrid, and shortly strigose or arachnoid; lobes ovate to linear, apex acute. Middle and upper stem leaves gradually smaller upward on stem; uppermost leaves linear, undivided, margin dentate to almost entire. Capitula 2–8, on stem and branch ends, in a corymbiform synflorescence, shortly pedunculate. Involucre cylindrical or narrowly campanulate, 4–5 mm in diam. Phyllaries in ca. 4 rows, often reddish, pubescent or glabrescent, apex subobtusate; outer phyllaries ovate, 3–5 × 2–3 mm; middle phyllaries narrowly ovate-elliptic, 5–8 × 1.5–2.5 mm; inner phyllaries linear-oblong, 8–10 × 1–2 mm. Receptacle with subulate bristles. Corolla reddish purple or pink, ca. 1.2 cm, tube ca. 7 mm, limb ca. 5 mm. Achene light brown, cylindrical, ca. 2.5 mm, smooth. Pappus white or light brown; outer bristles to 5 mm; inner bristles ca. 9 mm. Fl. and fr. Jul–Sep.

Saline meadows; 200–700 m. Xinjiang [Kazakhstan, Kyrgyzstan, Russia, Tajikistan].

95. *Saussurea pseudosalsa* Lipschitz, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 59(6): 79. 1954.

假盐地风毛菊 jia yan di feng mao ju

Herbs or subshrubs, 10–60 cm tall, perennial. Rootstock apically branched. Stems solitary or several, erect or ascending, simple or much branched. Lower stem leaves petiolate; petiole to 1.5 cm; leaf blade oblong, elliptic, rhombic, or narrowly ovate, 0.4–3.5(–10) × 0.2–1.2(–4) cm, fleshy, both surfaces grayish green and scabrid, base cuneate, margin dentate, denticulate, or entire, apex acute. Middle and upper stem leaves sessile, narrowly obovate, elliptic, or linear-oblong, margin en-

ture. Capitula 1–5, on stem and branch ends, solitary or in a corymbiform synflorescence, shortly pedunculate. Involucre obconic, 6–8 mm in diam. Phyllaries in 5 or 6 rows, straw-colored, purple in apical part, villous, apex acuminate; outer phyllaries ovate-elliptic, 2–3 × 1.5–2 mm; middle phyllaries narrowly ovate-elliptic, 3–7 × 1.5–2 mm; inner phyllaries narrowly elliptic to linear, 7–8 × 1–1.5 mm. Receptacle bristles subulate, 7–8 mm. Corolla purplish red, 1.3–1.5 cm, tube 7–8 mm, limb 7–8 mm. Achene ca. 4 mm, apex with a short crown. Pappus straw-colored; outer bristles ca. 3 mm; inner bristles 9–10 mm. Fl. and fr. Jun–Aug.

Saline soils and gravelly shores near rivers and lakes; 2700–2800 m. NW Gansu, Nei Mongol, Qinghai, Xinjiang [Mongolia].

96. *Saussurea aerjingsensis* K. M. Shen, Acta Phytotax. Sin. 36: 275. 1998.

阿尔金风毛菊 a er jin feng mao ju

Herbs 8–40 cm tall, perennial. Rootstock stout, apically branched, densely covered with remains of leaf sheaths. Stems solitary or 2 or 3, ca. 5 mm in diam., erect, simple or branched from base. Leaves petiolate; petiole to 2 cm; leaf blade narrowly elliptic to linear, 5–10 × 0.2–0.8 cm, thick, fleshy, both surfaces green and gland-dotted but otherwise glabrous or sparsely pubescent, base attenuate, margin entire or remotely denticulate, apex acute to acuminate. Capitula 1–4, at end of stem or branches and sometimes also axillary, solitary or in a congested corymbiform or racemiform synflorescence, subsessile. Involucre campanulate, 8–10 mm in diam. Phyllaries in ca. 4 rows, pilose, gland-dotted, apex acute; outer phyllaries ovate, 6–7 × 4–5 mm; middle phyllaries narrowly elliptic, 7–10 × 1.5–4 mm; inner phyllaries linear, 10–11 × 1–1.5 mm. Receptacle bristles to 2 mm. Corolla purple, 0.9–1.1 cm, gland-dotted, tube 4–6 mm, limb 4–5 mm. Achene obconic, ca. 3 mm, apex with a denticulate crown. Pappus brownish to reddish; outer bristles 2–3 mm; inner bristles ca. 1 cm. Fl. and fr. Aug–Sep.

- Salt marshes; 1900–3000 m. SE Xinjiang (Ruoqiang).

No specimens of *Saussurea aerjingsensis* were seen by the present authors. The description here is based on the original description and on the treatment by G. M. Shen (Fl. Xinjiang. 5: 294–296, 478–479. 1999).

97. *Saussurea daurica* Adams, Nouv. Mém. Soc. Imp. Naturalistes Moscou 3: 251. 1834.

达乌里风毛菊 da wu li feng mao ju

Saussurea crassifolia Candolle var. *papposa* (Turczaninow ex Candolle) Ledebour; *S. papposa* Turczaninow ex Candolle; *S. salsa* (Pallas) Sprengel var. *papposa* (Turczaninow ex Candolle) Ledebour.

Herbs 4–20(–30) cm tall, perennial. Taproot slender, 2–4 mm in diam. Stems solitary or several, ascending, erect, or sometimes procumbent, branched from base or apically. Basal leaves petiolate; petiole 0.5–3 cm; leaf blade narrowly ovate to narrowly elliptic, 2–10 × 0.5–3 cm, fleshy, both surfaces grayish green, gland-dotted, and scabridulous but glabrescent, base cuneate, margin entire, sinuate-dentate, runcinate-pinnately lobed, or pinnately parted, apex acute to subobtusely. Lower stem leaves similar to basal leaves but smaller, margin

sinuate-dentate or entire. Upper stem leaves sessile, narrowly elliptic to broadly linear. Capitula usually numerous, in a globose condensed corymbiform synflorescence. Involucre cylindrical, (3–)5–6 mm in diam. Phyllaries in 6 or 7 rows, purplish red in apical part, subglabrous, margin pubescent, apex acute to obtuse; outer phyllaries ovate to elliptic, 2–4 × 1–1.5 mm; middle phyllaries narrowly elliptic, 4–9 × 1–1.5 mm; inner phyllaries linear, 9–11 × ca. 1 mm. Corolla pink, 1.3–1.8 cm, tube 8–11 mm, limb 6–7 mm, lobes 3–3.5 mm. Achene cylindrical, 2–3 mm, ribbed, glabrous, apex with a short crown. Pappus white; outer bristles 1–3 mm, scabrid; inner bristles 1.1–1.2 cm. Fl. and fr. Jul–Sep. $2n = 28^*$.

Salt meadows and marshes, alkaline moist soils near rivers and lakes, riverbeds; 1000–3600 m. W Gansu, Heilongjiang, Nei Mongol, Ningxia, Qinghai, Xinjiang [Mongolia, Russia].

98. *Saussurea salsa* (Pallas) Sprengel, Syst. Veg. 3: 381. 1826.

盐地风毛菊 yan di feng mao ju

Serratula salsa Pallas, Reise Russ. Reich. 3: 607. 1776; *Heterotrichum salsum* (Pallas) M. Bieberstein; *S. crassifolia* Candolle.

Herbs 15–50 cm tall, perennial. Stems solitary or several, branched above middle. Basal and lower stem leaves petiolate; leaf blade ovate to broadly elliptic, 5–30 × 2–6(–12) cm, fleshy, lyrate-pinnately parted or pinnately lobed, both surfaces green, abaxially gland-dotted, adaxially sparsely strigose or glabrous; lateral lobes elliptic to triangular, margin entire or subentire; terminal lobe triangular, sagittate, or hastate, large, margin sinuate-dentate or entire. Middle and upper stem leaves sessile, oblong, linear-oblong, or narrowly ovate, margin entire or sparsely dentate. Capitula numerous, in a corymbiform synflorescence, pedunculate. Involucre narrowly cylindrical, 4–5 mm in diam. Phyllaries in 5–7 rows, arachnoid, glabrescent, apex obtuse to subacute; outer phyllaries ovate, 2–3 × 2–2.5 mm; middle phyllaries narrowly ovate, 3–10 × 1.5–2 mm; inner phyllaries narrowly ovate-elliptic, 10–12 × 1–2 mm. Receptacle bristles subulate, 4–4.5 mm. Corolla pale purple, (1–)1.3–1.6 cm, tube 7–9 mm, limb 6–7 mm. Achene reddish brown, cylindrical, 2.5–3 mm, glabrous. Pappus white; outer bristles ca. 3 mm; inner bristles (0.9–)1.3–1.5 cm. Fl. and fr. Jul–Sep. $2n = 28$.

Saline grasslands, alkaline steppes and meadows; 100–3300 m. Gansu, Nei Mongol, Ningxia, Qinghai, Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Uzbekistan, SW Asia, E Europe].

The basionym, *Serratula salsa*, was validated by Pallas in the third volume of his *Reise*. In the text, he gave a reference to the short description of a *Serratula* (without specific epithet) from the second volume (Reise Russ. Reich. 2: 444. 1773); and in the unpaginated “Zweytes Register über die lateinischen Anhänge aller drey Theile” [second index of the Latin appendices of all three volumes] *S. salsa* was given as a name belonging to the description of a “*Planta salsa ambigui generis*” previously published in the first volume (Reise Russ. Reich. 1: 502. 1771).

99. *Saussurea kaschgarica* Ruprecht, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 14(4): 54. 1869.

喀什风毛菊 ka shi feng mao ju

Herbs 14–25 cm tall, perennial. Caudex stout, apically branched, covered with dark brown remains of leaf sheaths. Stems several, ascending to erect, few branched. Basal and lower stem leaves petiolate; leaf blade narrowly obovate-elliptic, to 10 × 2.5 cm, pinnately lobed or pinnately divided, scabrid, hispid; lobe margins dentate, apex acute. Middle and upper stem leaves similar to lower leaves, gradually smaller upward on stem, shortly petiolate to sessile; leaf blade small, not decurrent. Capitula in a densely corymbiform synflorescence. Involucre 6–10 mm in diam. Phyllaries in ca. 4 rows, apically purple and densely pubescent to glabrescent; outer phyllaries ovate, 3–4 mm, apex subobtusate; middle and inner phyllaries narrowly ovate-elliptic to linear, 4–12 mm, apex subacute. Receptacle with subulate bristles. Corolla pale purplish red, 1.4–1.6 cm, tube 6–8 mm, limb 7–8 mm. Achene pale brown, cylindrical, 5–6 mm, glabrous. Pappus dirty white; outer bristles 3–5 mm, rigid, serrulate, persistent; inner bristles 1–1.2 cm. Fl. and fr. Jul–Aug.

Gravelly riverbanks in high mountain valleys, saline soils; ca. 3200 m. W Xinjiang (Wuqia) [Kyrgyzstan].

No specimens of *Saussurea kaschgarica* were seen by the present authors, and the description here is based on the treatments by Lipschitz (Fl. URSS 27: 509. 1962) and G. M. Shen (Fl. Xinjiang. 5: 280. 1999).

100. *Saussurea maximowiczii* Herder, Bull. Soc. Imp. Naturalistes Moscou 41(3): 14. 1868.

羽叶风毛菊 *yu ye feng mao ju*

Saussurea hakonensis Franchet & Savatier; *S. maximowiczii* f. *serrata* (Nakai) Kitamura; *S. maximowiczii* var. *ser-rata* Nakai; *S. maximowiczii* var. *triceps* (H. Léveillé & Vaniot) Kitamura; *S. triceps* H. Léveillé & Vaniot.

Herbs 40–100 cm tall, perennial. Rhizome stout, with many fibrous roots. Stem solitary, erect, apically branched, unwinged. Basal and lower stem leaves petiolate; petiole 5–13(–20) cm; leaf blade oblong to obovate in outline, (10–)20–50(–70) × (3–)7–10(–15) cm, thick, pinnately divided or pinnately lobed, both surfaces green, scabrid, and hispid; lateral lobes 4–8 pairs, narrowly obovate-elliptic to oblong, margin serrate, dentate, or entire, apex acuminate; terminal lobe narrowly ovate to elliptic. Middle stem leaves gradually smaller upward on stem. Upper stem leaves sessile, narrowly elliptic to linear, undivided. Capitula numerous, in a corymbiform-paniculiform synflorescence. Involucre cylindrical to narrowly campanulate, 6–7 mm in diam. Phyllaries in 4 or 5 rows, sparsely arachnoid; outer phyllaries ovate, 3–4 × ca. 2 mm, apex acuminate; middle phyllaries oblong, 4–9 × 1.5–2 mm, apex subobtusate and mucronate; inner phyllaries narrowly elliptic, 9–11 × 1–1.5 mm, apex obtuse. Receptacle bristles to 7 mm. Corolla purple, 1.1–1.5 cm, tube 6–9 mm, limb 5–6 mm, lobes 3–3.5 mm. Achene yellowish brown to black, obconic, 5–7 mm, obtusely ribbed, glabrous. Pappus white; outer bristles 2–5 mm; inner bristles ca. 1 cm. Fl. and fr. Aug–Oct. $2n = 26$.

Forest margins, thickets, meadows; near sea level to 1000 m. Heilongjiang, Jilin, Liaoning, Nei Mongol [Japan, Korea, Russia (Far East)].

101. *Saussurea pulvinata* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 493. 1882.

甘青风毛菊 *gan qing feng mao ju*

Saussurea ruoqiagensis K. M. Shen.

Herbs 8–20 cm tall, perennial, densely caespitose. Caudex stout, much branched, with many leaf rosettes and flowering shoots, densely covered with remains of leaf sheaths, forming hard cushions. Stem solitary, 2–3 mm in diam., erect, simple. Rosette leaves petiolate; petiole to 2 cm, base and sheath adaxially densely white lanate; leaf blade narrowly elliptic to linear, 2–6 × 0.3–0.5 cm, both surfaces green, abaxially villous, adaxially sparsely villous but glabrescent, base cuneate-attenuate, margin revolute, entire, or crenulate, apex acute or obtuse. Stem leaves similar to rosette leaves, sessile, gradually smaller upward on stem. Capitula 5–12, in a densely congested corymbiform synflorescence, shortly pedunculate. Involucre narrowly campanulate, 8–10 mm in diam. Phyllaries in 4 or 5 rows, straw-colored, apically densely villous, apex acuminate to acute; outer phyllaries narrowly triangular-ovate, 5–7 × 3–4 mm, apex acuminate; middle and inner phyllaries narrowly ovate-elliptic to linear, 7–10 × 1.5–3 mm, apex acute. Receptacle bristles ca. 1 mm. Corolla pale red, 0.9–1.3 cm, tube 4–7 mm, limb 4–6 mm, lobes 2.5–3 mm. Achene brown, 3–5 mm, transversely rugose. Outer pappus bristles white, 2–3 mm, barbellate; inner bristles grayish brown, 8–9 mm. Fl. Jul–Aug, fr. Aug–Sep.

• Alpine scree slopes, rocky dry mountain slopes; 2900–4300 m. Gansu, Qinghai, SE Xinjiang (Ruoqiang).

102. *Saussurea pulchra* Lipschitz, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 19: 389. 1959.

美丽风毛菊 *mei li feng mao ju*

Hemisteptia pulchra (Lipschitz) Soják.

Herbs 8–27(–60) cm tall, perennial. Caudex stout, apically branched, densely covered with brown remains of old leaves. Stems 1–4, erect, simple or branched from middle. Rosette and lower stem leaves sessile, linear, 1.5–5 × 0.1–0.4 cm, abaxially grayish white and densely tomentose, adaxially glaucous green and glabrous, margin revolute and entire or with a few obtuse teeth, apex acute to obtuse. Middle and upper stem leaves linear, 5–10 mm. Capitula solitary or 2 or 3, on branch ends, in a corymbiform synflorescence, pedunculate. Involucre turbinate, 1–2 cm in diam. Phyllaries in 4–6 rows, purple, sparsely villous, apex acuminate and with a cartilaginous mucro; outer phyllaries ovate-elliptic, 4–6 × 1.5–2 mm; middle phyllaries narrowly ovate-elliptic to oblong, 6–15 × 1.5–2 mm; inner phyllaries linear-elliptic to linear, 15–19 × 1.8–2 mm. Receptacle bristles subulate, 5–6 mm. Corolla rose-purple, 1.8–2.5 cm, tube 1–1.2 cm, limb 1–1.2 cm, lobes 4–5 mm. Achene blackish green, cylindrical, 5–5.5 mm, 4-angled, transversely rugose, gland-dotted, apex with a short crown. Pappus white; outer bristles ca. 3 mm, scabrid; inner bristles 1.5–1.6 cm. Fl. and fr. Aug–Oct.

• Sandy river valleys; 1900–3100 m. Gansu, Qinghai.

When Lipschitz published the name *Saussurea pulchra*, he intended it to be a replacement name for his earlier "*S. bella*" (Lipschitz, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 59(6): 83. 1954), which he evidently thought was illegitimate as a later homonym of *S. bella* Y.

Ling (1949). However, because Lipschitz published "*Hemisteptia bella*" and "*S. bella*" simultaneously as alternative names, neither of them was validly published (*Vienna Code*, Art. 34.2). Lipschitz therefore inadvertently published *S. pulchra* as the name of a new species by reference to the Latin description of "*H. bella*" and "*S. bella*."

103. *Saussurea ovata* Benth in G. Henderson & Hume, Lahore to Yarkand, 325. 1873.

卵叶风毛菊 luan ye feng mao ju

Saussurea pseudocolorata Danguy.

Herbs 1.5–15 cm tall, perennial. Caudex slender, 2–3 mm in diam., simple or few branched. Stem solitary, erect or ascending, simple. Basal and lower stem leaves petiolate; petiole 1–5 cm, winged; leaf blade ovate, elliptic, obovate, or suborbicular, 1.5–6 × 1.2–4 cm, both surfaces green, glabrescent or arachnoid villous, and glandular hairy at margin, margin sinuate-dentate, apex rounded to acuminate and mucronate. Upper stem leaves similar to lower ones, gradually smaller upward on stem; uppermost stem leaf narrowly elliptic to linear, subtending synflorescence. Capitula 3–15(–25), in a densely condensed globose or lax corymbiform synflorescence. Involucre campanulate, 8–9 mm in diam. Phyllaries in ca. 4 rows, purple and villous in apical part, apex subacute; outer phyllaries broadly triangular-ovate, 2–3 × ca. 2 mm; middle and inner phyllaries narrowly ovate-elliptic, 3–10 × ca. 2 mm. Receptacle without bristles. Corolla purplish red, 1.2–1.3 cm, glabrous, tube 6–7 mm, limb ca. 6 mm, lobes ca. 3 mm. Achene brown, 2–2.5 mm, ribbed, glabrous. Pappus white; outer bristles 4–5 mm, scabrid; inner bristles 1–1.1 cm. Fl. and fr. Aug.

Alpine meadows, gravelly mountain slopes, moist riverbeds, sand dunes; 2400–4300 m. SW Xinjiang [Tajikistan].

104. *Saussurea licentiana* Handel-Mazzetti, Oesterr. Bot. Z. 85: 222. 1936.

川陕风毛菊 chuan shan feng mao ju

Saussurea salicifolia (Linnaeus) Candolle var. *shensiensis* Y. Ling.

Herbs 40–80 cm tall, perennial. Rhizomes procumbent, with many black fibrous roots. Stem solitary, erect, simple or apically few branched. Basal and lower stem leaves withered at anthesis. Middle stem leaves petiolate; petiole to 1 cm; leaf blade ovate, obovate, narrowly ovate-elliptic, or elliptic, 4–13 × 2.5–8 cm, abaxially grayish white and densely tomentose, adaxially green and sparsely strigose, base cuneate, margin serrate, apex acuminate to caudate. Upper stem leaves similar to middle stem leaves but gradually smaller upward on stem, subtending synflorescence. Capitula few to numerous, in a paniculiform or corymbiform synflorescence, pedunculate. Involucre narrowly campanulate to cylindrical, 4–5 mm in diam. Phyllaries in 4 or 5 rows, straw-colored or brown, glabrous; outer phyllaries broadly ovate, 1.5–3 × 1–1.5 mm, apex acute; middle phyllaries elliptic, 3–6 × 1–1.5 mm, apex obtuse; inner phyllaries elliptic to broadly linear, 6–8 × 1–1.5 mm, apex obtuse. Corolla purple, 7–8 mm, tube 4–5 mm, limb 2.5–3 mm, lobes 1.5–2 mm. Achene pale brown, ca. 4 mm, glabrous. Pappus pale brown; outer bristles ca. 3 mm, scabrid; inner bristles 6–8 mm. Fl. and fr. Aug–Sep.

• Grassy slopes, montane forests; 1900–3300 m. Gansu, Hubei, Shaanxi, Sichuan.

105. *Saussurea alberti* Regel & C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 6: 298. 1880.

新疆风毛菊 xin jiang feng mao ju

Herbs, perennial. Stem apically branched, slightly winged. Basal leaves petiolate; leaf blade narrowly ovate-elliptic, to 7 × 2–3 cm, both surfaces green and glabrous, base cuneate, margin sinuate-dentate or runcinate and scabrous, apex acute. Stem leaves narrower than basal leaves, base decurrent to stem wing, margin subentire. Capitula numerous, at ends of flexuous or apically nodding branches, in an ample corymbiform synflorescence, pedunculate, with 19–20 florets. Involucre obconic, ca. 1 cm in diam. Phyllaries in 5 or 6 rows, arachnoid, glabrescent, apex acute and mucronate; outer phyllaries ovate; middle phyllaries narrowly ovate-oblong; inner phyllaries sublinear. Receptacle bristles to 8 mm. Corolla rose-pink, ca. 1.3 cm, tube 6–7 mm, limb 6–7 mm. Achene cylindrical to oblong, ribbed, apex with a short crown. Pappus in 2 rows; outer bristles short, scabrid; inner bristles ca. 4 × as long as outer ones. Fl. and fr. Aug–Sep.

Scree slopes; 2700–2900 m. Xinjiang (Tian Shan) [Kyrgyzstan].

No specimens of *Saussurea alberti* from China were seen by the present authors. This description is based on an image of the cultivated type specimen (LE), on the original description, and on the account by Lipschitz (Fl. URSS 27: 426. 1962).

106. *Saussurea larionowii* C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 11: 376. 1891.

天山风毛菊 tian shan feng mao ju

Saussurea takhtadganii Lipschitz.

Herbs 10–40(–60) cm tall, perennial. Caudex fibrous, branched, with several sterile and flowering leaf rosettes. Stems solitary or several, erect, simple or branched, slightly winged. Lower stem leaves petiolate; petiole 2–3(–5) cm; leaf blade narrowly ovate, ovate-oblong, or narrowly ovate-elliptic, 5–10 × (0.4–)1.5–4.5 cm, undivided, pinnately cleft, or pinnately lobed, abaxially grayish white and arachnoid tomentose, adaxially green, scabrous, and spinulose-strigose, margin sinuate or dentate. Middle and upper stem leaves sessile, gradually smaller upward on stem, base decurrent. Capitula in a densely congested corymbiform synflorescence, erect, shortly pedunculate, with 10–13 florets. Involucre narrowly cylindrical, 4–9 mm in diam. Phyllaries in 4 or 5 rows, apically reddish, arachnoid, glabrescent, with a conspicuous midvein, apex acuminate and with a straight or weakly curved cusp; outer phyllaries ovate; inner phyllaries narrowly ovate-oblong. Receptacle bristles subulate, to 8 mm. Corolla rose-pink, 1.4–1.5 cm, sometimes sparsely glandular, tube 7–8 mm, limb 7–8 mm. Achene ca. 3 mm, glabrous, apex with a short crown. Pappus white or basally pale brown; outer bristles 2–4 mm; inner bristles 1.1–1.2 cm. Fl. and fr. Jul–Oct.

Forests, scree slopes, alpine and subalpine meadows; 1800–3800 m. Xinjiang (Tian Shan) [Kazakhstan, Kyrgyzstan].

Saussurea larionowii may be conspecific with the insufficiently known *S. alberti*, which has been described from a cultivated plant. Further studies in the field are needed to clarify the taxonomic status of these species.

107. *Saussurea mucronulata* Lipschitz, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 59(6): 80. 1954.

小尖风毛菊 xiao jian feng mao ju

Herbs 8–30 cm tall, perennial, densely caespitose. Rootstock and caudex strongly fibrous, branched, with many sterile and flowering leaf rosettes. Stems solitary or several, erect or ascending, simple or apically few branched. Rosette and lower stem leaves narrowly elliptic-linear, 3–5 × 0.2–0.5 cm, both surfaces grayish white and with a prominent midvein, abaxially densely arachnoid tomentose, adaxially sparsely arachnoid tomentose, margin entire or denticulate and subrevolute, apex acute. Middle and upper stem leaves sessile, gradually smaller upward on stem, linear, 10–25 × 1–3 mm, base subamplexicaul, apex acuminate. Capitula numerous, in a corymbiform synflorescence, shortly pedunculate. Involucre narrowly campanulate to cylindrical, 6–7 mm in diam. Phyllaries in 4 or 5 rows, blackish purple, apex acuminate, with a long ± reflexed cusp; outer phyllaries ovate, 3–5 × 1.5–2 mm; inner phyllaries linear-oblong, 5–8 × 1–1.5 mm. Receptacle with bristles. Corolla red, 1.3–1.5 cm, tube 5–6 mm, limb 8–10 mm. Achene brown, 2.5–3 mm, glabrous, apex with a short rim. Pappus dirty white to pale brown; outer bristles 2–3 mm, scabrid; inner bristles 1–1.2 cm. Fl. and fr. Aug.

- Scree slopes; 2100–3000 m. Xinjiang (Tian Shan).

108. *Saussurea coronata* Schrenk, Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Petersbourg 3: 107. 1845.

副冠风毛菊 fu guan feng mao ju

Saussurea dshungarica Iljin.

Herbs or subshrubs, 25–40 cm, perennial. Roots fibrously branched. Caudex much branched, with many flowering shoots. Stems erect or ascending, simple or apically branched, distinctly woody at base. Lower and middle stem leaves petiolate; leaf blade oblong to narrowly ovate-oblong, 5–10 × 1–2.5 cm, leathery, abaxially green or grayish, pubescent to almost glabrous, and gland-dotted, adaxially green, margin entire or crenate, apex acute to acuminate. Upper stem leaves gradually smaller upward on stem, narrowly ovate-elliptic, margin almost entire. Capitula [3–]7–10, in a ± condensed corymbiform synflorescence. Involucre narrowly campanulate, 7–10 mm in diam. Phyllaries in ca. 5 rows, green, apically purple, arachnoid or almost glabrous, gland-dotted, apex acuminate with a straight, not recurved cusp; outer phyllaries ovate, 2–3 × 1.5–2 mm; middle phyllaries 3–8 × 1–2 mm; inner phyllaries 8–10 × 1–1.5 mm. Receptacle bristles subulate, to 8 mm. Corolla purplish red, 1.2–1.6 cm, gland-dotted, tube 7–9 mm, limb 5–7 mm, lobes 2.5–3 mm. Achene cylindrical, to 5 mm, with a short crown. Pappus white; outer bristles 1–5 mm; inner bristles 1–1.2 cm. Fl. and fr. Jul–Aug.

Rocky mountain slopes; 1400–2100 m. NW Xinjiang (Huocheng) [Kazakhstan, Mongolia].

109. *Saussurea blanda* Schrenk, Bull. Sci. Acad. Imp. Sci. Saint-Petersbourg 10: 354. 1842.

绿风毛菊 lü feng mao ju

Saussurea konuroba Saposhnikow.

Herbs or subshrubs, 10–30 cm tall, perennial, caespitose. Roots fibrous. Caudex much branched, with several leaf rosettes and flowering shoots. Stem erect or ascending, simple or apically branched, woody at base. Lower and middle stem leaves petiolate; petiole ca. 2 cm; leaf blade narrowly obovate to oblong, 3–7 × 2–2.5 cm, pinnately lobed to pinnatisect, both surfaces green and gland-dotted; lateral lobes 2–5 pairs, triangular-ovate, margin entire or dentate, apex acute to obtuse. Upper stem leaves sessile, gradually smaller upward on stem, pinnately lobed or pinnatisect. Capitula 1–5, solitary or in a corymbiform or paniculiform synflorescence, pedunculate. Involucre campanulate, 7–10 mm in diam. Phyllaries in ca. 5 rows, green or purple, glabrous or sparsely arachnoid, gland-dotted, apex acute; outer phyllaries ovate, 5–6 × 1.5–2.5 mm; middle phyllaries elliptic, 6–9 × ca. 2 mm; inner phyllaries linear-oblong, 9–10 × 1–1.5 mm. Receptacle bristles subulate, 5–6 mm. Corolla purple, 1.2–1.4 cm, gland-dotted, tube 5–6 mm, limb 7–8 mm, lobes ca. 3 mm. Achene ca. 4 mm, ribbed, glabrous, apex with a short crown. Pappus white; outer bristles 3–5 mm; inner bristles 1–1.2 cm. Fl. and fr. Jul–Aug.

Rocky mountain slopes; ca. 1600 m. N Xinjiang (Toli) [Kazakhstan].

110. *Saussurea kanzanensis* Kitamura, Acta Phytotax. Geobot. 8: 75. 1939.

台湾风毛菊 tai wan feng mao ju

Herbs 6–14 cm tall, perennial. Stem solitary, ca. 1 mm in diam., slender, erect, simple, woody at base. Basal leaves withered at anthesis. Stem leaves petiolate; petiole 1–2.5 cm, narrowly winged, sometimes decurrent on stem; leaf blade narrowly elliptic to oblong, 2–4.5(–10) × 1–2(–4) cm, pinnately lobed to pinnatisect, both surfaces green and pubescent, base truncate to cuneate; lateral lobes 3–5 pairs, triangular to oblong, apex acute. Upper stem leaves smaller; uppermost stem leaves linear, subtending capitula. Capitula 1–3, solitary or in a corymbiform synflorescence, pedunculate. Involucre narrowly cylindrical, 4–5 mm in diam. Phyllaries in ca. 4 rows, margin arachnoid, apex acuminate; outer phyllaries ovate; middle phyllaries oblong; inner phyllaries linear, ca. 8 mm. Receptacle bristles few, subulate, 5–6 mm. Corolla red, 9–10 mm, tube 4–5 mm, limb 4–5 mm. Achene brownish purple, cylindrical, ca. 3.5 mm, glabrous. Pappus white, basally pale brown; outer bristles ca. 2 mm, scabrid; inner bristles ca. 7.5 mm. Fl. Aug–Sep, fr. Oct.

- Sunny rocky slopes, semishaded *Abies* forests; ca. 3500 m. Taiwan.

111. *Saussurea elata* Ledebour, Icon. Pl. 1: 20. 1829.

高风毛菊 gao feng mao ju

Herbs 1–2 m tall, perennial. Stem solitary, ca. 1 cm in diam., erect, branched from middle or apically, hollow. Basal

leaves usually withered at anthesis, petiolate. Middle stem leaves sessile or subsessile; leaf blade oblong-elliptic to narrowly ovate-elliptic, 6–15 × 1–4 cm, both surfaces green and strigose, abaxially glandular, margin entire or irregularly dentate, apex acute to acuminate. Upper stem leaves narrowly ovate-elliptic to linear. Capitula numerous, in a long and spreading corymbiform-paniculiform synflorescence. Involucre cylindric to narrowly campanulate, 5–7 mm in diam. Phyllaries greenish, colored in apical part, pubescent, apex subobtusely to obtuse; outer phyllaries ovate to ovate-oblong; inner phyllaries linear-oblong. Receptacle bristles ca. 3 mm. Corolla bluish purple, ca. 1.4 cm, tube ca. 7 mm, limb ca. 7 mm. Achene smooth, 7–8 mm. Pappus dirty white; outer bristles ca. 3 mm; inner bristles 8–10 mm. Fl. and fr. Jun–Aug.

Steppe meadows, thickets. N Xinjiang (Tacheng) [Kazakhstan].

No specimens of *Saussurea elata* from China have been seen by the present authors. The description here is based on plants from outside the Flora area, as well as on the treatments by Lipschitz (Fl. URSS 27: 422. 1962) and G. M. Shen (Fl. Xinjiang. 5: 285. 1999).

112. *Saussurea cana* Ledebour, Icon. Pl. 1: 18. 1829.

灰白风毛菊 hui bai feng mao ju

Saussurea cana var. *angustifolia* Ledebour; *S. fruticulosa* Karelin & Kirilov.

Herbs 8–25 cm tall, perennial, densely caespitose. Caudex much branched, with many leaf rosettes and flowering shoots. Stems erect, simple or apically branched. Rosette and lower stem leaves petiolate; petiole 1.5–3 cm; leaf blade narrowly elliptic, linear-oblong, or linear, 1.5–10 × 0.2–1.5 cm, abaxially grayish white and densely tomentose, adaxially grayish green and sparsely tomentose, margin entire, dentate, or pinnately lobed; lateral lobes or lateral teeth few, small, apex acuminate. Middle and upper stem leaves petiolate or sessile; leaf blade gradually smaller upward on stem. Uppermost stem leaves sessile, linear. Capitula 4–20, in a corymbiform synflorescence, shortly pedunculate. Involucre narrowly cylindric, 4–8 mm in diam. Phyllaries in 4–7 rows, apically purplish red, sparsely arachnoid, apex acute to obtuse; outer phyllaries ovate, 3–3.5 × ca. 2 mm; middle phyllaries ovate to narrowly elliptic, 3.5–9 × 1.5–2 mm; inner phyllaries linear, 9–10 × ca. 1.5 mm. Receptacle bristles subulate, to 8 mm. Corolla pale red, 1.2–1.3 cm, gland-dotted, tube 6–7 mm, limb 6–7 mm. Achene brown, cylindric, 4–7 mm, glabrous. Pappus white; outer bristles 2–3 mm; inner bristles 7–11 mm. Fl. and fr. Jul–Sep.

River valleys, rocky and dry mountain slopes; 800–2800 m. Gansu, Nei Mongol, Ningxia, Qinghai, Shanxi, Sichuan, Xinjiang [Kazakhstan, Russia (Siberia)].

113. *Saussurea petrovii* Lipschitz, Bot. Zhurn. (Moscow & Leningrad) 57: 524. 1972.

西北风毛菊 xi bei feng mao ju

Saussurea petrovii var. *latifolia* H. C. Fu.

Herbs 5–30 cm tall, perennial. Roots woody, fibrous. Caudex branched, covered with remains of leaf sheaths. Stem 1.5–2 mm in diam., erect, simple or apically branched. Lower and middle stem leaves sessile, linear, linear-oblong, or oblong, 2–

11 × 0.1–0.4 cm, abaxially grayish white and densely tomentose, adaxially green and glabrous, base attenuate, margin revolute and entire or with 1–5 pairs of remote teeth, apex acute to acuminate. Upper stem leaves narrowly linear, 1–4 × ca. 0.1 cm. Capitula 2–6, in a corymbiform synflorescence, pedunculate. Involucre cylindric, 5–8 mm in diam. Phyllaries in 4 or 5 rows, greenish yellow to straw-colored, apically purple, sparsely arachnoid, gland-dotted, apex shortly acuminate; outer phyllaries ovate, 2–3 × 1–2 mm; middle phyllaries oblong, 3–7 × 1–2 mm; inner phyllaries narrowly elliptic to linear, 7–9 × 1–2 mm. Receptacle with bristles. Corolla purple, (0.8–)1–1.4 cm, minutely gland-dotted, tube 5–7 mm, limb 5–7 mm, lobes 3–3.5 mm. Achene brown, cylindric, 3–4 mm, obtusely 4-angled, glabrous. Pappus white; outer bristles 2–3 mm, scabrid; inner bristles (0.7–)0.9–1.1 cm. Fl. and fr. Jun–Sep.

• Mountain slopes; 1700–2500 m. Gansu, Nei Mongol, Ningxia.

Saussurea cana and *S. petrovii* are very closely related and may even be conspecific. Further studies are needed to clarify if the characters that distinguish *S. petrovii* fall within the variation range of *S. cana*.

114. *Saussurea canescens* C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 11: 168. 1889.

伊宁风毛菊 yi ning feng mao ju

Saussurea canescens var. *major* C. Winkler.

Herbs 1.5–20 cm tall, perennial, caespitose. Rootstock stout, fibrously split. Caudex much branched, with many leaf rosettes and flowering shoots, covered with remains of leaf sheaths. Stem solitary, ascending or erect, simple. Rosette and lower stem leaves petiolate; leaf blade narrowly elliptic or narrowly obovate, 1.5–7 × 0.2–0.6 cm, both surfaces grayish green to grayish white and densely arachnoid tomentose, margin sinuate-dentate or pinnately lobed. Upper stem leaves subsessile, linear to subulate, 0.6–2 cm. Capitula 1–3, solitary or in a condensed corymbiform synflorescence, slightly nodding, shortly pedunculate. Involucre campanulate, (5–)7–10 mm in diam. Phyllaries in ca. 5 rows, apically purple, arachnoid pubescent, glabrescent, apex acuminate; outer phyllaries ovate; inner phyllaries narrowly ovate-elliptic to linear. Receptacle with bristles. Corolla pink, 1.1–1.3 cm, tube 5–6 mm, limb ca. 7 mm. Achene brown, cylindric, 2–3 mm, with a short crown. Pappus basally pale brown, apically white; outer bristles 2–3 mm; inner bristles 1–1.1 cm. Fl. and fr. Jul–Aug.

Rocky mountain slopes; 1600–2500 m. Xinjiang [Kazakhstan].

115. *Saussurea salemannii* C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 11: 166. 1889.

倒卵叶风毛菊 dao luan ye feng mao ju

Herbs 15–25 cm tall, perennial. Roots stout, fibrous. Caudex branched, with several leaf rosettes and flowering shoots. Stem solitary, erect, simple or branched. Basal and lower stem leaves petiolate; leaf blade obovate, 7–8 × 1.5–2 cm, pinnately lobed, pinnately dentate, or lyrate-pinnately lobed, both surfaces green, strongly scabrous, hispid, apex rounded. Middle and upper stem leaves sessile, gradually smaller upward on stem, narrowly ovate-elliptic, base amplexicaul, margin pin-

nately dentate, apex acuminate. Capitula 1 to few, solitary or in a corymbiform synflorescence, sessile or shortly pedunculate. Involucre obconic, 7–10 mm in diam. Phyllaries in 4–6 rows, pubescent, apex attenuate into a short cusp; outer phyllaries ovate; inner phyllaries narrowly ovate-elliptic to linear. Receptacle with bristles. Corolla pale red, 1.4–1.5 cm, tube ca. 7 mm, limb ca. 8 mm, lobes ca. 4 mm. Achene cylindrical, 4–5 mm, glabrous. Pappus white; outer bristles 1–5 mm; inner bristles 1.2–1.3 cm. Fl. and fr. Jun–Aug.

Mountain steppes and rock crevices; 1600–2200 m. NW Xinjiang (Bole, Huoqiang) [Kazakhstan].

116. *Saussurea popovii* Lipschitz, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 59(6): 82. 1954.

寡头风毛菊 *gua tou feng mao ju*

Herbs or subshrubs, 20–50(–100) cm tall, perennial, densely caespitose. Rootstock stout and fibrous. Caudex much branched. Stems very numerous, 1.5–2 mm in diam., ascending or erect, virgately branched from base, woody at base. Rosette and lower stem leaves shortly petiolate; leaf blade linear, 4.5–5.5 × 0.5–0.6 cm, thick, both surfaces grayish green, abaxially arachnoid and gland-dotted, margin entire or sparsely dentate, apex mucronate. Middle and upper stem leaves gradually smaller upward on stem, 3–30 × 1–3 mm. Capitula solitary or to 3 clustered on end of branches in a corymbiform synflorescence, pedunculate. Involucre narrowly campanulate to tubular, 3–6 mm in diam. Phyllaries in 4–6 rows, straw-colored, apically purplish, pubescent, gland-dotted, glabrescent, apex obtuse to shortly acuminate; outer phyllaries broadly ovate, 1–2 × 0.5–1 mm; middle and inner phyllaries narrowly ovate to linear, 2–7 × ca. 1 mm. Receptacle bristles subulate, to 8 mm. Corolla pink, ca. 1.6 cm, gland-dotted, tube ca. 6 mm, limb ca. 1 cm, lobes ca. 4 mm. Achene dark brown, 5–6 mm, 4-ribbed. Pappus white; outer bristles 1–4 mm; inner bristles 1–1.1 cm. Fl. and fr. Aug–Sep.

Gravelly shores, saline deserts; ca. 600 m. Xinjiang [W Mongolia].

117. *Saussurea yabulaiensis* Y. Y. Yao, Fl. Desert. Reipubl. Popularis Sin. 3: 472. 1992.

雅布赖风毛菊 *ya bu lai feng mao ju*

Herbs 12–35 cm tall, perennial. Rootstock stout. Stems many, erect or ascending, apically few branched, base densely covered with yellowish white or yellowish brown remains of leaf petiole and rachis. Lower stem leaves 2–15 cm, irregularly pinnately parted; segments 2 or 3, distant, needlelike, 3–20 × 0.5–3 mm, both surfaces sparsely gland-dotted otherwise glabrous, base widened and semiamplexicaul, margin entire, apex acuminate or sometimes obtuse and mucronate. Middle and upper stem leaves gradually smaller upward on stem, filiform, 1.5–3 cm, undivided. Capitula 1–4, solitary or in a lax corymbiform synflorescence. Involucre obconic, obovoid, or campanulate, 5–8 mm in diam. Phyllaries yellowish green, in 7 or 8 rows, glandular hairy, apex acute to acuminate and mucronate; outer phyllaries ovate; middle phyllaries narrowly ovate; inner phyllaries linear. Receptacle bristles subulate, 2–2.5 mm. Corolla purple, 1.2–1.5 cm, gland-dotted, tube 7–8 mm, limb 5–7

mm. Achene cylindrical to ovoid, 4- or 5-angled, sparsely glandular. Pappus white; outer bristles 2–3 mm; inner bristles 9–10 mm. Fl. and fr. Aug–Sep.

• Desert areas; 1300–1400 m. Nei Mongol (Alxa Meng).

No specimens of *Saussurea yabulaiensis* were seen by the present authors. The description here is based on the original publication and on the treatment by H. C. Fu (in Ma, Fl. Intramongol., ed. 2, 4: 749. 1993).

This species is close to and may be conspecific with *Saussurea catharinae* Lipschitz from Mongolia, which was described as having always undivided leaves.

118. *Saussurea mae* H. C. Fu in Ma, Fl. Intramongol., ed. 2, 4: 848. 1993.

毓泉风毛菊 *yu quan feng mao ju*

Herbs 4–15 cm tall, perennial. Caudex stout, much branched. Stems many, erect or ascending, base densely covered with brown remains of old petioles. Basal and lower stem leaves 3–7 cm, pinnately divided; segments 3–5, linear to narrowly ovate-linear, 3–10 × 0.5–2 cm, both surfaces sparsely arachnoid and glandular, margin entire or denticulate, apex acute to subobtuse and mucronate. Middle and upper stem leaves gradually smaller upward on stem, pinnately parted or undivided. Capitula 1–3, solitary or in a corymbiform synflorescence. Involucre campanulate, 8–10 mm in diam. Phyllaries in 5 or 6 rows, purplish, arachnoid, glandular; outer phyllaries ovate, apex acute; inner phyllaries narrowly ovate to linear, apex acuminate. Receptacle with bristles. Corolla rose, 1.3–1.6 cm, tube 6–7 mm, limb 7–9 mm. Achene cylindrical, ca. 4 mm, 4- or 5-angled, rugose, densely glandular. Pappus white; inner bristles 1.1–1.2 cm. Fl. and fr. Jul–Aug.

• Stony mountain slopes; ca. 2400 m. Nei Mongol (Alxa Meng, Longshou Shan).

No specimens of *Saussurea mae* were seen by the present authors, and the treatment here is based on the original description.

119. *Saussurea deserticola* H. C. Fu, J. Inner Mongolia Inst. Agric. Anim. Husb. 1: 50. 1981.

荒漠风毛菊 *huang mo feng mao ju*

Herbs 30–40 cm tall, perennial. Caudex stout, apically covered with blackish brown remains of old petioles. Stem solitary, erect, apically branched. Lower stem leaves petiolate; petiole 1–2 cm, winged, base semiamplexicaul; leaf blade ovate to narrowly ovate-elliptic in outline, 5–9 × 1.5–2 cm, bipinnately parted; segments 11–13 pairs, linear, needlelike, 2–12 × 1–3 mm, both surfaces arachnoid and densely glandular, apex obtuse to acute. Middle and upper stem leaves gradually smaller upward on stem, linear, undivided, margin subentire to dentate. Capitula many, in a paniculiform or corymbiform synflorescence, pedunculate. Involucre campanulate, 7–12 mm in diam. Phyllaries in 5–7 rows, apical half and margin purple, arachnoid pubescent, midvein dark; outer phyllaries ovate, apex obtuse or mucronate; middle phyllaries oblong-elliptic, apex acute; inner phyllaries narrowly elliptic to linear, apex obtuse. Receptacle bristles 1.5–6 mm. Corolla rose-purple, ca. 1.4 cm, tube ca. 6 mm, limb ca. 8 mm. Achene dark green, obconic, 3.5–4 mm, 4-angled, sparsely glandular, apically squamulose, apex with an

obtusely dentate crown. Pappus white; outer bristles short; inner bristles 1–1.1 cm. Fl. Sep.

- Desert areas; 1300–1400 m. Nei Mongol (Ih Ju Meng).

No specimens of *Saussurea deserticola* were seen by the present authors, and the description here is based on the treatment by H. C. Fu (in Ma, Fl. Intramongol., ed. 2, 4: 749. 1993).

120. *Saussurea salicifolia* (Linnaeus) Candolle, Ann. Mus. Natl. Hist. Nat. 16: 200. 1810.

柳叶风毛菊 liu ye feng mao ju

Serratula salicifolia Linnaeus, Sp. Pl. 2: 817. 1753.

Herbs 15–50 cm tall, perennial, caespitose. Roots stout, fibrous. Caudex much branched near ground level. Stems usually numerous, erect, simple or branched. Leaves shortly petiolate or sessile; leaf blade narrowly elliptic to linear, 2–10 × 0.2–0.5 cm, abaxially white and densely tomentose, adaxially green and glabrous or sparsely pubescent, base cuneate-attenuate, margin entire or rarely basally dentate and usually revolute, apex acuminate. Capitula numerous to few, in a corymbiform synflorescence, pedunculate. Involucre cylindric, 4–7 mm in diam. Phyllaries in 4 or 5 rows, purplish red; outer phyllaries ovate, 1.5–2 × 1–1.5 mm, apex acute to obtuse; middle phyllaries ovate to narrowly ovate-elliptic, 2–6 × 1–1.5 mm, apex acute; inner phyllaries narrowly ovate-elliptic to linear, 6–8 × 1–2 mm, apex acute. Receptacle bristles 6–8 mm. Corolla pink, 1.2–1.5 cm, tube 6–8 mm, limb 6–7 mm. Achene brown, 3.5–4.5 mm, glabrous. Pappus white; outer bristles ca. 2 mm; inner bristles 1–1.1 cm. Fl. and fr. Jun–Sep.

Thickets, meadows, moist places in gullies; 1600–3800 m. Gansu, Heilongjiang, Nei Mongol [Mongolia, Russia (Siberia)].

121. *Saussurea lomatolepis* Lipschitz, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 59(6): 80. 1954.

纹苞风毛菊 wen bao feng mao ju

Herbs 15–35 cm tall, perennial. Roots woody, fibrous. Caudex branched, with several flowering shoots. Stem erect or ascending, simple or rarely branched from base. Basal and lower stem leaves shortly petiolate; leaf blade ovate-elliptic to oblong, 8–10 × 1.5–2 cm, abaxially grayish white and densely arachnoid tomentose, adaxially green, almost glabrous, and scabrous, margin sinuate-dentate to pinnately cleft. Upper stem leaves sessile, gradually smaller upward on stem, usually with sterile shoots in axils. Capitula 2–5, in a condensed corymbiform synflorescence, pedunculate. Involucre campanulate, 8–10 mm in diam. Phyllaries in 4 or 5 rows, straw-colored, pubescent, margin distinct, narrow, and brown or black, apex obtuse to rounded; outer phyllaries ovate; inner phyllaries oblong. Receptacle bristles subulate, to 8 mm. Corolla dark red, ca. 1.2 cm, gland-dotted, tube ca. 6 mm, limb ca. 6 mm. Achene dark brown, cylindric, 4–6 mm, glabrous. Pappus white; outer bristles 1.5–3 mm; inner bristles 1–1.1 cm. Fl. and fr. Jul–Oct.

- Mountain steppes, meadows; 1300–2700 m. Xinjiang.

122. *Saussurea polycephala* Handel-Mazzetti, Acta Horti Gothob. 12: 313. 1938.

多头风毛菊 duo tou feng mao ju

Saussurea thibetica Franchet, J. Bot. (Morot) 8: 338. 16 Oct 1894, not *S. tibetica* C. Winkler (1894); *S. leucota* Handel-Mazzetti.

Herbs 60–100 cm tall, perennial. Rhizome stout. Stem solitary, erect, much branched in apical part, unwinged. Basal and lower stem leaves withered at anthesis. Middle stem leaves petiolate; petiole 4–7 mm; leaf blade narrowly ovate to narrowly elliptic, 10–18 × 1.5–3 cm, abaxially white and densely tomentose, adaxially green and sparsely strigose, base cuneate, margin denticulate, apex acuminate. Upper stem leaves narrowly ovate-elliptic, gradually smaller upward on stem. Capitula very numerous, in an ample corymbiform-paniculiform synflorescence, pedunculate. Involucre cylindric, 5–6 mm in diam. Phyllaries in 5 or 6 rows; outer phyllaries ovate, 2–3 × 1.5–2 mm, sparsely arachnoid, apex acuminate; middle phyllaries narrowly elliptic, 3–6 × 1–1.5 mm, densely villous, apex acute; inner phyllaries narrowly elliptic, 6–9 × 1–1.5 mm, sparsely villous, apex obtuse. Receptacle bristles to 5 mm. Corolla purple, 0.9–1.1 cm, tube 5–6 mm, limb 4–5 mm, lobes 2.5–3 mm. Achene brown, ca. 3 mm, ribbed. Pappus white; outer bristles ca. 2 mm; inner bristles ca. 8 mm. Fl. and fr. Aug–Sep.

- Forests, forest margins, near mountain trails, mountain slopes; 1200–2200(–4600) m. Hubei, Sichuan.

Saussurea leucota, described from W Sichuan, is preliminarily included here as a synonym; it may deserve separate taxonomic status. It is certainly not conspecific with *S. salicifolia*.

123. *Saussurea chinensis* (Maximowicz) Lipschitz, Bot. Zhurn. (Moscow & Leningrad) 51: 1496. 1966.

中华风毛菊 zhong hua feng mao ju

Saussurea salicifolia (Linnaeus) Candolle var. *chinensis* Maximowicz, Bull. Soc. Imp. Naturalistes Moscou 54(1): 28. 1879; *S. denticulata* Ledebour var. *chinensis* (Maximowicz) Y. Ling.

Herbs 30–75 cm tall, perennial. Stem solitary, simple or apically branched. Basal leaves withered at anthesis. Lower stem leaves sessile, narrowly ovate-elliptic to narrowly elliptic, 9–10 × 1.5–2.5 cm, abaxially white, densely tomentose, and gland-dotted, adaxially green and glabrous, base cuneate, margin denticulate, apex long acuminate. Middle stem leaves sessile, narrowly ovate-elliptic, 9–12 × 1.5–2.5 cm, base semi-amplexicaul, margin denticulate, apex acuminate. Upper stem leaves sessile, narrowly elliptic to linear, margin entire. Capitula 10–20, in a compact corymbiform synflorescence, pedunculate. Involucre cylindric, 4–5 mm in diam. Phyllaries in 4 or 5 rows, greenish yellow, apically purple, sparsely pubescent; outer phyllaries ovate, 2–3 × 1–1.5 mm, sparsely arachnoid, apex acuminate; middle phyllaries narrowly elliptic to linear, 3–8 × 1–2 mm, apically densely appressed villous; inner phyllaries linear, 7–8 × 1–1.5 mm, apex obtuse to acute. Receptacle bristles 2–3 mm. Corolla pale purple, 8–9 mm, tube 3–4 mm, limb 4–5 mm, lobes 2–2.5 mm. Achene brown, ca. 2 mm, glabrous. Pappus straw-colored; outer bristles 1–3 mm; inner bristles 5–7 mm. Fl. and fr. Aug–Sep.

- Grasslands on mountain slopes; 1900–2300 m. Hebei (Xiaowutai Shan).

Saussurea chinensis is very close to *S. polycephala*, only differing by fewer capitula in a smaller and more compact synflorescence.

124. *Saussurea zhuxiensis* Y. S. Chen & Q. L. Gan, J. Syst. Evol. 49: 160. 2011.

竹溪风毛菊 zhu xi feng mao ju

Herbs 30–50 cm tall, perennial. Rhizome stout, with numerous fibrous roots. Stems solitary or 3–5, erect, apically branched. Basal and lower stem leaves sessile, narrowly ovate-elliptic, 5–15 × 1–2 cm, abaxially light green and puberulent, adaxially green and puberulent, base attenuate, margin sparsely dentate or incised, apex acuminate and mucronate. Middle stem leaves narrowly ovate-elliptic, margin usually entire or sometimes minutely denticulate. Upper stem leaves smaller upward on stem, margin entire. Capitula numerous, in a lax corymbiform synflorescence, shortly pedunculate. Involucre campanulate, 8–10 mm in diam. Phyllaries in ca. 5 rows; outer phyllaries green, narrowly ovate-oblong, 4–5 × ca. 1 mm, sparsely arachnoid, apex acute; inner phyllaries light green, narrowly ovate-elliptic, 10–12 × 1–1.5 mm, glabrous, apex acuminate. Receptacle bristles filiform, 5–6 mm. Corolla purplish red, ca. 1.4 cm, tube ca. 7 mm, limb ca. 7 mm. Achene ellipsoid, ca. 3 mm. Pappus bristles in 1 row, grayish white, ca. 1 cm, plumose. Fl. Aug.

• Rock crevices, sandy places along streams; ca. 900 m. Hubei (Zhuxi).

125. *Saussurea virgata* Franchet, J. Bot. (Morot) 8: 340. 1894.

帚状风毛菊 zhou zhuang feng mao ju

Herbs 20–90 cm tall, perennial. Stem solitary, 5–7 mm in diam., erect, apically branched, winged, densely leafy. Lower and middle stem leaves shortly petiolate or sessile; leaf blade narrowly ovate-elliptic, 6–10 × 1–2 cm, abaxially grayish white or grayish green and arachnoid, adaxially green and glabrous or with short glandular hairs, base decurrent, margin entire, crenate, or apically denticulate, apex acute to acuminate. Upper stem leaves linear, 1–5 × 0.1–0.3 cm, margin entire. Capitula numerous, clustered at end of branches, in a corymbiform synflorescence, shortly pedunculate. Involucre narrowly obovoid, 5–8 mm in diam. Phyllaries in ca. 5 rows, narrowly ovate-elliptic to linear, arachnoid, apex acute; outer phyllaries ovate-elliptic, 5–6 × 2–2.5 mm, apical part herbaceous and reflexed, apex acuminate to caudate; middle and inner phyllaries 7–11 × 1–2 mm, apically and near margin purplish red, scarious, apex acute and erect. Receptacle bristles 4–7 mm. Corolla purplish red, ca. 9 mm. Achene glabrous. Pappus pale brown; outer bristles scabrid; inner bristles ca. 8 mm. Fl. and fr. Jul–Sep.

• Grasslands on mountain slopes; 2800–3400 m. Yunnan (Dali, Huize).

126. *Saussurea integrifolia* Handel-Mazzetti, Acta Horti Gothob. 12: 313. 1938.

全缘叶风毛菊 quan yuan ye feng mao ju

Herbs 30–100 cm tall, perennial. Stem erect, simple or branched in apical part. Basal and lower stem leaves withered at anthesis. Middle stem leaves sessile or subsessile; leaf blade narrowly ovate-elliptic to linear, 5–12 × 0.6–0.7 cm, abaxially white and densely tomentose, adaxially green and slightly sca-

brid, base cuneate-attenuate, margin entire and revolute, apex long acuminate. Upper stem leaves similar to middle stem leaves, gradually smaller upward on stem. Capitula numerous, in a corymbose-paniculate synflorescence, shortly pedunculate. Involucre narrowly campanulate, ca. 5 mm in diam. Phyllaries in 5 or 6 rows, dark purple, sparsely pubescent, glabrescent; outer phyllaries ovate, ca. 3 × 1–1.5 mm, apex acute to obtuse; middle phyllaries elliptic, ca. 7 × 2 mm, apex obtuse; inner phyllaries narrowly linear-elliptic, 7–8 × ca. 1 mm, apex acute to obtuse. Corolla purple, ca. 9 mm, tube ca. 4 mm, limb ca. 5 mm. Achene brown, ca. 3 mm. Pappus straw-colored; outer bristles ca. 3 mm; inner bristles ca. 9 mm. Fl. and fr. Aug–Sep.

• Thickets in mountain valleys, grasslands, by trails on mountain slopes; 2000–3500 m. NW Sichuan, ?NW Yunnan (Dêqên).

It is not clear if the much smaller specimens of *Saussurea integrifolia* from Yunnan (10–18 cm tall) with fewer (3–7) but slightly larger capitula really belong to the same taxon as the plants from NW Sichuan.

127. *Saussurea sutchuenensis* Franchet, J. Bot. (Morot) 8: 353. 1894.

四川风毛菊 si chuan feng mao ju

Saussurea dutaillyana Franchet var. *macrocephala* (Y. Ling) X. Y. Wu; *S. dutaillyana* var. *shensiensis* Y. Y. Pai; *S. rufostrigillosa* Y. Ling; *S. rufostrigillosa* var. *macrocephala* Y. Ling.

Herbs 40–100 cm tall, perennial. Rhizome stout. Stem solitary, erect, apically branched. Basal and lower stem leaves petiolate; petiole 10–25 cm; leaf blade ovate to triangular-ovate, ca. 14 × 10 cm, both surfaces green and glabrous or strigillose, base truncate to cordate, margin sharply dentate, apex acuminate. Median stem leaves petiolate; petiole 1.5–3.5 cm; leaf blade gradually smaller upward on stem, ovate to triangular-ovate, 4–6 × 2–4 cm. Upper stem leaves petiolate; leaf blade narrowly ovate, base cuneate-attenuate. Capitula numerous, clustered 3–6 at end of branches in a corymbiform-paniculiform synflorescence, pedunculate. Involucre campanulate to obconic, 5–9(–15) mm in diam. Phyllaries in 6 or 7 rows, arachnoid lanate; outer and middle phyllaries narrowly ovate to narrowly ovate-elliptic, 3–10 × 1–2 mm, margin apically crenate-dentate, apex herbaceous, acute, and reflexed; inner phyllaries linear, 8–10 × 1.5–2 mm, apex obtuse and erect. Receptacle bristles subulate, 4–6 mm. Corolla purple or white, 1–1.2(–1.5) cm, tube 6–7 mm, limb 5–5.5 mm, lobes 3–3.5 mm. Achene brown, ca. 3 mm, smooth, glabrous. Pappus straw-colored; outer bristles 2–4 mm; inner bristles 7–9 mm. Fl. and fr. Jul–Sep.

• Forests, forest margins; 700–2000 m. N Chongqing (Chengkou), Henan (Lushi), ?Hubei, Shaanxi.

128. *Saussurea dolichopoda* Diels, Bot. Jahrb. Syst. 29: 623. 1901.

长梗风毛菊 chang geng feng mao ju

Saussurea saligniformis Handel-Mazzetti; *S. wilsoniana* Handel-Mazzetti.

Herbs 0.6–1.4 m tall, perennial. Rhizome stout. Stems solitary or few, (2–)5–8 mm in diam., erect, apically much branched, apically flexuous. Basal leaves withered at flowering

time. Lower and middle stem leaves petiolate; petiole 1.5–5 cm; leaf blade narrowly ovate to oblong, 8–19 × 2–6.5 cm, both surfaces green, abaxially with a few isolated articulate hairs, adaxially glabrous, base cordate to rounded, margin denticulate and sparsely ciliate, apex acuminate to caudate. Upper stem leaves gradually smaller upward on stem; petiole 0.5–1.5 cm; leaf blade narrowly elliptic, base cuneate to rounded. Capitula numerous, in a diffuse corymbiform-paniculiform synflorescence, pedunculate. Involucre campanulate, 6–8(–13) mm in diam. Phyllaries in 4–6 rows, straw-colored, sometimes apically tinged purple, glabrous or apically bearded, apex obtuse to subacute; outer phyllaries ovate, 1.5–3 × 1–2 mm; middle phyllaries narrowly ovate, 3–10 × 1.5–2 mm; inner phyllaries narrowly elliptic to linear, 10–14 × 1–1.5 mm. Receptacle bristles brownish, subulate, 4–8 mm. Corolla purple, 1–1.3 cm, tube 4.5–7 mm, limb 5–6.5 mm, lobes 3–3.5 mm. Achene blackish brown, cylindrical, 3–5 mm, smooth, glabrous. Pappus pale brown; outer bristles 2–4 mm; inner bristles (0.8–)1–1.1 cm. Fl. and fr. Jul–Oct.

• Forests, forest margins, montane meadows, rocky slopes; 1400–3700 m. Gansu, Guizhou, Henan, Hubei, Shaanxi, Sichuan, NW Yunnan (Lijiang, Zhongdian).

129. *Saussurea saligna* Franchet, J. Bot. (Morot) 8: 345. 1894.

尾尖风毛菊 wei jian feng mao ju

Herbs 70–120 cm tall, perennial. Stem solitary, 5–7 mm in diam., erect, apically much branched. Lower and middle stem leaves petiolate; petiole 1–3 cm; leaf blade narrowly ovate-elliptic to oblong, 10–20 × 3–4 cm, both surfaces green and glabrous or subglabrous, base rounded to truncate, margin denticulate, apex caudate-acuminate. Upper stem leaves shortly petiolate; leaf blade narrowly ovate-elliptic, 7–15 × 1–3 cm. Capitula numerous, clustered 5–7 at end of branches in a congested corymbiform synflorescence, shortly pedunculate. Involucre campanulate to obconic, 6–10 mm in diam. Phyllaries in 5–7 rows, straw-colored with green veins, subglabrous, scarious, apically bearded, apex obtuse; outer phyllaries ovate, 2–3 × 1–1.5 mm; middle phyllaries oblong to narrowly elliptic, 3–8 × 1–1.5 mm; inner phyllaries narrowly obovate-elliptic to linear, 8–10 × 1–1.5 mm. Receptacle bristles subulate, 5–7 mm. Corolla white or purple, 9–10 mm, tube 4–6 mm, limb 4–5 mm, lobes 3–3.5 mm. Achene cylindrical, 4–5 mm, ribbed, glabrous. Pappus dirty white; outer bristles 2–3 mm; inner bristles 8–10 mm. Fl. and fr. Jul–Oct.

• Mountain slopes, forests; 1200–2500 m. N Chongqing (Chengkou), Shaanxi.

130. *Saussurea conyzoides* Hemsley, J. Linn. Soc., Bot. 29: 309. 1892.

假蓬风毛菊 jia peng feng mao ju

Saussurea oppositicolor H. Léveillé & Vaniot; *S. rosthornii* Diels var. *oppositicolor* (H. Léveillé & Vaniot) F. H. Chen ex Handel-Mazzetti; *S. silvestrii* Pampanini.

Herbs 0.9–1.2 m tall, perennial. Stem solitary, ca. 5 mm in diam., erect, branched from middle. Middle stem leaves petiolate; petiole to 2.5 cm; leaf blade elliptic to ovate, 7.5–15(–20)

× 5–6 cm, abaxially grayish green to grayish white and densely tomentose, adaxially green and sparsely strigose but glabrescent, base cuneate-attenuate, margin denticulate, shallowly crenate, or entire, apex acuminate. Upper leaves similar, gradually smaller upward on stem, narrowly elliptic, 8–15 × 1.5–3 cm. Uppermost stem leaves narrowly elliptic to linear. Capitula numerous, in a corymbiform-paniculiform synflorescence, sessile or shortly pedunculate. Involucre narrowly cylindrical, 3–5 mm in diam. Phyllaries in 5 or 6 rows, yellowish green, sparsely arachnoid or glabrescent; outer phyllaries oblong, 1.5–2 × 0.5–0.8 mm, apex acute and mucronate; middle phyllaries ovate to narrowly elliptic, 2–7 × 0.8–1.5 mm, apex acute to obtuse and without a mucro; inner phyllaries narrowly elliptic to linear, 7–9 × 0.5–1 mm, apically bearded, apex obtuse. Receptacle bristles 4–5 mm. Corolla purple, 0.9–1.1 cm, tube 4–5 mm, limb 5–6 mm, lobes 3.5–4 mm. Achene (immature) ca. 2 mm, glabrous. Pappus dirty white; outer bristles 3–4 mm; inner bristles 8–9 mm. Fl. Jul–Aug.

• Forests; 1000–2300 m. Guizhou, Henan, Hubei, Shaanxi, Sichuan.

131. *Saussurea flexuosa* Franchet, J. Bot. (Morot) 8: 341. 1894.

城口风毛菊 cheng kou feng mao ju

Saussurea flexuosa var. *penicillata* Franchet; *S. tsinlingensis* Handel-Mazzetti.

Herbs 50–100 cm tall, perennial. Rhizome stout. Stem solitary, erect, apically branched. Basal leaves withered at anthesis. Lower and middle stem leaves petiolate; petiole 2–7 cm, winged and usually with a pair of lobes; leaf blade ovate, elliptic, or narrowly ovate-elliptic, 6–17 × 4–9 cm, abaxially grayish white and densely arachnoid tomentose, adaxially green, scabrid, and sparsely strigose, base cordate, truncate, or cuneate, margin serrulate or sinuate-dentate, apex acuminate. Upper stem leaves shortly petiolate; leaf blade gradually smaller upward on stem, narrowly elliptic, base cuneate, margin denticulate or entire. Capitula numerous or few, in a laxly corymbiform or paniculiform synflorescence, pedunculate. Involucre narrowly campanulate, 7–10 mm in diam. Phyllaries in 4 or 5 rows, apically red to blackish purple, sparsely arachnoid lanate; outer phyllaries ovate, 2–3 × 1–1.5 mm, apex acute, with a black straight mucro; middle phyllaries ovate-elliptic, 3–7 × 1.5–2 mm, apex acute; inner phyllaries narrowly elliptic to linear, 7–10 × 1.5–2 mm, apex acute to obtuse. Corolla red, 1–1.1 cm, tube 4–5 mm, limb ca. 6 mm. Achene brown, cylindrical, ca. 4 mm, glabrous. Pappus pale brown; outer bristles 2–4 mm, scabrid; inner bristles 9–10 mm. Fl. and fr. Jul–Sep.

• Forests, forest margins, thickets, near trails, meadows; 1300–2000 m. Chongqing, Gansu, Henan, W Hubei, S Shaanxi, Sichuan.

132. *Saussurea elegans* Ledebour, Icon. Pl. 1: 19. 1829.

优雅风毛菊 you ya feng mao ju

Saussurea amoena Karelina & Kirilov; *S. elegans* var. *latifolia* Karelina & Kirilov; *S. elegans* var. *nivea* Lipschitz; *S. salicifolia* (Linnaeus) Candolle var. *elegans* (Ledebour) Trautvetter; *S. tenuis* Ledebour.

Herbs 10–70 cm tall, perennial. Roots fibrous. Stems solitary or few, erect, apically branched, usually with short sterile shoots in leaf axils. Basal and lower stem leaves petiolate; petiole 1.5–6 cm; leaf blade oblong to ovate-oblong, to 15 × 1.5–4 cm, pinnately lobed or lyrate-pinnately lobed, abaxially grayish white or green, arachnoid tomentose or glabrous, and gland-dotted, adaxially green, scabrous, and strigose or glabrous. Middle stem leaves shortly petiolate or sessile; leaf blade ovate to elliptic, 3–10 × 0.5–3 cm, undivided, margin entire or dentate, apex acuminate. Upper stem leaves narrowly ovate-elliptic to linear, 3–8 mm wide. Capitula numerous, in a corymbiform or paniculiform synflorescence. Involucre cylindrical, 5–8 mm in diam. Phyllaries in 5 rows, yellowish green, apically purple, sparsely arachnoid, gland-dotted; outer phyllaries ovate, 2–3 × 1.5–2 mm, apex shortly acuminate; middle phyllaries narrowly ovate, 3–8 × 1.5–3 mm, apex shortly acuminate; inner phyllaries linear, 8–10 × 1.5–2 mm, apex obtuse. Receptacle bristles to 7 mm. Corolla purple, 1.1–1.4 cm, tube 6–8 mm, limb 5–6 mm, lobes 2.5–4 mm. Achene brown, cylindrical, 3–5 mm, glabrous. Pappus white; outer bristles 2–4 mm; inner bristles 1–1.2 cm. Fl. and fr. Jul–Sep.

Grassy or stony mountain slopes, forest meadows, fields; 1100–3200 m. Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia (Siberia), Tajikistan, Uzbekistan].

133. *Saussurea acroua* Cummins, Bull. Misc. Inform. Kew 1908: 19. 1908.

川甘风毛菊 *chuan gan feng mao ju*

Herbs 30–80 cm tall, perennial. Stem solitary, 2–4 mm in diam., erect, branched from middle. Lower stem leaves petiolate; petiole to 5 cm; leaf blade oblong, 4–15 × 2–6 cm, pinnatisect, both surfaces green, abaxially sparsely arachnoid pubescent and gland-dotted, adaxially scabrid and strigose; lateral segments 4–10 pairs, linear-oblong, to 3 × 0.7 cm, margin entire or with a single tooth and revolute, apex mucronate. Middle and upper stem leaves gradually smaller upward on stem, base auriculate-amplexicaul. Uppermost stem leaves linear, undivided or with 1–4 segments. Capitula numerous, in a paniculiform-corymbiform synflorescence, pedunculate. Involucre tubular to narrowly campanulate, 5–8 mm in diam. Phyllaries in ca. 4 rows, apically ± villous; outer phyllaries ovate, 2–3 × 1–1.5 mm, apex acuminate; middle phyllaries narrowly elliptic, 3–7 × 1–1.2 mm, apex acute to obtuse; inner phyllaries linear, 7–8(–11) × 0.8–1 mm, apex obtuse. Receptacle bristles 2–3 mm. Corolla pink, 8–9 mm, glabrous, tube 2.5–3.5 mm, limb 5–6 mm, lobes 2.5–3 mm. Achene brown, obconic to cylindrical, 3–3.5 mm, gland-dotted, with a short crown. Pappus light brown; outer bristles 2–2.5 mm; inner bristles 8–10 mm. Fl. and fr. Aug.

• Riverbanks, grassy slopes, clay soil at roadsides; 2100–3600 m. Gansu, Sichuan.

134. *Saussurea megaphylla* (X. Y. Wu) Y. S. Chen, J. Syst. Evol. 49: 160. 2011.

秦岭风毛菊 *qin ling feng mao ju*

Saussurea carduiiformis Franchet var. *megaphylla* X. Y. Wu, Fl. Tsinling. 1(5): 423. 1985.

Herbs to 45 cm tall, perennial. Stem solitary, 4–5 mm in diam., erect, simple. Stem leaves petiolate, usually arranged around middle of stem; petiole 0.7–1.8 cm; leaf blade oblong, 6–20 × 2.5–6 cm, pinnatipartite, abaxially pale green and densely glandular hairy, adaxially green and sparsely shortly glandular hairy; lateral lobes 13–17 pairs, oblong, narrowly ovate-elliptic, or linear, 0.6–3 × 0.1–0.5 cm, usually curved downward, margin entire, apex acuminate. Capitula usually 10–14, in a laxly corymbiform synflorescence, long pedunculate. Involucre globose to campanulate, 1–1.5 cm in diam. Phyllaries in 5 or 6 rows, brownish, leathery; outer phyllaries ovate, ca. 5 × 2 mm; inner phyllaries apically black, narrowly oblong, 10–12 × ca. 2 mm, tomentose, apex long acuminate and recurved. Receptacle bristles yellowish brown, 5–6 mm. Corolla pink, 1–1.2 cm, glabrous, tube 5–6 mm, limb 5–6 mm, lobes ca. 4 mm. Achene brown, cylindrical, ca. 5 mm, glabrous. Pappus yellowish white; outer bristles 3–4 mm; inner bristles ca. 8 mm. Fl. Aug–Sep, fr. Sep–Oct.

• Montane meadows, margins of mixed forests; 1800–2000 m. Shaanxi (Huxian).

135. *Saussurea tianshuiensis* X. Y. Wu, Fl. Loess-Plat. Sin. 5: 520. 1989.

天水风毛菊 *tian shui feng mao ju*

Herbs ca. 1.5 m tall, perennial. Stem solitary, erect, apically branched, unwinged. Basal and lower stem leaves petiolate; petiole 1–2 cm; leaf blade narrowly ovate, elliptic, or obovate, 10–21 × 3–7 cm, pinnately lobed or pinnately parted, both surfaces green, abaxially glabrous, adaxially scabrid, glandular, or glabrescent, base cuneate, margin sinuate-dentate, apex acute; main segments or lobes 3–5 pairs, triangular to narrowly triangular-ovate, margin entire or dentate, apex acute and mucronate. Middle and upper stem leaves gradually smaller upward on stem, narrowly elliptic, undivided, margin dentate, apex long acuminate. Capitula 1–4, on end of branch apices, solitary or in a corymbiform synflorescence, long pedunculate. Involucre tubular-campanulate, 5–8 mm in diam. Phyllaries in 5 or 6 rows, apex acute to subobtuse; outer phyllaries triangular-ovate, ca. 5 mm; middle phyllaries narrowly elliptic, 0.6–1.5 cm; inner phyllaries narrowly elliptic to linear, 1–1.8 cm. Corolla purple, ca. 1.3 cm, tube ca. 6 mm, limb ca. 4 mm. Achene ca. 4 mm, glabrous. Pappus white or yellowish brown; outer bristles 2–5 mm; inner bristles ca. 1 cm. Fl. Aug–Sep.

• Montane meadows, forest margins, thickets; 1800–2500 m. SE Gansu, S Ningxia, Shaanxi.

No specimens of *Saussurea tianshuiensis* or *S. tianshuiensis* var. *huxianensis* were seen by the present authors. The descriptions here are based on the original publication.

- 1a. Involucre tubular-campanulate, ca. 8 mm in diam.; inner phyllaries 1.3–1.8 cm 135a. var. *tianshuiensis*
- 1b. Involucre turbinate to campanulate-turbinate, 5–7 mm in diam.; inner phyllaries ca. 1 cm 135b. var. *huxianensis*

135a. *Saussurea tianshuiensis* var. *tianshuiensis*

天水风毛菊(原变种) *tian shui feng mao ju* (yuan bian zhong)

Involucre tubular-campanulate, ca. 8 mm in diam. Inner phyllaries to 1.8 cm.

• Montane meadows, forest margins, thickets; 1800–2500 m. SE Gansu, S Ningxia, SW Shaanxi.

135b. *Saussurea tianshuiensis* var. *huxianensis* X. Y. Wu, Fl. Loess-Plat. Sin. 5: 521. 1989.

户县风毛菊 hu xian feng mao ju

Involucre turbinate to campanulate-turbinate, 5–7 mm in diam. Inner phyllaries to 1 cm.

• Montane meadows, forest margins, thickets; 2300–2400 m. Shaanxi (Huxian).

136. *Saussurea pteridophylla* Handel-Mazzetti, Symb. Sin. 7: 1149. 1936.

延翅风毛菊 yan chi feng mao ju

Herbs 60–90 cm tall, perennial. Rhizome stout, apically branched. Stem solitary, erect, apically branched, partly winged. Basal and stem leaves petiolate; petiole to 2.5 cm, winged; leaf blade elliptic to narrowly elliptic, 10–16 × 2.5–4(–6) cm, pinnately lobed to pinnatisect, abaxially light green and with articulate hairs, adaxially dark green, scabrous, and with short spinulose prickles; lateral lobes 6–10 pairs, ovate to narrowly ovate-elliptic, 1–3 × 0.2–0.5 cm, margin ciliate and dentate or entire, apex acute and mucronate. Uppermost leaves linear-subulate, 5–15 × ca. 1 mm. Capitula numerous, in a laxly paniculiform synflorescence, pedunculate, with 5–10 florets. Involucre narrowly campanulate to tubular, 4–6 mm in diam. Phyllaries in ca. 6 rows, straw-colored, apically dark purple, sparsely arachnoid; outer phyllaries ovate, 2–3 × ca. 1 mm, apex acuminate; middle phyllaries narrowly ovate-oblong, 3–7 × 1–1.5 mm, apex acute; inner phyllaries narrowly oblong to obovate, 7–9 × 1–1.5 mm, apex obtuse and barbellate. Receptacle bristles 2–5 mm. Corolla red, 7–8(–10) mm, tube 2–3 mm, limb 4–5 mm, lobes 2–2.5 mm. Achene obconic, 2.5–3 mm, glabrous. Pappus pale brown; outer bristles 2–3 mm; inner bristles 5–7 mm. Fl. and fr. Oct.

• Thickets; ca. 3000 m. SW Sichuan (Yanyuan).

137. *Saussurea compta* Franchet, J. Bot. (Morot) 10: 422. 1896.

华美风毛菊 hua mei feng mao ju

Herbs 30–80 cm tall, perennial. Stem solitary, ca. 3 mm in diam., simple or apically branched. Basal and lower stem leaves withered at anthesis. Middle stem leaves shortly petiolate; leaf blade narrowly elliptic, 4–7 × 1–2 cm, pinnately lobed, abaxially white and densely tomentose, adaxially green, scabrous, and sparsely hispid; lateral segments 2 or 3 pairs, oblong to narrowly triangular-ovate, margin entire or with a pair of lobes, apex acute to obtuse; terminal segment caudate. Upper stem leaves sessile or subsessile, similar to middle stem leaves, gradually smaller upward on stem; lateral lobes 1 or 2 pairs. Capitula 3–15, in a corymbiform synflorescence, pedunculate. Involucre narrowly obconic, 6–8 mm in diam. Phyllaries in 5 or 6 rows, apically sparsely pubescent to villous; outer phyllaries ovate, 2–3 × 1–1.5 mm, apex acute; middle phyllaries narrowly

elliptic, 3–7 × 1–1.5 mm, apex obtuse; inner phyllaries narrowly elliptic-linear, 7–10 × 1–1.5 mm, apex obtuse. Corolla purple, 7–8 mm, tube 4–5 mm, limb 2.5–3 mm, lobes 1.5–2 mm. Achene blackish brown, 2.5–3 mm. Pappus dirty white; outer bristles ca. 2 mm; inner bristles ca. 1 cm. Fl. Aug–Sep, fr. Sep–Nov.

• Montane steppes; 2300–2600 m. W Sichuan (Kangding).

The record of this species from Yunnan (S. W. Liu, Fl. Yunnan. 13: 572. 2004) must be referable to *Saussurea chrysanthemoides* (which was cited as a synonym).

138. *Saussurea variiloba* Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 6: 71. 1949.

变裂风毛菊 bian lie feng mao ju

Herbs 40–100 cm tall, perennial. Rhizome short and stout, with many fibrous roots. Stem solitary, ca. 6 mm in diam., erect, apically branched. Lower stem leaves withered at anthesis. Middle stem leaves shortly petiolate to sessile; leaf blade narrowly elliptic, 4–18 × 2–6 cm, pinnately lobed, lyrate-pinnately lobed, or undivided and sinuate-dentate, abaxially pale green and thinly arachnoid, adaxially green and strigose, base ± decurrent, apex ± long acuminate; lateral lobes 4–14 pairs, ovate-oblong, 5–13 × 2–6 mm. Upper stem leaves narrowly elliptic to linear, base decurrent, margin dentate, teeth broadly triangular, apex long acuminate and mucronate. Uppermost stem leaves linear, margin entire. Capitula several, in a corymbiform synflorescence, pedunculate or sessile. Involucre narrowly campanulate or tubular, ca. 5 mm in diam. Phyllaries in ca. 6 rows, apically purplish red, sparsely arachnoid; outer phyllaries ovate, apex acute; inner phyllaries narrowly elliptic to linear, to 9 mm, apically densely arachnoid villous, apex subobtusate. Receptacle bristles subulate, ca. 4 mm. Corolla purple, 8–11 mm, tube 4–4.5 mm, limb 4–4.5 mm, lobes ca. 3 mm. Achene grayish brown, ca. 4 mm, glabrous. Pappus pale yellowish brown; outer bristles 2–3 mm; inner bristles 8–9 mm. Fl. and fr. Aug–Sep.

• Mountain slopes; 1900–2700 m. S Gansu, E Qinghai (Xunhua), N Sichuan.

No specimens of *Saussurea variiloba* were seen by the present authors, and the description here is based on the original publication and the treatments by X. Y. Wu (Fl. Loess-Plat. Sin. 5: 446. 1989) and S. W. Liu (Fl. Qinghai. 3: 481. 1996). This species is similar to *S. compta* but differs in the decurrent leaf bases, thinly arachnoid abaxial leaf surface, and higher number of lateral leaf lobes. The application of the name is problematic because the type material seems to be lost (Lipschitz, Rod *Saussurea*, 251. 1979). Lipschitz's choice of a neotype (loc. cit.), which seems even closer to *S. compta* and may well be conspecific with that taxon, is not entirely in accordance with the original description.

139. *Saussurea chrysanthemoides* F. H. Chen, Bull. Fan Mem. Inst. Biol., Bot. 6: 97. 1935 [*“chrysanthemumoides”*].

菊状风毛菊 ju zhuang feng mao ju

Herbs 30–60 cm tall, perennial. Rootstock stout, fibrously split. Stem solitary, 2–3 mm in diam., erect, apically branched, densely covered at base with fibrous remains of petioles. Basal and lower stem leaves petiolate; petiole 4–10 cm; leaf blade ovate to elliptic, 8–12 × 2–5 cm, bipinnately divided, abaxially white, with conspicuous veins, arachnoid tomentose, and gland-

dotted, adaxially green, scabrous, sparsely strigose, and gland-dotted; primary segments 8–10 pairs, elliptic, apex obtuse and mucronate; secondary lobes 1–3 pairs, obliquely triangular-ovate. Upper stem leaves shortly petiolate to sessile, pinnatisect to pinnately lobed; lateral segments 4–6 pairs. Capitula few, in a corymbiform synflorescence, long pedunculate. Involucre campanulate, 6–10 mm in diam. Phyllaries in 5 or 6 rows, arachnoid, gland-dotted; outer phyllaries ovate, 2–3 × 1–2 mm, apex acuminate; middle phyllaries narrowly elliptic, 3–10 × 1–2 mm, apex acute; inner phyllaries narrowly elliptic-linear, 10–12 × 1–1.5 mm, apex acute. Receptacle bristles subulate, 2–3 mm. Corolla purple, 1–1.1 cm, gland-dotted, tube 4–5 mm, limb 6–7 mm, lobes 3.5–4 mm. Achene blackish brown, 2.5–3 mm. Pappus straw-colored; outer bristles 2–3 mm; inner bristles 9–10 mm. Fl. and fr. Aug–Oct.

• Open stony meadows, thickets; ca. 4000 m. NW Yunnan (Lijiang).

Saussurea chrysanthemoides is apparently only known from the type collection and is clearly different from *S. compta* in leaf division and shape and size of the capitula.

140. *Saussurea bartholomewii* S. W. Liu & T. N. Ho, *Novon* 20: 172. 2010.

玉树风毛菊 *yu shu feng mao ju*

Herbs 7–12 cm tall, perennial. Caudex simple, densely covered with fibrous remains of petioles. Stem solitary, 2–3 mm in diam., erect, apically branched. Lower and middle stem leaves petiolate; petiole 3–5 cm; leaf blade narrowly obovate-elliptic, 4–8 × 1.5–4.5 cm, lyrate-pinnatisect, abaxially grayish green, sparsely arachnoid tomentose, and gland-dotted, adaxially green, strigose, and gland-dotted; lateral segments 1–3 pairs, triangular-ovate, margin entire or denticulate, apex acute to obtuse; terminal segment large, margin dentate, apex obtuse. Upper stem leaves petiolate; leaf blade narrowly obovate-elliptic, 2–5 × 0.4–2 cm, undivided, margin entire or sinuate-dentate. Capitula numerous, in a laxly corymbiform synflorescence, pedunculate. Involucre tubular-campanulate, 7–10 mm in diam. Phyllaries in 5 or 6 rows, apically blackish, villous; outer and middle phyllaries ovate to ovate-oblong, 3–10 × 1.5–2 mm, apex obtuse to rounded; inner phyllaries narrowly ovate-elliptic, 10–15 × 1–1.5 mm, apex obtuse to acute. Receptacle bristles ca. 1.5 mm. Corolla bluish purple, 1.2–1.5 cm, gland-dotted, tube 6–7 mm, limb 5–8 mm, lobes 3.5–4 mm. Achene cylindrical, ca. 3 mm, 4-ribbed, apex with a short crown. Outer pappus bristles white, 7–12 mm, barbellate; inner pappus bristles pale brown, 1–1.2 cm. Fl. and fr. Aug–Sep.

• *Picea* forests; ca. 3600 m. S Qinghai (Yushu).

5. *Saussurea* sect. *Lagurostemon* (Cassini) Candolle, *Prodr.* 6: 532. 1838.

全叶风毛菊组 *quan ye feng mao ju zu*

Lagurostemon Cassini in Cuvier, *Dict. Sci. Nat.* 53: 466. 1828.

Herbs, perennial, sometimes densely caespitose, usually with developed stems, sometimes stemless. Stem usually simple, erect, rarely apically branched. Leaf blade often narrowly linear and grasslike or narrowly ovate-elliptic, narrowly elliptic, narrowly oblong, or linear, almost always undivided. Capitula (1–)1.5–3 cm in diam., usually solitary but sometimes ± numerous and in a racemiform or corymbiform synflorescence. Receptacle with apiculate papillae or with subulate bristles. Corolla glabrous or gland-dotted. Anther tails usually lanate. Achene glabrous or sometimes densely sericeous, apically with a short and entire or denticulate crown. Pappus always in 2 rows; outer bristles usually scabrid.

About 24 species: C, E, and S Asia, C Europe; 21 species (14 endemic) in China.

Saussurea sect. *Pycnocephala*, the name used by Lipschitz (Rod *Saussurea*, 143. 1979) and typified with *S. baicalensis*, is not the earliest legitimate name for this taxon at sectional rank. Lipschitz included the type of *S.* sect. *Lagurostemon*, *S. pygmaea* (Jacquin) Sprengel (not present in China), in his *S.* sect. *Pycnocephala*.

- 1a. Leaf blade ovate, elliptic, narrowly ovate-elliptic, or oblong, 0.8–7 cm wide, margin sinuate-dentate or denticulate; capitula usually several.
- 2a. Capitula in a racemiform or lax corymbiform synflorescence; leaf blade usually more than 2 cm wide.
 - 3a. Stem densely leafy; leaf blade narrowly ovate-elliptic, 1–3 cm wide; capitula in a dense racemiform synflorescence, sessile or shortly pedunculate; receptacle with short papillae or few short bristles to 3 mm 155. *S. baicalensis*
 - 3b. Stem with distant leaves; leaf blade ovate to elliptic, 2–7 cm wide; capitula in a lax corymbiform or racemiform synflorescence, pedunculate; receptacle with dense bristles 5–7 mm 161. *S. sordida*
- 2b. Capitula in a corymbiform synflorescence; leaf blade 0.8–2 cm wide.
 - 4a. Leaf blade abaxially grayish green and densely sericeous-tomentose, adaxially green 158. *S. souliei*
 - 4b. Leaf blade concolorous, green, abaxially not sericeous-tomentose.
 - 5a. Stem not winged.
 - 6a. Plants 10–50 cm tall; stem ca. 0.5 cm in diam.; involucre campanulate, less than 2 cm in diam. 154. *S. krylovii*
 - 6b. Plants 60–70 cm tall; stem 1–1.5 cm in diam.; involucre hemispheric-campanulate, more than 2 cm in diam. 160. *S. megacephala*
 - 5b. Stem winged.
 - 7a. Leaf blade retrorsely denticulate, apex obtuse to acute; lower stem leaves petiolate 156. *S. sylvatica*

- 7b. Leaf blade coarsely sinuate-dentate, apex acuminate; lower stem leaves sessile.
- 8a. Capitula pedunculate; involucre 2–3.5 cm in diam.; middle stem leaves ovate to narrowly ovate 157. *S. sobarocephala*
- 8b. Capitula sessile; involucre 1.5–2 cm in diam.; middle stem leaves narrowly ovate-triangular to linear 159. *S. semifasciata*
- 1b. Leaf blade narrowly linear or narrowly elliptic, 0.1–1 cm wide, margin entire or inconspicuously dentate; capitula solitary or rarely 2.
- 9a. Capitula obconic; uppermost leaves and phyllaries dark purple 142. *S. tibetica*
- 9b. Capitula campanulate; uppermost leaves green and phyllaries straw-colored, brown, or green, sometimes purplish tinged.
- 10a. Phyllaries villous, with brown and white hairs.
- 11a. Achene glabrous; plants 7–45 cm tall 148. *S. brunneopilosa*
- 11b. Achene densely white villous; plants 2–6 cm tall.
- 12a. Leaves abaxially white, densely villous, adaxially green, sparsely pilose 149. *S. pubescens*
- 12b. Leaves concolorous, grayish white, densely sericeous 150. *S. sericea*
- 10b. Phyllaries white lanate, villous, or glabrous, without brown hairs.
- 13a. Leaf blade with stalked glandular hairs 141. *S. schlagintweitii*
- 13b. Leaf blade without stalked glandular hairs.
- 14a. Stem base densely covered with fibrously lacerate remains of old leaves 144. *S. romuleifolia*
- 14b. Stem base not densely covered with fibrously lacerate remains of old leaves.
- 15a. Leaf blade concolorous, grayish white, lanate, sericeous, or pubescent.
- 16a. Outer phyllaries reflexed; leaf apex obtuse 147. *S. loriformis*
- 16b. Outer phyllaries erect and appressed; leaf apex acuminate 152. *S. leucophylla*
- 15b. Leaf blade abaxially subglabrous, lanate, or tomentose, adaxially green, glabrous or sparsely arachnoid and glabrescent.
- 17a. Stem densely and fluffily lanate; base of basal and lower stem leaves widened into a membranous sheath 145. *S. graminifolia*
- 17b. Stem glabrous, appressed tomentose, or pilose; base of basal and lower stem leaves not widened into a membranous sheath.
- 18a. Achene densely gland-dotted; corolla white or pink; leaf blade sometimes pinnately lobed 151. *S. cinerea*
- 18b. Achene glabrous; corolla purple; leaf blade always undivided.
- 19a. Leaf blade narrowly elliptic, 3–5 mm wide; involucre 1–1.2 cm in diam. 143. *S. rockii*
- 19b. Leaf blade narrowly linear, 1–3 mm wide; involucre 1.5–2.5 cm in diam.
- 20a. Leaf blade abaxially grayish white and lanate tomentose 146. *S. graminea*
- 20b. Leaf blade abaxially green, glabrous or glabrescent 153. *S. schanginiana*

141. *Saussurea schlagintweitii* Klatt, Sitzungsber. Math.-Phys. Cl. Königl. Akad. Wiss. München 8: 94. 1878.

腺毛风毛菊 xian mao feng mao ju

Saussurea glanduligera Schultz Bipontinus ex J. D. Hooker.

Herbs 10–20 cm tall, perennial, sometimes caespitose. Caudex branched, with several sterile leaf rosettes and flowering stems. Stem solitary, erect, simple, covered at base with remains of petioles. Rosette and basal stem leaves petiolate; petiole adaxially densely white lanate or sericeous at base; leaf blade narrowly elliptic to linear, 2–10 × 0.7–1.2 cm, both surfaces green and densely glandular hairy, margin sinuate-dentate. Middle and upper stem leaves similar to lower ones. Capitulum solitary, terminal on stem, usually surrounded by uppermost linear leaves. Involucre broadly campanulate, 2.5–3.5 cm in diam. Phyllaries in 3 or 4 rows, narrowly triangular-ovate to subulate, densely villous, apex acuminate; outer phyllaries green, 12–20 × 2–3 mm; middle and inner phyllaries purple, 1.8–2 × 0.1–0.2 cm. Corolla purplish red, 1.5–1.7(–2.5) cm,

tube 7–8 mm, limb 8–9 mm, lobes 4–5 mm. Achene cylindrical or obconic, 4–5 mm, 4-angled, apically with glands. Pappus pale brown or purplish; outer bristles 1–4 mm; inner bristles 1.2–1.4 cm. Fl. and fr. Jul–Sep.

Scree slopes, grasslands, rock crevices; 4700–5500 m. SW Xinjiang (Yecheng), W Xizang [NW India, Kashmir].

142. *Saussurea tibetica* C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 13: 242. 1894.

西藏风毛菊 xi zang feng mao ju

Herbs 8–25 cm tall, perennial. Caudex simple or few branched. Stem solitary, erect, simple. Rosette and basal leaves petiolate; leaf blade linear, 3–12 × 0.1–0.7(–1) cm, abaxially grayish green and white tomentose, adaxially green or purplish, glabrous, base attenuate, margin revolute and entire or very shallowly crenate, apex acute or obtuse. Stem leaves few, similar to basal leaves, but sessile, base amplexicaul. Uppermost stem leaves usually dark purple. Capitula solitary or 2, terminal on stem. Involucre obconic, 1.5–2 cm in diam. Phyllaries in 3 or 4 rows, dark purple, densely to sparsely villous, apex acumi-

nate; outer phyllaries narrowly triangular-ovate, 8–10 × 3–5 mm; middle phyllaries narrowly ovate-elliptic, 10–12 × 2–3 mm; inner phyllaries linear, 12–14 × 1–2 mm. Corolla purple, 0.9–1.2 cm, glabrous, tube 5–7 mm, limb 4–6 mm, lobes 2.5–4 mm. Achene narrowly obconic, 3.5–4 mm, glabrous, 5-angled, apex with a short crown. Pappus dirty white to pale yellowish brown; outer bristles 1–4 mm; inner bristles 7–11 mm. Fl. and fr. Jul–Aug. $2n = 36^*$.

• Alpine pastures and meadows; 3400–4700 m. Qinghai, NW Sichuan (Sérxi), N Xizang.

143. *Saussurea rockii* J. Anthony, Notes Roy. Bot. Gard. Edinburgh 18: 211. 1934.

显鞘风毛菊 xian qiao feng mao ju

Herbs 10–15 cm tall, perennial, caespitose. Caudex stout, branched, densely covered with blackish brown remains of petioles, sterile leaf rosettes, and flowering stems. Stem ca. 4 mm in diam., erect, simple. Rosette and basal leaves sessile, narrowly elliptic to linear, 5–9 × 0.2–0.5 cm, abaxially grayish green and densely tomentose, adaxially green or yellowish green, sparsely pilose, glabrescent, and nitid, base widened and sheathing, margin revolute and entire or denticulate, apex acute. Stem leaves few, similar to basal leaves. Uppermost stem leaves subtending and exceeding capitulum, merging into phyllaries. Capitulum solitary, terminal on stem. Involucre turbinate-campanulate, 1.5–2 cm in diam. Phyllaries in 4 or 5 rows, sparsely to densely villous, apex acuminate; outer phyllaries narrowly ovate, 12–13 × 2.5–3 mm; middle phyllaries narrowly elliptic, 12–13(–16) × 2–3 mm; inner phyllaries broadly linear, 14–15 × 1.5–2 mm. Corolla dark purple, 0.9–1.1(–1.5) cm, tube 4–5 mm, limb 5–6 mm, lobes 2.5–3 mm. Achene brown, ca. 2.5 mm, glabrous, apex with a short crown. Pappus pale brown; outer bristles 1.5–3 mm; inner bristles 7–8 mm. Fl. and fr. Sep–Oct.

• Rocky slopes; 2700–3900 m. NW Yunnan (Gongshan, Lijiang).

144. *Saussurea romuleifolia* Franchet, J. Bot. (Morot) 2: 339. 1888.

鸢尾叶风毛菊 yuan wei ye feng mao ju

Herbs 10–40 cm tall, perennial, rarely almost stemless. Caudex fusiform, densely covered with many fibrous remains of leaves. Stem solitary, erect, simple. Leaves sessile, narrowly linear, (3–)15–25(–45) × 0.1–0.2(–0.5) cm, longer than stem, rigid, abaxially grayish white and sparsely pubescent, adaxially green and glabrous, margin revolute and entire, apex acute. Capitulum solitary, terminal on stem. Involucre turbinate-campanulate, 2–2.5(–3.5) cm in diam. Phyllaries in ca. 5 rows, apically purple, sericeous, margin entire or denticulate, apex long acuminate; outer phyllaries narrowly triangular-ovate, 13–20 × 3–5 mm; middle phyllaries narrowly ovate-elliptic, 2–2.5 × 0.2–0.4 cm; inner phyllaries linear, 2.5–3.2 × 0.1–0.2 cm. Corolla purple, 1.8–2.5(–3) cm, gland-dotted, tube 0.6–2 cm, limb 0.9–1.2 cm, lobes 6–7 mm. Achene 4–5 mm, apex with a short crown. Pappus dirty white; outer bristles 1–5 mm; inner bristles 1.9–2.2 cm. Fl. and fr. Jul–Aug.

• Grasslands on mountain slopes, forests, forest margins; 2200–4000 m. W Sichuan, SE Xizang (Zayü), NW Yunnan.

145. *Saussurea graminifolia* Wallich ex Candolle, Prodr. 6: 536. 1838.

密毛风毛菊 mi mao feng mao ju

Herbs 7–20 cm tall, perennial. Caudex branched, with sterile leaf rosettes and flowering stems. Stem solitary, erect, simple, densely white lanate. Basal leaves sessile, narrowly linear, 3–14 × 0.1–0.2 cm, abaxially grayish white and densely lanate, adaxially green and glabrous, base widened and sheathlike, margin revolute and entire, apex acuminate. Stem leaves similar to basal leaves, reflexed, basally widened to a purple membranous sheath. Capitulum solitary, terminal on stem. Involucre subglobose, 1.8–2.5 cm in diam. Phyllaries in 4 or 5 rows, lanate; outer phyllaries narrowly ovate-elliptic, 7–15 × 2–4 mm, apically purple, apex long acuminate and reflexed; middle phyllaries narrowly ovate-elliptic, 9–15 × 1.5–3 mm; inner phyllaries linear, 10–15 × 1–2 mm. Corolla purple, 1.1–1.2 cm, glabrous, tube 4–5 mm, limb 6–7 mm, lobes 3–3.5 mm. Achene cylindrical, ca. 3 mm, glabrous, apex with a short crown. Pappus pale yellowish brown; outer bristles 1–3 mm; inner bristles 1–1.2 cm. Fl. and fr. Jul–Sep. $2n = 32^*$.

Grasslands on mountain slopes, grasslands near gravel beaches; 4500–4700 m. S Xizang [Bhutan, NW India, Kashmir, Nepal].

146. *Saussurea graminea* Dunn, J. Linn. Soc., Bot. 35: 509. 1903.

禾叶风毛菊 he ye feng mao ju

Herbs 3–40 cm tall, perennial, caespitose, often in large clumps. Caudex much branched, apically covered with fibrous remains of old leaf bases, sterile leaf rosettes, and flowering stems. Stem erect, simple, densely sericeous or pubescent. Basal leaves sessile, narrowly linear, 3–15 × 0.1–0.3 cm, abaxially densely tomentose, adaxially sparsely pubescent to subglabrous, base sheathing stem, margin revolute and entire, apex acuminate. Stem leaves few, gradually smaller upward on stem. Capitulum solitary, terminal on stem. Involucre campanulate, 1.5–1.8 cm in diam. Phyllaries in 4 or 5 rows, sparsely to densely tomentose; outer phyllaries narrowly ovate, 10–12 × 2–3 mm, apically reflexed or erect, apex long acuminate; middle phyllaries narrowly ovate-elliptic, ca. 12 × 2 mm; inner phyllaries linear, ca. 12 × 1 mm. Corolla purple, 1.4–1.6 cm, sometimes gland-dotted, tube 6–8 mm, limb 6–9 mm, lobes 4–4.5 mm. Achene cylindrical, 3–4 mm, glabrous, apex with a short crown. Pappus pale yellowish brown; outer bristles 1–3 mm; inner bristles ca. 9 mm. Fl. and fr. Jul–Sep. $2n = 32^*$.

• Alpine and montane grasslands and steppes, meadows, thickets; 3000–5400 m. Gansu, Nei Mongol, Ningxia, Qinghai, W Sichuan, Xizang, NW Yunnan.

- 1a. Outer phyllaries densely lanate, apically reflexed 146a. var. *graminea*
- 1b. Outer phyllaries sparsely pubescent, apically erect 146b. var. *ortholepis*

146a. *Saussurea graminea* var. *graminea*

禾叶风毛菊(原变种) he ye feng mao ju (yuan bian zhong)

Saussurea geraecephala Diels; *S. lanicaulis* Handel-Mazzetti; *S. poophylla* Diels.

Outer phyllaries densely lanate, apically reflexed.

• Alpine and montane grasslands and steppes, meadows, thickets; 3000–4400 m. Gansu, Nei Mongol, Ningxia (Liupan Shan), W Sichuan, NW Yunnan (Ninglang, Zhongdian).

146b. *Saussurea graminea* var. *ortholepis* Handel-Mazzetti, Acta Horti Gothob. 12: 339. 1938.

直鳞禾叶风毛菊 zhi lin he ye feng mao ju

Saussurea romuleifolia Franchet var. *ortholepis* (Handel-Mazzetti) Handel-Mazzetti ex S. Y. Hu.

Outer phyllaries appressed, sparsely pubescent, apically erect.

• Alpine and montane steppes; 3300–5400 m. Gansu, Qinghai, W Sichuan, Xizang.

In S. W. Liu (Fl. Qinghai. 3: 465 1996) this taxon was treated under *Saussurea eopygmaea*. Plants from S Qinghai (Chindu, Nangqên, Yushu) often have several (2–4) clustered heads and usually grow taller (10–40 cm); they may deserve separate taxonomic status.

147. *Saussurea loriformis* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 8: 114. 1913.

带叶风毛菊 dai ye feng mao ju

Herbs 10–15 cm tall, perennial, caespitose. Caudex thick, densely covered with dark brown remains of leaf sheaths. Stem erect, simple, grayish white, lanate. Basal and stem leaves sessile, linear, 2–8 × 0.2–0.4 cm, abaxially grayish white and densely lanate, adaxially brownish or yellowish and lanate, base widened and sheathing stem, margin entire, apex obtuse. Capitulum solitary, terminal on stem. Involucre campanulate, 2–3 cm in diam. Phyllaries in 4 or 5 rows, narrowly ovate-elliptic to linear, densely villous, apex acuminate; outer phyllaries ca. 8 × 2 mm, apically reflexed; middle phyllaries ca. 13 × 2 mm, apically reflexed; inner phyllaries ca. 13 × 2 mm, apex acuminate. Corolla pale reddish purple, 1.1–1.2 cm, tube 8–9 mm, limb ca. 3 mm. Achene black, ca. 2.6 mm, apex with a short crown. Pappus white; outer bristles ca. 2 mm; inner bristles ca. 1 cm. Fl. and fr. Jun–Sep.

• Alpine scree slopes, grassy slopes, thickets; 4100–5100 m. W Sichuan, Xizang, NW Yunnan (Dêqên, Lijiang, Zhongdian).

148. *Saussurea brunneopilosa* Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 651. 1937.

异色风毛菊 yi se feng mao ju

Saussurea brunneopilosa var. *eopygmaea* (Handel-Mazzetti) Lipschitz; *S. eopygmaea* Handel-Mazzetti.

Herbs 7–45 cm tall, perennial. Caudex branched, covered with fibrous remains of leaf sheaths, sterile leaf rosettes, and flowering stems. Stem solitary, erect, simple. Rosette and basal leaves sessile, narrowly linear, 3–10(–15) × ca. 0.1 cm, abaxially white and densely sericeous, adaxially green and glabrous, basally widened and sheathing stem, margin revolute and entire. Stem leaves similar to basal leaves. Capitulum solitary, terminal on stem. Involucre broadly campanulate, ca. 2 cm in diam. Phyllaries in ca. 4 rows, apically purple, densely brown and white villous; outer phyllaries ovate-elliptic, 7–8 × 2–3 mm,

apically usually reflexed, apex long acuminate; middle phyllaries narrowly ovate-elliptic, 8–10 × 2–3 mm; inner phyllaries narrowly ovate to linear, 10–12 × 1–1.5 mm. Receptacle bristles 4–5 mm. Corolla purple to pink, 1.2–1.4 cm, sometimes gland-dotted, tube 6–7 mm, limb 5–7 mm, lobes 3.5–4 mm. Achene obconic, 3.5–4 mm, glabrous, apex with a denticulate crown. Pappus yellowish brown; outer bristles 1–2 mm, barbellate to plumose; inner bristles 0.9–1.1 cm. Fl. and fr. Jul–Sep. $2n = 30^*$.

• Alpine pastures and meadows, grassy slopes among rocks; 2900–4900 m. Gansu, Qinghai.

The plants treated as *Saussurea eopygmaea* by S. W. Liu (Fl. Qinghai. 3: 465 1996) usually lack the typical brown hairs on the phyllaries and belong to *S. graminea*. The type specimen of *S. eopygmaea* is intermediate between *S. brunneopilosa* and *S. graminea* var. *ortholepis*.

149. *Saussurea pubescens* Y. L. Chen & S. Yun Liang, Acta Phytotax. Sin. 19: 95. 1981.

毛果风毛菊 mao guo feng mao ju

Herbs to 6 cm tall, perennial. Caudex branched, apically covered with brown remains of leaf sheaths, sterile leaf rosettes, and flowering stems. Stem erect, simple, densely white lanate. Basal leaves sessile, linear, 3–8 × 0.2–0.3 cm, abaxially densely lanate and with a conspicuous midvein, adaxially sparsely pilose, base somewhat widened, sheathing stem, and densely lanate, margin revolute, apex acute to acuminate. Stem leaves few, shorter. Capitula 1 or 2, terminal on stem. Involucre campanulate, (0.6–)1.5–2 cm in diam. Phyllaries in 3 or 4 rows, densely brown villous; outer phyllaries green, narrowly ovate, ca. 10 × 2 mm, apically reflexed, apex long acuminate; inner phyllaries basally straw-colored but apically purplish red, linear, 13–15 × 1–2 mm. Corolla dark pink, 1.2–1.3 cm, tube 5–6 mm, limb ca. 7 mm, lobes ca. 3 mm. Achene cylindrical, ca. 2 mm, densely white villous. Pappus pale brown but basally purplish. Fl. and fr. Jul–Sep.

• Mountain slopes; ca. 4900 m. SC Xizang (Namling).

Saussurea pubescens is only known from the type collection.

150. *Saussurea sericea* Y. L. Chen & S. Yun Liang, Acta Phytotax. Sin. 19: 96. 1981.

绢毛风毛菊 juan mao feng mao ju

Herbs 2–3 cm tall, perennial, caespitose. Caudex branched, covered with brown remains of leaf sheaths. Stem erect, simple, white sericeous. Leaves sessile, linear, 1–2.5 × 0.2–0.3 cm, both surfaces grayish white, densely sericeous, and with a conspicuous midvein, base somewhat widened and sheathing stem, apex acute. Capitulum solitary, terminal on stem. Involucre campanulate, 1–1.5 cm in diam. Phyllaries in 3 or 4 rows, densely brown villous; outer phyllaries green, narrowly ovate-elliptic, 8–10 × 2–2.5 mm, apically reflexed; middle and inner phyllaries basally yellowish green and apically purplish red, linear, 10–12 × 1–2 mm. Corolla purplish red, 0.9–1.3(–1.6) cm, usually gland-dotted, tube 4–6(–9.5) mm, often with hairs, limb 5–7 mm, lobes 3–4.5 mm. Achene cylindrical, 2–3 mm, densely white villous. Pappus straw-colored; outer bristles 0.5–2 mm, inner bristles basally purple, 1–1.2 cm. Fl. and fr. Jul–Sep.

• Mountain slopes, scree slopes, alpine mats; 5000–5200 m. SC Xizang (Lhünzê).

The reported records of *Saussurea sericea* from Bhutan and India (Sikkim) (Grierson & Springate, Fl. Bhutan 2(3): 1442. 2001) do not belong here because the achenes from these collections are glabrous and not white villous.

151. *Saussurea cinerea* Franchet, Bull. Mus. Hist. Nat. (Paris) 3: 324. 1897.

昆仑风毛菊 kun lun feng mao ju

Saussurea pusilla Lipschitz.

Herbs 3–7(–9) cm tall, perennial, stemless or shortly stemmed. Caudex long and thin, ascending, apically branched, covered with brownish remains of leaf sheaths. Stems solitary or few, erect, simple, arachnoid tomentose. Basal leaves indistinctly petiolate; leaf blade narrowly linear, 1–7 × 0.1–0.4 cm, undivided or pinnately lobed, abaxially grayish white and arachnoid tomentose, adaxially grayish green and arachnoid, margin revolute and entire or sparsely dentate, apex acute. Stem leaves few, shortly petiolate; petiole basally widened, semiamplexicaul; leaf blade gradually smaller upward on stem. Capitula solitary or 2, terminal on stem. Involucre cylindrical to campanulate, (0.6–)1–1.5 cm in diam. Phyllaries in 4 or 5 rows, pale green, densely lanate, apex acuminate; outer phyllaries ovate to narrowly ovate, ca. 5 × 2 mm; middle phyllaries narrowly ovate-elliptic, 5–10 × 2–2.5 mm; inner phyllaries narrowly elliptic to linear, 10–13 × 1.5–2 mm. Receptacle naked or with very short papillae but without bristles. Corolla pink or white, 1.5–1.7 cm, sparsely gland-dotted, tube 8–9 mm, limb 6–8 mm, lobes 2.5–3 mm. Achene brown, cylindrical, 3–5 mm, ribbed, densely gland-dotted. Pappus dirty white; outer bristles 0.5–3.5 mm, plumose; inner bristles 1.2–1.4 cm. Fl. and fr. Jul–Aug.

• Alpine stony slopes, scree slopes, grazed areas, silt or mud; 3000–3800 m. S Xinjiang (Kunlun Shan).

152. *Saussurea leucophylla* Schrenk, Bull. Sci. Acad. Imp. Sci. Saint-Petersbourg 10: 354. 1842.

白叶风毛菊 bai ye feng mao ju

Herbs 3–12 cm tall, perennial, caespitose. Caudex branched, with many sterile leaf rosettes and flowering stems, covered with brown fibrous remains of old leaf sheaths. Stem erect, simple, purple and densely sericeous. Rosette and basal stem leaves sessile, narrowly linear, 3–8 × 0.1–0.2 cm, both surfaces grayish white and lanate, base widened and sheathing stem, margin revolute and entire, apex acuminate. Capitulum solitary, terminal on stem. Involucre obconic, 2.5–3.5 cm in diam. Phyllaries in 3 or 4 rows, purple, white villous; outer phyllaries ovate, 10–12 × 4–5 mm, apex acuminate to caudate; middle phyllaries narrowly ovate-elliptic, 12–15 × 2–4 mm; inner phyllaries linear, 14–15 × 1–2 mm. Corolla rose-purple, 1.6–1.8 cm, tube 9–10 mm, limb 7–9 mm, lobes 5–6 mm. Achene brown, cylindrical, ca. 2 mm, apex with a short crown. Pappus yellowish brown; outer bristles 1–3 mm; inner bristles 1.1–1.5 cm. Fl. and fr. Jul–Aug.

Alpine pastures and meadows, mountain slopes; 2600–4000 m. Xinjiang [Kazakhstan, Kyrgyzstan, W Mongolia, Russia (Siberia), Tajikistan].

153. *Saussurea schanginiana* (Wydler) Fischer ex Sergievskaya in Krylov, Fl. Zapadnoi Sibiri 11: 2906. 1949.

暗苞风毛菊 an bao feng mao ju

Lagrostemon pygmaeus (Jacquin) Cassini var. *schanginianus* Wydler, Linnaea 5: 427. 1830 [*Schanginiana*]; *Saussurea pygmaea* (Jacquin) Sprengel var. *schanginii* Candolle, nom. illeg. superfl.

Herbs [4–]10–34 cm tall, perennial. Stems solitary or few, erect, simple. Leaves sessile, narrowly elliptic to linear, 4–20 × 0.1–0.5(–1) cm, both surfaces dark green and sparsely villous to subglabrous, margin entire or sparsely denticulate, apex acute to acuminate. Capitulum solitary, terminal on stem. Involucre campanulate, 1–2 cm in diam. Phyllaries in ca. 3 rows, villous, subequal in length; outer and middle phyllaries ovate-triangular to narrowly elliptic, 14–15 × 3–4 mm; inner phyllaries narrowly elliptic to linear, 14–15 × 1–1.5 mm. Receptacle bristles 3–5 mm. Corolla violet, 1.4–1.6 cm, tube 7–9(–10) mm, limb 6–7 mm, lobes 3–5 mm. Achene brown, cylindrical, 5–6 mm, ribbed, apex with a short crown. Pappus dirty white to light brown; outer bristles 1–4 mm; inner bristles 1–1.2 cm. Fl. and fr. Jul–Aug. $2n = 36$.

Alpine meadows, tundra, scree and rocky slopes; 2100–2800 m. N Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia (Siberia)].

154. *Saussurea krylovii* Schischkin & Sergievskaya, Sist. Zametki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kuybysheva 1944(1): 1. 1944.

阿尔泰风毛菊 a er tai feng mao ju

Herbs 10–50 cm tall, perennial. Stem solitary, erect, simple. Basal and lower stem leaves shortly petiolate; leaf blade narrowly elliptic to linear, 10–20 × 0.6–1.5 cm, both surfaces green and scabrid, margin sinuate-dentate, apex acuminate. Middle and upper stem leaves sessile, gradually smaller upward on stem. Capitula (1 or)2–4, in a corymbiform synflorescence, shortly pedunculate. Involucre campanulate, to 2 cm in diam. Phyllaries in ca. 3 rows; outer phyllaries ovate to narrowly elliptic; inner phyllaries narrowly elliptic, apex long acuminate. Receptacle bristles to 5 mm. Corolla dirty violet, 1.3–1.4(–1.6) cm, tube 7–8 mm, limb 5–6 mm, lobes ca. 3 mm. Achene brown, cylindrical, (3–)5–7 mm. Pappus dirty white; outer bristles 1–2 mm; inner bristles 1–1.1 cm. Fl. and fr. Jul–Sep.

Alpine meadows, forest margins; 2300–2800 m. N Xinjiang [Kazakhstan, Mongolia, Russia (W Siberia)].

155. *Saussurea baicalensis* (Adams) B. L. Robinson, Proc. Amer. Acad. Arts 47: 216. 1911.

大头风毛菊 da tou feng mao ju

Liatris baicalensis Adams, Mém. Soc. Imp. Naturalistes Moscou 5: 115. 1817; *Saussurea calobotrys* Diels; *S. pycnocephala* Ledebour.

Herbs 30–45(–60) cm tall, perennial. Stem solitary, 0.8–1.5 cm in diam., erect, simple, covered at base with lacerate remains of leaf sheaths. Leaves shortly petiolate; leaf blade narrowly ovate to narrowly elliptic, 10–20 × 1–3 cm, both surfaces

green and scabrous, abaxially glabrous, adaxially sparsely villous to subglabrous, base cuneate, margin dentate, apex acute to acuminate. Capitula 7–16, in a dense racemiform 10–25 cm synflorescence, sessile or shortly pedunculate, subtended by narrowly triangular-ovate herbaceous bracts. Involucre campanulate, 1.5–2.5(–3) cm in diam. Phyllaries in 3 or 4 rows, green but dark on midvein and apically, narrowly triangular-ovate, 1.5–2.2 × 0.2–0.4 cm, villous, apex acute to acuminate. Receptacle with apiculate papillae or short to 3 mm bristles. Corolla purple, 1.5–1.7 cm, tube 8–9 mm, limb 7–8 mm, lobes 4–4.5 mm. Achene brown, cylindrical, 5–6 mm, ribbed, apex with a short crown. Pappus straw-colored; outer bristles 2–5 mm; inner bristles 1.3–1.4 cm. Fl. and fr. Jun–Jul. $2n = 26, 36$.

Alpine meadows, around exposed ledges and boulders; 2000–3200 m. Hebei (Dongling Shan, Xiaowutai Shan) [Mongolia, Russia (Siberia)].

Material of *Saussurea baicalensis* from both known localities in China has receptacle bristles to 3 mm.

156. *Saussurea sylvatica* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 495. 1882.

林生风毛菊 lin sheng feng mao ju

Saussurea hsiaowutaishanensis F. H. Chen; *S. sylvatica* var. *hsiaowutaishanensis* (F. H. Chen) Lipschitz.

Herbs 20–80 cm tall, perennial. Stem 2–4 mm in diam., erect, simple or apically branched, with dentate wings, covered at base with fibrous remains of petioles. Lower stem leaves petiolate; petiole 1–5 cm; leaf blade narrowly elliptic, obovate, or narrowly ovate, (3–)7–13 × 0.8–2 cm, abaxially glaucous, adaxially green and glabrous or sparsely pubescent, base cuneate, margin denticulate, apex rounded to subacute. Middle and upper stem leaves sessile, narrowly ovate-elliptic, 3.5–12 × 0.5–1.5 cm, base decurrent, apex acute. Uppermost stem leaves narrowly triangular to subulate-linear, 2–4 × 0.1–0.5 cm. Capitula 1–6, in a ± condensed corymbiform synflorescence, sessile to long pedunculate. Involucre campanulate, 1.2–2 cm in diam. Phyllaries in 4 or 5 rows, blackish purple, pilose-sericeous to glabrescent, apex acute to acuminate; outer phyllaries ovate-triangular, 6–7 × 2–4 mm; middle and inner phyllaries narrowly triangular-ovate to linear, 7–15 × 2–3 mm. Corolla purple, 1.5–1.6 cm, tube 8–8.5 mm, limb 7–7.5 mm, lobes 3–3.5 mm. Achene brown, cylindrical, 5–5.5 mm, 4- or 5-angled, glabrous, with a short crown. Pappus brown; outer bristles (2–)3–5 mm; inner bristles 1.2–1.3 cm. Fl. and fr. Jun–Sep. $2n = 30^*$.

• Alpine and montane grasslands, thickets, forest margins; 1900–4500 m. Gansu, Hebei (Xiaowutai Shan), Qinghai, Shaanxi, Shanxi, Sichuan.

157. *Saussurea sobarocephala* Diels, Bot. Jahrb. Syst. 36(Beibl. 82): 108. 1905.

昂头风毛菊 ang tou feng mao ju

Herbs 20–60 cm tall, perennial. Stem solitary, erect, simple or apically branched, winged, covered at base with numerous fibrous remains of old petioles. Basal and lower stem leaves sessile, ovate to oblong, 8–12 × 1–2 cm, both surfaces green and glabrous, base decurrent, margin serrulate, apex acute.

Middle and upper stem leaves ovate to narrowly ovate, gradually smaller upward on stem, 4–7 × 1–1.5 cm, apex long acuminate. Capitula 2–11, in a corymbiform synflorescence, sessile to pedunculate. Involucre campanulate to hemispheric, 2–3.5 cm in diam. Phyllaries in 4 or 5 rows, usually black, apex acuminate; outer phyllaries narrowly ovate-triangular, 10–15 × 2–3(–5) mm; middle and inner phyllaries narrowly elliptic to linear, (10–)15–20 × 1–3(–4) mm. Corolla purple, 1.6–1.7 cm, glabrous, tube 9–10 mm, limb 5–6 mm, lobes 3.5–4 mm. Achene cylindrical, 5–6 mm, ribbed, apex with a short crown. Pappus pale yellowish brown; outer bristles 1–5 mm, scabrid; inner bristles ca. 1.2 cm. Fl. and fr. Jul–Aug. $2n = 34^*$.

• Forest margins, grasslands on mountain slopes; 1900–3600 m. Hebei, Henan, Shaanxi, Shanxi, Sichuan.

Saussurea sobarocephala has often been confused with *S. sylvatica*.

158. *Saussurea souliei* Franchet, Bull. Annuel Soc. Philom. Paris, sér. 8, 3: 147. 1891.

披针叶风毛菊 pi zhen ye feng mao ju

Herbs 35–55 cm tall, perennial. Stem solitary, 3–5 mm in diam., erect, simple, winged, covered at base with lacerate remains of leaf sheaths. Leaves sessile, narrowly ovate-elliptic, 7–10 × 1.5–2 cm, abaxially grayish white and sericeous-tomentose, adaxially dark green and pubescent, base decurrent, margin dentate, apex acute. Capitula 10–20(–30), in a subglobose, densely congested corymbiform synflorescence 4–5 cm in diam., shortly pedunculate. Involucre campanulate to globose, 0.8–1.2 cm in diam. Phyllaries in 6–8 rows, basally brown to straw-colored, apically green, villous, apex acute to acuminate; outer phyllaries narrowly triangular-ovate, 4–6 × ca. 2 mm; middle phyllaries narrowly ovate-elliptic, 6–8 × 2–3 mm; inner phyllaries linear, 8–12 × 1.5–2 mm. Corolla purple, ca. 1.2 cm, tube ca. 6 mm, limb ca. 6 mm, lobes ca. 3 mm. Pappus dirty white; inner bristles ca. 8 mm. Fl. Aug.

• W Sichuan (Kangding).

159. *Saussurea semifasciata* Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 60: 100. 1923.

锯叶风毛菊 ju ye feng mao ju

Herbs 15–100 cm tall, perennial. Stem solitary, 6–8 mm in diam., erect, simple or apically branched, with sinuate-lobate, dentate wings, covered at base with fibrous remains of leaf sheaths. Leaves sessile, narrowly ovate-triangular, 5–18 × 0.8–2 cm, abaxially green and glabrous, adaxially dark green and sparsely arachnoid, base decurrent, margin sinuate-lobate and doubly dentate, apex acute to long acuminate. Capitula 8–25, in a basally lax but apically clustered corymbiform synflorescence, long pedunculate to subsessile. Involucre broadly campanulate to subglobose, 1.5–2 cm in diam. Phyllaries in 4 or 5 rows, basally brown or straw-colored, apically green with a blackish to black margin, pilose, apex acute; outer phyllaries narrowly triangular-ovate, 8–10 × 2–3 mm; middle phyllaries narrowly elliptic, 10–13 × 1.5–2 mm; inner phyllaries linear, 13–14 × 1–1.5 mm. Corolla red, 1.1–1.5 cm, tube 6–9 mm, limb 5–6 mm, lobes 3–3.5 mm. Achene dark brown, cylindrical, ca. 3 mm, obtusely 4-angled, glabrous, apex with a short crown.

Pappus light brown; outer bristles ca. 2 mm; inner bristles 1–1.2 cm. Fl. and fr. Aug–Sep.

• Forests, thickets, near rivers; 3800–4800 m. Gansu, Qinghai, Sichuan, NW Yunnan (Dêqên, Zhongdian).

160. *Saussurea megacephala* C. C. Chang ex Y. S. Chen, Ann. Bot. Fenn. 48: 142. 2011.

察隅风毛菊 cha yu feng mao ju

Herbs 60–70 cm tall, perennial. Stem solitary, 1–1.7 cm in diam. at base, erect, simple, hollow. Basal and lower stem leaves petiolate; petiole 1–6 cm; leaf blade narrowly elliptic, 13–16 × 1–2.5 cm, both surfaces green and glabrous, base decurrent, margin coarsely sinuate-dentate, apex acute. Middle and upper stem leaves sessile, gradually smaller upward on stem, 4–9 × 0.2–1.2 cm, margin denticulate or entire, apex acuminate. Uppermost stem leaves linear, 10–15 × ca. 1 mm. Capitula 3 or 4, in a clustered corymbiform synflorescence, sessile. Involucre globose, 2–2.5 cm in diam. Phyllaries in 6 or 7 rows, brown, densely villous, apex acuminate; outer phyllaries triangular-oblong, 9–10 × 2.8–3 mm; middle phyllaries ovate-oblong, 8–10 × 2.5–2.8 mm; inner phyllaries narrowly ovate, 14–15 × ca. 2 mm. Receptacle bristles yellowish brown, 5–6 mm. Corolla dark purple, 1.4–1.5 cm, glabrous, tube ca. 7 mm, limb 7–8 mm, lobes ca. 3 mm. Achene brown, cylindrical, 2.8–3(–4) × 0.5–1 mm, glabrous. Pappus yellowish white; outer bristles 5–6 mm; inner bristles 1.1–1.4 cm. Fl. Aug.

• *Juniperus* forests; ca. 3500 m. SE Xizang (Zayü).

Saussurea megacephala is only known from the type and is very close to *S. semifasciata*, from which it differs by its petiolate lower leaves, non-decurrent stem leaves, and sessile and glomerate capitula.

161. *Saussurea sordida* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 389. 1842.

污花风毛菊 wu hua feng mao ju

Saussurea pycnocephala Ledebour var. *sordida* (Karelin & Kirilov) Herder; *S. russowii* C. Winkler; *S. sordida* var. *oligocephala* C. Winkler ex Lipschitz; *S. tuoliensis* K. M. Shen.

Herbs 40–100 cm tall, perennial. Stem solitary, erect, simple or apically branched, covered at base with fibrous remains of leaf sheaths. Lower stem leaves petiolate; petiole to 10 cm, winged; leaf blade ovate to narrowly ovate-elliptic, 15–40 × 2–7 cm, both surfaces green, abaxially pilose but glabrescent, adaxially scabrid, margin serrulate-dentate, apex acuminate. Middle and upper stem leaves sessile, elliptic to narrowly ovate-elliptic, gradually smaller upward on stem. Capitula solitary to numerous, in a lax corymbiform or racemiform synflorescence, pedunculate. Involucre broadly campanulate, 2–2.5 cm in diam. Phyllaries in 4 or 5 rows, blackish brown or straw-colored with a dark margin, triangular-ovate to narrowly triangular-ovate, pilose but later glabrescent, apex acuminate; outer phyllaries 9–12 × 3–4 mm; middle phyllaries narrowly elliptic, 13–15 × 2–3 mm; inner phyllaries 15–18 × 1.5–2 mm. Corolla purple, 1.2–1.5 cm, tube 5–8 mm, limb 5–9 mm, lobes 2–4 mm. Achene brown with dark spots, cylindrical, 5–6 mm, obtusely 4- or 5-angled, glabrous, apex with a short crown. Pappus straw-colored; outer bristles 1–5 mm; inner bristles 1–1.5 cm. Fl. and fr. Jul–Sep.

Meadows, gravelly mountain slopes; 2000–2800 m. C and NW Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

According to Lipschitz (Fl. URSS 27: 402. 1962), *Saussurea sordida* is a widespread and very variable taxon, including larger plants from China that had been described as *S. russowii*. Following this wide concept, we also include *S. tuoliensis* here, which perfectly matches *S. russowii*.

6. *Saussurea* sect. *Strictae* C. B. Clarke, Compos. Ind. 221. 1876.

羽裂风毛菊组 yu lie feng mao ju zu

Aplotaxis Candolle; *Cyathidium* Lindley ex Royle; *Eriostemon* Lessing (1832), not Smith (1798).

Herbs, perennial, stemless, substemless, or with developed leafy or scapiform stems. Leaves usually pinnately dentate, pinnately lobed, or pinnatisect, rarely undivided. Capitula usually relatively large, solitary, sometimes 2 or 3 in center of leaf rosette or terminal on stem, rarely numerous in a clustered corymbiform synflorescence. Phyllaries in many rows, imbricate, often subequal in length. Receptacle usually with subulate bristles, rarely naked. Anther tails usually lanate or villous. Achene ribbed, smooth or transversely rugose, glabrous. Pappus usually in 2 rows, white, straw-colored, or brown; outer bristles short, deciduous, scabrid, rarely plumose or barbellate, rarely lacking; inner bristles long, plumose.

About 44 species: Bhutan, China, NE and NW India, Kashmir, Nepal; 36 species (27 endemic) in China.

Saussurea sect. *Strictae* occurs mainly on the Qinghai-Xizang Plateau and in the Hengduan Shan region.

Saussurea sect. *Cyathidium*, the name used by Lipschitz (Rod *Saussurea*, 154. 1979) for both stemless and cauliferous species with predominantly pinnately divided and often dandelion-like leaves, is not the earliest legitimate name for this taxon at sectional rank. *Saussurea taraxacifolia*, the type species of the genus *Cyathidium*, was included in *S. sect. Strictae* by C. B. Clarke (loc. cit.) and chosen as a lectotype of that section by Lipschitz (loc. cit.: 155). *Saussurea andersonii*, the lectotype species of *S. sect. Depressae*, is considered here to be a member of *S. sect. Strictae* as well. *Saussurea* sect. *Acaules*, lectotypified by Kitamura (Acta Phytotax. Geobot. 24: 22. 1969) with *S. stoliczkae* (= *S. andryaloides*), is also a synonym of this section. See also the discussion under *S. sect. Gymnocline*.

1a. Plants stemless or shortly stemmed, less than 10 cm tall; capitula usually in center of leaf rosette, exceeded by leaves.

2a. Leaf blade undivided with margin entire, shallowly crenate, or sinuate-dentate.

3a. Leaf blade 1–4 cm; involucre narrowly campanulate, 1–1.5 cm in diam. 185. *S. dschungdienensis*

- 3b. Leaf blade 3–11 cm; involucre broadly campanulate, 2–3.5 cm in diam.
- 4a. Leaf blade narrowly elliptic to linear, 0.4–1.2 cm wide; inner phyllaries to 1.5 cm; achene transversely rugose 172. *S. lhunzhubensis*
- 4b. Leaf blade elliptic, 1–3.5 cm wide; inner phyllaries 2–2.5 cm; achene smooth 184. *S. arenaria*
- 2b. Leaf blade bipinnatisect, pinnatisect, pinnately lobed, or pinnately dentate.
- 5a. Leaf blade bipinnatisect or pinnatisect with split segments.
- 6a. Leaf blade narrowly elliptic, 6–15 cm; involucre campanulate, 2–2.5 cm in diam. 180. *S. colpodes*
- 6b. Leaf blade narrowly elliptic-linear, 3–5 cm; involucre cylindric to narrowly campanulate, 1–1.5 cm in diam. 186. *S. lavrenkoana*
- 5b. Leaf blade simply pinnatisect, pinnately lobed to pinnately dentate, or lyrate-pinnately lobed.
- 7a. Leaf blade adaxially grayish green, ± arachnoid tomentose.
- 8a. Involucre 2–3 cm in diam.; receptacle without bristles; leaf blade obovate-oblong to elliptic, 2–4 cm wide; phyllaries whitish, with a purple mucro 178. *S. porphyroleuca*
- 8b. Involucre 1–2 cm in diam.; receptacle with bristles; leaf blade narrowly ovate-elliptic, 0.3–1.5 cm wide; phyllaries purplish red, without a purple mucro 187. *S. andryaloides*
- 7b. Leaf blade adaxially green, glabrous, scabrid and strigose, or sparsely arachnoid.
- 9a. Capitula several in a clustered or lax corymbiform synflorescence; involucre ovoid or campanulate, 0.5–1.2 cm in diam.
- 10a. Plants usually stemless, 1–5 cm tall; leaf blade narrowly elliptic to linear, 0.5–1.5 cm wide; capitula usually 3–10, in a clustered synflorescence; pappus brown, in 1 row 183. *S. salwinensis*
- 10b. Plants with a ± developed stem, 5–10(–15) cm tall; leaf blade obovate to narrowly obovate, 1–3 cm wide; capitula usually 2–5, in a lax synflorescence; pappus dirty white, in 2 rows 191. *S. nimborum*
- 9b. Capitula always solitary; involucre usually campanulate, 1–4 cm in diam.
- 11a. Leaf blade abaxially pale green, subglabrous, sparsely pilose on veins and margin 188. *S. andersonii*
- 11b. Leaf blade abaxially grayish green or grayish white, densely tomentose or thinly to moderately lanate.
- 12a. Outer pappus bristles 8–11 mm, plumose; leaf blade abaxially thinly to moderately lanate 197. *S. donkiah*
- 12b. Outer pappus bristles 1–6 mm, scabrid; leaf blade abaxially densely tomentose.
- 13a. Leaf blade adaxially smooth, sparsely arachnoid 195. *S. leiocarpa*
- 13b. Leaf blade adaxially scabrid, strigose or glandular, or glabrous but not arachnoid.
- 14a. Leaf blade linear, 0.3–0.8 cm wide.
- 15a. Leaf blade pinnately lobed or pinnately dentate; involucre broadly campanulate, 2–2.5 cm in diam. 189. *S. purpurascens*
- 15b. Leaf blade runcinately pinnatisect; involucre narrowly campanulate, 0.6–1 cm in diam. 190. *S. nyalamensis*
- 14b. Leaf blade narrowly elliptic, oblong, or obovate, 0.8–4 cm wide.
- 16a. Leaf blade narrowly elliptic, oblong, or broadly linear, pinnatisect; leaf blade lateral lobes 8–20 pairs.
- 17a. Achene smooth; leaf blade 4–30 × 1–4 cm; leaf blade lateral lobes 8–20 pairs; involucre 2–4 cm in diam.; phyllaries sparsely pilose 194. *S. kansuensis*
- 17b. Achene transversely rugose; leaf blade 3–18 × 0.8–2.5 cm; leaf blade lateral lobes 8–12 pairs; involucre 1–3 cm in diam.; phyllaries glabrous 193. *S. leontodontoides*
- 16b. Leaf blade obovate or narrowly obovate, lyrate or pinnately lobed; leaf blade lateral lobes 3–8 pairs.
- 18a. Plants stemless, to 3 cm tall; leaf blade obovate-elliptic, 1.5–4.5 × 0.8–1.5 cm 192. *S. ceterach*
- 18b. Plants stemless or shortly stemmed, 3–10 cm tall; leaf blade obovate to narrowly obovate, 3–12 × 1–3 cm.
- 19a. Leaf blade shallowly pinnately lobed; involucre ovoid, 0.5–1.2 cm in diam. 191. *S. nimborum*
- 19b. Leaf blade lyrate-pinnately lobed; involucre campanulate, 1.2–1.5 cm in diam. 196. *S. brachylepis*
- 1b. Plants with well-developed flowering stems, usually more than 10 cm tall; capitula usually solitary and terminal on stem or sometimes several in a corymbiform or paniculiform synflorescence.
- 20a. Capitula several, in a paniculiform or corymbiform synflorescence.

- 21a. Capitula 4–15, in a paniculiform synflorescence, pedunculate; leaf blade green and glabrous on both surfaces 162. *S. incisa*
- 21b. Capitula 2–20, clustered in corymbiform synflorescence, sessile; leaf blade abaxially grayish white and densely tomentose, adaxially green.
- 22a. Capitula 2–5(–8); involucre campanulate, 1–1.5 cm in diam.; phyllaries subglabrous, inner ones 1.3–1.6 cm 181. *S. lingulata*
- 22b. Capitula 3–20; involucre ovoid to globose, 0.6–1 cm in diam.; phyllaries sparsely villous, inner ones to 1 cm 182. *S. przewalskii*
- 20b. Capitulum solitary, or rarely 2 or 3, terminal on stem.
- 23a. Leaf blade green on both surfaces, glabrous or subglabrous.
- 24a. Leaf blade pinnatisect, lateral segments linear, margin entire 163. *S. henryi*
- 24b. Leaf blade runcinate-pinnately lobed, lateral lobes narrowly triangular-falcate, semiobovate, or triangular, margin dentate.
- 25a. Stem and petioles subglabrous or whitish pubescent; leaf blade adaxially subglabrous; involucre 0.8–1.7 cm in diam.; outer pappus bristles plumose 164. *S. eriostemon*
- 25b. Stem and petioles densely covered with pale brown multicellular articulate hairs; leaf blade adaxially scabrid, strigose; involucre 1.5–2.5 cm in diam.; outer pappus bristles scabrid 165. *S. scabrida*
- 23b. Leaf blade abaxially grayish green or grayish white and densely tomentose, arachnoid, or lanate, adaxially green and glabrous, subglabrous, or sparsely arachnoid.
- 26a. Leaf blade bipinnately lobed or bipinnatisect 167. *S. centiloba*
- 26b. Leaf blade not bipinnately lobed or bipinnatisect but rather simply pinnately lobed, pinnatisect, or rarely undivided.
- 27a. Leaf blade undivided with margin entire, sinuate, denticulate, or dentate.
- 28a. Leaf blade linear to narrowly elliptic, less than 1 cm wide (if wider than leaf blade pinnatisect) 168. *S. yunnanensis*
- 28b. Leaf blade elliptic, obovate, or oblong, 1–2 cm wide.
- 29a. Outer phyllaries reflexed; corolla ca. 2 cm 173. *S. paleacea*
- 29b. Outer phyllaries not reflexed; corolla ca. 1.5 cm 174. *S. limprichtii*
- 27b. Leaf blade runcinate-pinnately lobed, or pinnatisect.
- 30a. Leaf blade adaxially grayish green and ± arachnoid tomentose, lyrate pinnately lobed; receptacle without bristles; phyllaries whitish, densely arachnoid tomentose, with purple mucro 178. *S. porphyroleuca*
- 30b. Leaf blade adaxially green and glabrous, pubescent, glandular, or strigose, pinnately lobed to pinnatisect; receptacle with bristles; phyllaries not arachnoid, without purple mucro.
- 31a. Leaf blade adaxially glabrous or subglabrous.
- 32a. Stem ca. 5 mm in diam. at base; capitula large; involucre 2.5–3.5 cm in diam.; phyllaries densely villous 177. *S. wardii*
- 32b. Stem 2–3 mm in diam. at base; capitula small; involucre 1.5–2.5 cm in diam.; phyllaries sparsely villous or glabrous.
- 33a. Leaf blade runcinately pinnatisect; leaf blade segments narrowly triangular-linear, strongly reclinate, margin revolute 168. *S. yunnanensis*
- 33b. Leaf blade pinnately lobed; leaf blade lobes obliquely triangular, patent or recurved, margin not revolute.
- 34a. Leaf blade 5–15 × 1–2.5 cm; leaf blade lobes 5–7 pairs 166. *S. taraxacifolia*
- 34b. Leaf blade 2–6.5 × 0.6–1.7 cm; leaf blade lobes 2–5 pairs 169. *S. leptolepis*
- 31b. Leaf blade adaxially scabrid, pubescent, glandular hairy, strigose, or sparsely arachnoid.
- 35a. Outer phyllaries usually reflexed, apical part green and herbaceous.
- 36a. Leaf blade lyrate, pinnately lobed, or subpinnatisect; involucre 1.5–2 cm in diam.; basal leaves usually shorter than flowering stem 175. *S. semilyrata*
- 36b. Leaf blade pinnatisect; segments coarsely dentate; involucre 2–3.5 cm in diam.; basal leaves usually longer than flowering stem 179. *S. pachyneura*

- 35b. Outer phyllaries erect, appressed, apical part straw-colored or brownish to blackish purple and not herbaceous.
- 37a. Leaf blade runcinate-pinnately lobed, sometimes lyrate; leaf blade lobes 3–8 pairs, obliquely triangular; capitula large; involucre 2.5–3.5 cm; outer phyllaries narrowly triangular-subulate 176. *S. subulisquama*
- 37b. Leaf blade pinnatisect; leaf blade lobes 7–13 pairs, narrowly oblong or narrowly triangular-ovate; capitula medium-sized; involucre 1–2.5 cm in diam.; outer phyllaries narrowly ovate-triangular.
- 38a. Lateral leaf blade lobes 7–13 pairs, narrowly oblong, apex rounded and mucronate 170. *S. polypodioides*
- 38b. Lateral leaf blade lobes 10–20 pairs, narrowly triangular-ovate, apex acuminate 171. *S. coriacea*

162. *Saussurea incisa* F. H. Chen, Bull. Fan Mem. Inst. Biol., Bot. 6: 96. 1935.

锐裂风毛菊 rui lie feng mao ju

Herbs 15–20 cm tall, perennial. Stem solitary, 1–2 mm in diam., erect, branched. Basal and lower stem leaves long petiole; leaf blade ovate-triangular, 4–10 × 3–6 cm, abaxially pale green and glabrous, adaxially dark green, base cordate-hastate, margin incised-dentate, teeth wide and triangular, apex acuminate. Upper stem leaves narrowly elliptic to linear, 1–3 × 0.2–0.8 cm. Capitula 4–15, in a paniculiform synflorescence, pedunculate. Involucre ovoid to obconic, 5–10 mm in diam. Phyllaries in ca. 4 rows, glabrous or sparsely arachnoid near margin, apex acuminate; outer phyllaries narrowly ovate, 2–4 × 0.5–1.5 mm; middle phyllaries narrowly elliptic, 4–7 × 1–1.5 mm; inner phyllaries linear, 7–9 × 0.5–1 mm, with conspicuous green veins. Corolla 0.9–1.1 cm, tube 4–5 mm, limb 4–5 mm, lobes 3–3.5 mm. Achene grayish brown with blackish dots, cylindrical, 4–5 mm, glabrous. Pappus white; outer bristles 1–3 mm; inner bristles 7–8 mm. Fl. and fr. Aug–Oct.

- Meadows, thickets. Hebei (Changli, Xiaowutai Shan).

163. *Saussurea henryi* Hemsley, J. Linn. Soc., Bot. 29: 311. 1892.

巴东风毛菊 ba dong feng mao ju

Herbs 12–80 cm tall, perennial. Stem solitary, 1–2 mm in diam., erect, usually simple. Basal and lower stem leaves petiole; petiole 2–9 cm; leaf blade narrowly elliptic, 5–12.5 × 2–4.5 cm, pinnatisect, both surfaces green, abaxially glabrous, adaxially sparsely strigose; lateral segments 6–11 pairs, linear, 10–20 × 3–6 mm, margin revolute and entire, apex acute and mucronate; terminal segment linear, 5–20 × 2–3 mm. Middle stem leaves much smaller and with fewer segments. Upper stem leaves linear-filiform, 1–2 × 0.2–0.4 cm, margin entire, apex caudate. Capitulum solitary, sometimes 2 or 3, terminal on stem. Involucre obconic, 1.3–1.6 cm in diam. Phyllaries in ca. 5 rows, sparsely arachnoid tomentose, glabrescent, apex long acuminate; outer phyllaries narrowly ovate-elliptic, 5–6 × 1–2 mm, basally straw-colored, apically green; middle phyllaries narrowly ovate-elliptic, 8–13 × 1.5–2 mm; inner phyllaries narrowly elliptic, 12–14 × 1–1.5 mm, apically brown. Corolla purple, 1.4–1.6 cm, tube 7–8 mm, limb 6.5–7 mm, lobes 4.5–

mm. Achene blackish brown, obconic, ca. 3 mm, glabrous. Pappus straw-colored; outer bristles 2–4 mm, scabrid, sometimes very few; inner bristles 1–1.1 cm. Fl. and fr. Jul–Aug.

- Forests, rocky slopes; 2000–2800 m. Chongqing, Hubei, Shaanxi, ?Sichuan.

164. *Saussurea eriostemon* Wallich ex C. B. Clarke, Compos. Ind. 229. 1876.

尼泊尔风毛菊 ni bo er feng mao ju

Centaurea taraxacifolia D. Don, Prodr. Fl. Nepal. 167. 1825, not *Saussurea taraxacifolia* (Lindley ex Royle) Wallich ex Candolle (1838); *Aplotaxis nepalensis* Candolle, nom. illeg. superfl.; *Eriostemon taraxacifolius* (D. Don) Lessing; *Saussurea chapmannii* C. E. C. Fischer; *S. nepalensis* Sprengel, nom. illeg. superfl.

Herbs 20–30 cm tall, perennial. Stems solitary or 2, erect, simple, covered at base with fibrously lacerate remains of petioles. Basal and lower stem leaves petiole; petiole 1–7 cm; leaf blade oblong to narrowly obovate-elliptic, 4–18 × 1–3 cm, runcinate-pinnately lobed, abaxially pale green, subglabrous, adaxially green; lateral lobes 4–10 pairs, narrowly triangular to semiobovate, 3–15 × 3–18 mm, margin mucronate-dentate, apex acute. Middle and upper stem leaves 1 or 2, smaller than lower leaves. Capitulum solitary, terminal on stem. Involucre campanulate, 0.8–1.7 cm in diam. Phyllaries in 5 or 6 rows, apically blackish green to purple, apex acute to acuminate; outer phyllaries narrowly triangular-ovate, ca. 10 × 4 mm; inner phyllaries ca. 1.9 × 0.3 cm. Receptacle bristles 5–11 mm. Corolla purple, 1.8–2.3 cm, lobes 3.5–6 mm. Achene cylindrical, 3.5–4.5[–6] mm, ribbed, smooth, glabrous, apex with a short crown. Pappus brown; outer bristles 2–3(–6) mm, plumose; inner bristles 1.3–1.8 cm. Fl. and fr. Aug–Oct. $2n = 32$.

Alpine grasslands, thickets, river valleys, by trails; 3500–4200 m. S Xizang (Yadong) [Bhutan, India (Sikkim), Nepal].

Saussurea nepalensis is illegitimate because Sprengel cited *Centaurea taraxacifolia* in synonymy but did not take up the epithet, which was at that time still available in *Saussurea*. Candolle also should have used the earlier epithet, “*taraxacifolia*,” when he transferred the name to *Aplotaxis*. When C. B. Clarke validated the nomen nudum *S. eriostemon* by Wallich, another nomen nudum, *S. taraxacifolia*, used for a different taxon by Wallich, had already been validated by Candolle, so the earliest epithet “*taraxacifolia*” was no longer available in *Saussurea*.

165. *Saussurea scabrida* Franchet, Bull. Annuel Soc. Philom. Paris, sér. 8, 3: 146. 1891.

糙毛风毛菊 cao mao feng mao ju

Saussurea leontodon Dunn; *S. pseudoleontodon* F. H. Chen.

Herbs 30–60 cm tall, perennial. Stem solitary, erect, simple, densely covered with pale brown articulate hairs. Basal and lower stem leaves shortly petiolate; leaf blade narrowly elliptic, 10–23 × 1.5–4.5 cm, green, concolorous, scabrid, with multicellular articulate hairs, base cuneate-attenuate, margin runcinate-pinnately lobed; lateral lobes 3–12 pairs, triangular, margin mucronate-dentate. Middle and upper stem leaves gradually smaller upward on stem. Uppermost stem leaves sessile, usually narrowly ovate-elliptic, undivided, base semiamplexicaul, margin dentate. Capitulum solitary, terminal on stem. Involucre campanulate, 1.5–2.5 cm in diam. Phyllaries in ca. 5 rows, densely villous or with articulate hairs, apex acuminate; outer phyllaries narrowly triangular-ovate, ca. 16 × 3–4 mm; middle phyllaries narrowly elliptic, ca. 15 × 3.5 mm; inner phyllaries linear, ca. 18 × 1–1.5 mm. Corolla purple, ca. 1.1 cm, tube ca. 8 mm, limb ca. 3 mm. Achene brown, cylindrical, ca. 6 mm, glabrous. Pappus pale brown; outer bristles 3.5–5 mm, scabrid; inner bristles ca. 1.3 cm. Fl. and fr. Jul–Sep.

• Thickets, forests, forest margins, meadows; 2700–4200 m. W Sichuan, SE Xizang (Zayü, Zogang), NW Yunnan (Dêqên, Zhongdian).

166. *Saussurea taraxacifolia* (Lindley ex Royle) Wallich ex Candolle, Prodr. 6: 532. 1838.

蒲公英风毛菊 pu gong ying feng mao ju

Cyathidium taraxacifolium Lindley ex Royle, Ill. Bot. Himal. Mts. 251, t. 56, f. 2. 1835.

Herbs 15–50 cm tall, perennial. Stem solitary, erect, simple. Basal and lower stem leaves petiolate; petiole 4–6 cm; leaf blade narrowly elliptic or narrowly obovate, 5–15 × 1–2.5 cm, runcinate, pinnately lobed to pinnatisect, abaxially grayish green and densely tomentose, adaxially green and glabrous; lateral lobes 5–7 pairs, triangular-ovate, 6–10 × 4–10 mm, reclinate, margin entire or dentate with 1 or 2 teeth on distal side, apex acute to obtuse and mucronate; terminal lobe triangular, 1–1.5(–2.5) × 0.5–1.5 cm. Upper stem leaves narrowly elliptic to linear, margin dentate. Capitulum usually solitary, terminal on stem. Involucre campanulate, (1–)2.5–3 cm in diam. Phyllaries in 4 or 5 rows, sparsely pilose, apically blackish green, apex long acuminate; outer phyllaries narrowly ovate-elliptic, 9–10 × 1–2 mm; middle phyllaries narrowly ovate-linear, 10–14 × 1–2 mm; inner phyllaries broadly linear, 14–16 × 1–1.5 mm. Corolla purple, 1.5–1.6 cm, tube 7–8 mm, limb 7–8 mm, lobes 4–5 mm. Achene cylindrical, 4–4.5 mm, glabrous, apex with a small crown. Pappus pale brown; outer bristles 2–3 mm, scabrid; inner bristles 1.1–1.2 cm. Fl. and fr. Jul–Sep.

Thickets; 3800–4700 m. Xizang, NW Yunnan (Gongshan) [Bhutan, NE and NW India, Kashmir, Nepal].

167. *Saussurea centiloba* Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 57: 144. 1920.

百裂风毛菊 bai lie feng mao ju

Saussurea leveillei F. H. Chen; *S. vaniotii* H. Lévillé.

Herbs 10–50 cm tall, perennial. Caudex simple, apically covered with fibrous remains of petioles. Stem solitary, erect, simple. Basal leaves petiolate; petiole 1–6 cm; leaf blade narrowly elliptic, 8–21 × 1.3–4.5 cm, bipinnately lobed or bipinnatisect, abaxially grayish white and densely tomentose, adaxially green and sparsely arachnoid; primary lobes 10–28 pairs. Stem leaves few, similar to basal leaves. Capitulum solitary, terminal on stem. Involucre broadly campanulate, 1.5–2 cm in diam. Phyllaries in 5–7 rows, purple, yellowish tomentose, apex obtuse or acute; outer phyllaries narrowly ovate-elliptic, 6–7 × 1–2 mm; middle phyllaries narrowly ovate, 7–14 × 1.5–2 mm; inner phyllaries narrowly ovate-elliptic, 14–16 × 1–1.5 mm. Corolla purplish red, 1.4–1.7 cm, tube 0.9–1.2 cm, limb 5–7 mm, lobes 3–4 mm. Achene brown, cylindrical, 4–5 mm, smooth, glabrous, apex with short crenulate crown. Pappus straw-colored; outer bristles 1.5–4 mm, scabrid; inner bristles 1.2–1.3(–1.7) cm. Fl. and fr. Jul–Aug.

• Forest margins, thickets, grasslands; 3200–4200 m. SW Sichuan (Muli), NW Yunnan.

168. *Saussurea yunnanensis* Franchet, J. Bot. (Morot) 2: 340. 1888.

云南风毛菊 yun nan feng mao ju

Saussurea mairei H. Lévillé; *S. vaginata* Dunn; *S. yunnanensis* var. *integrifolia* Franchet; *S. yunnanensis* var. *runcinata* Franchet; *S. yunnanensis* var. *sessilifolia* J. Anthony.

Herbs 10–40 cm tall, perennial. Stem solitary, erect, simple, covered at base with fibrous remains of petioles. Basal and lower stem leaves petiolate; petiole 1.5–4 cm; leaf blade elliptic, narrowly elliptic, or linear, 3–20 × 0.2–2(–4) cm, undivided, runcinate-pinnately lobed, or pinnatisect, abaxially grayish white and arachnoid tomentose, adaxially green and glabrous, margin entire, apex acute to acuminate; lateral lobes 1–7 pairs, linear or obliquely narrowly triangular, strongly reclinate; terminal lobe linear. Middle and upper stem leaves gradually smaller upward on stem. Capitulum solitary, terminal on stem. Involucre campanulate, ca. 2 cm in diam. Phyllaries in ca. 5 rows, apically purplish red, apex long acuminate; outer phyllaries triangular-subulate, ca. 12 × 1 mm; middle phyllaries narrowly ovate-elliptic, 10–13 × ca. 1.5 mm; inner phyllaries narrowly elliptic, ca. 15 × 1.5–2 mm. Corolla purple, ca. 1.5 cm, tube ca. 9 mm, limb ca. 6 mm. Achene cylindrical, ca. 4 mm, glabrous. Pappus dirty white; outer bristles ca. 4 mm, plumose; inner bristles ca. 1.3 cm. Fl. and fr. Jul–Oct.

• Stone cliffs, grasslands, gravelly mountain slopes, forests; 2300–4300 m. SW Sichuan (Muli), NW Yunnan (Dêqên, Lijiang).

169. *Saussurea leptolepis* Handel-Mazzetti, Acta Horti Gothob. 12: 337. 1938.

薄苞风毛菊 bao bao feng mao ju

Saussurea handeliana Y. Ling; *S. inconspicua* Handel-Mazzetti; *S. modesta* Handel-Mazzetti.

Herbs 3–20 cm tall, perennial. Stem solitary, purple, slender, erect, densely or sparsely villous. Basal leaves petiolate; petiole to 2 cm; leaf blade narrowly elliptic, 2.5–6.5 × 0.6–1.7

cm, pinnately lobed, abaxially grayish white and densely tomentose, adaxially green to purple and glabrous; lateral lobes 2–5 pairs, triangular, apex obtuse and mucronate. Stem leaves 1 or 2, narrowly elliptic to linear, margin irregularly triangular-dentate. Capitulum solitary, terminal on stem. Involucre obconic, ca. 1.7 cm in diam. Phyllaries in ca. 5 rows, apically sparsely villous, apex long acuminate; outer phyllaries narrowly ovate-elliptic, ca. 11 × 1 mm; middle phyllaries ovate-elliptic, ca. 13 × 3 mm; inner phyllaries narrowly ovate-elliptic, ca. 1.9 × 0.2 cm. Corolla purplish red, ca. 1 cm, tube ca. 7 mm, limb ca. 3 mm. Achene purplish red, cylindrical, ca. 5 mm, glabrous. Pappus yellowish brown; outer bristles 2–3 mm, scabrid; inner bristles 1–1.1 cm. Fl. and fr. Aug.

- Alpine meadows; 4200–4400 m. W Sichuan.

170. *Saussurea polypodioides* J. Anthony, Notes Roy. Bot. Gard. Edinburgh 18: 209. 1934.

水龙骨风毛菊 *shui long gu feng mao ju*

Herbs 10–20 cm tall, perennial. Stem solitary, erect, simple. Basal leaves petiolate; petiole 2–5 cm; leaf blade narrowly elliptic, 5–12 × 1–3 cm, pinnatisect, abaxially grayish white and densely tomentose, adaxially green and sparsely pubescent; lateral lobes (4–)7–15 pairs, oblong, patent, margin entire or with 1 or 2 teeth, apex rounded or obtuse and mucronate; terminal lobe triangular-ovate, apex acute. Stem leaves few or almost absent, sessile, linear, ca. 4 × 0.2 cm. Capitulum solitary, terminal on stem. Involucre campanulate, 1.5–2.5 cm in diam. Phyllaries in ca. 4 rows, sparsely villous, apex long acuminate; outer phyllaries subulate, ca. 10 × 2 mm; middle phyllaries narrowly elliptic, ca. 15 × 2 mm; inner phyllaries narrowly elliptic, ca. 17 × 2 mm. Corolla purple, ca. 1.2 cm, tube ca. 7 mm, limb ca. 5 mm. Achene cylindrical, ca. 3 mm, transversely rugose. Pappus pale brown; outer bristles ca. 3 mm, scabrid; inner bristles ca. 9 mm. Fl. and fr. Aug–Nov.

- Alpine grasslands, thickets; 2700–4300 m. SE Xizang (Zayü), NW Yunnan (Dali, Dèqên, Lijiang).

171. *Saussurea coriacea* Y. L. Chen & S. Yun Liang, Acta Phytotax. Sin. 19: 101. 1981.

黄苞风毛菊 *huang bao feng mao ju*

Herbs 15–20 cm tall, perennial, laxly caespitose. Caudex stout, simple or apically few branched, apically covered with blackish brown remains of petioles, with sterile leaf rosettes and flowering stems. Stem solitary, purplish red, erect, simple, arachnoid lanate. Rosette leaves petiolate; petiole purplish red, to 2.5 cm, arachnoid lanate; leaf blade narrowly oblong, 5–10 × 1–1.5 cm, pinnatisect or pinnately lobed, abaxially grayish white and densely tomentose, adaxially green and glandular; lateral lobes 10–20 pairs, narrowly ovate-triangular, margin revolute and mucronate-dentate, apex acuminate. Capitulum solitary, terminal on stem. Involucre campanulate, 1.2–2 cm in diam. Phyllaries in 4 or 5 rows, narrowly ovate-elliptic, basally yellowish brown, apically dark purplish red, margin arachnoid lanate and leathery, apex acuminate. Receptacle bristles 3.5–4 mm. Corolla purple, 2–2.4 cm, tube 1–1.3 cm, limb 0.9–1.1 cm, lobes 5–6 mm. Achene blackish, cylindrical, ca. 4 mm, apex with a short crown. Pappus pale yellowish brown, in 2 rows. Fl. and

fr. Jul–Aug.

- Scree slopes, river terraces; 3600–4400 m. W Sichuan, Xizang.

172. *Saussurea lhunzhubensis* Y. L. Chen & S. Yun Liang, Acta Phytotax. Sin. 19: 100. 1981.

林周风毛菊 *lin zhou feng mao ju*

Herbs 4–6 cm tall, perennial, caespitose, shortly stemmed. Caudex branched, apically covered with brown remains of petioles, with several sterile rosettes and flowering stems. Stem erect, simple, arachnoid. Basal leaves petiolate; petiole purplish red, 1.5–2 cm, base enlarged; leaf blade narrowly elliptic to narrowly obovate, 5–8 × 0.4–1.2 cm, abaxially grayish white and densely tomentose, adaxially green and densely arachnoid pubescent, margin entire or sinuate-lobate, apex acute and mucronate. Stem leaves linear, smaller than basal leaves. Capitulum solitary, terminal on stem. Involucre broadly campanulate, 2–3 cm in diam. Phyllaries in ca. 4 rows, straw-colored to pale brown, apically greenish or purplish red, arachnoid; outer phyllaries narrowly ovate-elliptic, pale brown; inner phyllaries linear. Receptacle bristles 2–2.5 mm. Corolla purplish red, ca. 2 cm, tube 9–10 mm, limb 8–9 mm. Achene oblong, 3–5 mm, transversely rugose, apex with a short crown. Pappus pale brown; outer bristles scabrid. Fl. and fr. Jul–Aug.

- Alpine grasslands, on sandy soils; 4000–4600 m. C Xizang.

173. *Saussurea paleacea* Y. L. Chen & S. Yun Liang, Acta Phytotax. Sin. 19: 99. 1981.

糠秕风毛菊 *kang bi feng mao ju*

Herbs 5–12 cm tall, perennial. Caudex branched, apically covered with brown remains of petioles, with sterile leaf rosettes and flowering stems. Stem solitary, erect, simple, with glandular hairs. Basal leaves petiolate; petiole 2–3.5 cm; leaf blade oblong, 5–8 × 1.4–2 cm, abaxially grayish white and densely tomentose, adaxially green and strigose, margin subentire, sinuate, or rarely coarsely dentate with mucronate teeth, apex acuminate. Stem leaves similar to basal leaves. Capitulum solitary, terminal on stem. Involucre broadly campanulate, ca. 2 cm in diam. Phyllaries in ca. 5 rows, yellowish green or slightly purplish red, with dark purple margin, densely pubescent; outer phyllaries narrowly ovate-elliptic, ca. 10 × 3 mm, apically herbaceous and reflexed; inner phyllaries linear, ca. 14 × 2 mm. Corolla purple, ca. 2 cm, tube 1.2–1.3 cm, limb ca. 7 mm, lobes 4–4.5 mm. Achene cylindrical, 3–3.5 mm, smooth, glabrous. Pappus pale brown; outer bristles scabrid. Fl. and fr. Jul–Aug.

- Alpine grasslands; 4300–4400 m. E Xizang (Qamdo).

Saussurea paleacea is apparently only known from the type collection. This taxon may be conspecific with *S. limprichtii*.

174. *Saussurea limprichtii* Diels, Repert. Spec. Nov. Regni Veg. Beih. 12: 512. 1922.

巴塘风毛菊 *ba tang feng mao ju*

Herbs to 15 cm tall, perennial. Stem solitary, erect, simple. Leaves petiolate; petiole 2.5–5 cm; leaf blade narrowly obovate or narrowly elliptic, 6–9 × 1–1.5 cm, abaxially grayish white, gland-dotted, and tomentose, adaxially green, gland-dotted, and

scabrid with short articulate hairs, base attenuate, margin subentire and repand to sinuate-dentate, apex acute and mucronate. Uppermost stem leaves narrowly elliptic to linear, $3.5-6 \times 0.2-0.8$ cm. Capitulum solitary, terminal on stem. Involucre campanulate, 1.5–2 cm in diam. Phyllaries in 4 or 5 rows, narrowly triangular-linear, sparsely villous, apex acuminate. Corolla purple, 1.4–1.5 cm, tube 9–10 mm, limb ca. 5 mm, lobes ca. 3 mm. Achene brown, cylindrical, ca. 3 mm, glabrous. Pappus pale yellow; outer bristles scabrid to barbellate, 1–3 mm; inner bristles 1.1–1.2 cm. Fl. and fr. Jul–Sep.

- Alpine grasslands; ca. 5100 m. W Sichuan (Batang).

Saussurea limprichtii has long been misunderstood because the type was thought to be lost. This description is based on the rediscovered type material of H. Limpricht (at WRS�). The specimens from NW Yunnan (S. W. Liu, Fl. Yunnan. 13: 576. 2004) treated under *S. limprichtii* are clearly different from the type specimen from W Sichuan. They either belong to *S. semilyrata* or to a yet undescribed species. The real *S. limprichtii* is apparently only known from the type collection and may be conspecific with *S. paleacea*, described from adjacent E Xizang.

175. *Saussurea semilyrata* Bureau & Franchet, J. Bot. (Morot) 5: 76. 1891.

半琴叶风毛菊 ban qin ye feng mao ju

Saussurea lanata Y. L. Chen & S. Yun Liang; *S. stoetzneriana* Diels; *S. viridibracteata* F. H. Chen.

Herbs 20–50 cm tall, perennial. Caudex apically covered with remains of petioles. Stem solitary, erect, simple, white arachnoid. Basal and lower stem leaves petiolate; petiole to 5 cm; leaf blade oblong to narrowly elliptic, $7-15(-30) \times 1.5-4$ cm, lyrate or pinnately lobed, abaxially grayish white and densely tomentose, adaxially green; lateral lobes 6–10 pairs, ovate-triangular, margin coarsely dentate or entire, apex obtuse to acuminate. Middle and upper stem leaves sessile, gradually smaller upward on stem. Uppermost stem leaves subtending capitulum; leaf blade linear, undivided, margin entire or dentate. Capitula solitary or 2, terminal on stem. Involucre campanulate, 1.5–2(–2.5) cm in diam. Phyllaries in 4–6 rows, basally straw-colored, apically purplish brown, sparsely villous, apex acuminate; outer phyllaries narrowly triangular, $10-12 \times$ ca. 2 mm, apical part green, herbaceous, and usually reflexed; middle phyllaries narrowly ovate-elliptic, $9-10 \times 2-3$ mm; inner phyllaries linear, $11-13 \times 1-2$ mm. Receptacle with bristles. Corolla purple, 1.2–1.6 cm, tube 4–8 mm, limb ca. 8 mm. Achene brown, cylindrical, ca. 4 mm, glabrous. Pappus pale brown; outer bristles ca. 3 mm, scabrid; inner bristles ca. 1.2 cm. Fl. and fr. Jul–Sep.

- Montane forests, forest margins, thickets, grasslands; 3200–4800 m. W Sichuan, SE Xizang (Bomi, Mainling), NW Yunnan.

176. *Saussurea subulisquama* Handel-Mazzetti, Acta Horti Gothob. 12: 326. 1938.

钻苞风毛菊 zuan bao feng mao ju

Saussurea kokonorensis Y. Ling.

Herbs 4–18(–30) cm tall, perennial. Caudex slender, apically densely covered with blackish brown sometimes fibrously

lacerate remains of petioles. Stem erect, densely arachnoid, sometimes glabrescent. Rosette leaves petiolate; petiole to 7 cm; leaf blade narrowly elliptic, $5-23 \times 2.5-4$ cm, pinnately parted or pinnately lobed, abaxially grayish white and arachnoid tomentose, adaxially green and glabrous; lateral lobes 3–8 pairs, ovate to triangular, margin entire or dentate, apex acute to obtuse and mucronate; terminal lobe triangular. Stem leaves 1–3, shortly petiolate; leaf blade same in division as basal leaves. Capitulum solitary, terminal on stem. Involucre campanulate, 2–3.5 cm in diam. Phyllaries in 5 or 6 rows, sparsely arachnoid, apex acuminate; outer phyllaries narrowly triangular-subulate, $12-14 \times$ ca. 3 mm; middle phyllaries subulate-linear, $15-17 \times$ ca. 3 mm; inner phyllaries linear, ca. 2.2×0.2 cm. Corolla purple, ca. 1.8(–2.5) cm, tube ca. 1.4 cm, limb ca. 4 mm. Achene cylindrical, ca. 4 mm, smooth, glabrous. Pappus pale brown; outer bristles ca. 2 mm, scabrid; inner bristles ca. 1.5 cm. Fl. and fr. Jul–Sep.

- Montane grasslands, thickets, forests; 2400–4600 m. Gansu, Qinghai, W Sichuan.

177. *Saussurea wardii* J. Anthony, Notes Roy. Bot. Gard. Edinburgh 18: 216. 1934.

川滇风毛菊 chuan dian feng mao ju

Saussurea bomiensis Y. L. Chen & S. Yun Liang; *S. graminicola* F. H. Chen.

Herbs 18–40 cm tall, perennial. Caudex apically covered with blackish remains of petioles. Stem solitary, purple, ca. 5 mm in diam., erect, simple, arachnoid. Basal and lower stem leaves petiolate; petiole 2.5–6 cm; leaf blade narrowly elliptic to narrowly obovate, $6-15 \times 1-4$ cm, runcinate-pinnately lobed or pinnately dentate, abaxially grayish green and densely arachnoid tomentose, adaxially green and glabrous; lateral lobes 3–6 pairs, semiorbicular, ovate, or obliquely triangular, base cuneate-attenuate, margin entire or with 1 or 2 small teeth, apex acute to rounded. Middle and upper stem leaves narrowly elliptic to linear, smaller than basal and lower stem leaves, margin pinnately dentate. Uppermost stem leaves subtending capitulum, linear, margin entire. Capitulum solitary, terminal on stem. Involucre hemispheric, 2.5–3.5 cm in diam. Phyllaries in 5 or 6 rows, densely villous, apex acuminate; outer phyllaries narrowly triangular-subulate, $9-12 \times$ ca. 2 mm, apically green, herbaceous, and usually reflexed; middle and inner phyllaries subulate-linear, $13-18 \times 1-2$ mm. Corolla purple, (1–)1.2–1.5 cm, tube 6–8 mm, limb 6–7 mm, lobes 3–4 mm. Achene brown, cylindrical, 3–4.5 mm, smooth, glabrous. Pappus brown; outer bristles ca. 3 mm, scabrid; inner bristles ca. 9 mm. Fl. and fr. Aug–Nov.

- Alpine meadows, thickets, *Larix* forests; 3500–4800 m. Qinghai, W Sichuan, SE Xizang (Bomi, Mainling, Nyingchi), NW Yunnan (Dêqên, Weixi, Zhongdian).

The type material of *Saussurea bomiensis* and other material at PE perfectly match *S. wardii*.

178. *Saussurea porphyroleuca* Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 15. 1925.

紫白风毛菊 zi bai feng mao ju

Herbs 4–12 cm tall, perennial, shortly stemmed. Caudex short, covered with remains of petioles. Stem solitary, erect, simple, arachnoid tomentose. Basal leaves petiolate; petiole 2–4 cm; leaf blade obovate-oblong to elliptic, 4–11 × 2–4 cm, lyrate, pinnately lobed, or undivided and margin obtusely dentate, abaxially grayish white and densely tomentose, adaxially green and sparsely arachnoid but glabrescent; lateral lobes 2–5 pairs, ovate, obliquely triangular, or semiorbicular, margin sinuate, apex obtuse to rounded and usually mucronate; terminal lobe ovate to narrowly ovate, large, margin subserrate or sinuate. Stem leaves absent or very few, narrowly linear. Capitulum solitary, in center of leaf rosette or terminal on stem. Involucre campanulate, 2–3 cm in diam. Phyllaries in ca. 4 rows, apically whitish, arachnoid tomentose, apex acute; outer phyllaries linear, ca. 12 × 1 mm; middle phyllaries narrowly ovate-elliptic, 14–17 × 2.5–3 mm, apically dull purple; inner phyllaries broadly linear, ca. 2.2 × 0.2 cm. Corolla dark purple, ca. 1.8 cm, tube ca. 1 cm, limb ca. 8 mm. Achene cylindrical, ca. 2 mm, transversely rugose. Pappus pale brown; outer bristles ca. 2 mm, scabrid; inner bristles ca. 1.5 cm. Fl. and fr. Aug–Sep.

• Grasslands on mountain slopes; 3000–4200 m. NW Yunnan (Dêqên, Lijiang).

179. *Saussurea pachyneura* Franchet, J. Bot. (Morot) 8: 354. 1894.

东俄洛风毛菊 *dong e luo feng mao ju*

Saussurea bodinieri H. Léveillé; *S. kunthiana* C. B. Clarke var. *caulescens* Kitamura; *S. kunthiana* var. *major* J. D. Hooker; *S. sikangensis* F. H. Chen.

Herbs 5–30 cm tall, perennial. Caudex simple or branched, densely covered with dark brown remains of petioles. Stem solitary, erect, simple, with brown glandular hairs or glabrous. Basal leaves petiolate; petiole purplish red, 2–9 cm, arachnoid; leaf blade elliptic to narrowly obovate, 5–30 × 1.5–4 cm, pinnatisect, abaxially grayish white and densely tomentose, adaxially green and glandular hairy; lateral segments 6–12 pairs, elliptic to ovate, margin coarsely triangular-dentate. Stem leaves 1–3, similar and same in division as basal leaves but smaller. Capitulum solitary, terminal on stem. Involucre campanulate, 2–3.5 cm in diam. Phyllaries in 5 or 6 rows, rigid, sparsely pubescent, basally straw-colored, apically green, margin purple, apex acuminate; outer phyllaries oblong to narrowly elliptic, ca. 7 × 2 mm, apically herbaceous, green, reflexed; middle phyllaries narrowly ovate, 1.5–1.7 × ca. 0.5 cm; inner phyllaries narrowly ovate-elliptic, ca. 2 × 0.3 cm. Corolla purple to violet, ca. 1.8 cm, tube ca. 1.1 cm, limb ca. 7 mm. Achene brown, oblong, 3–3.5 mm, transversely rugose. Pappus white or brownish; outer bristles ca. 2 mm, scabrid; inner bristles ca. 1.5 cm. Fl. and fr. Aug–Sep.

Rhododendron thickets, alpine meadows, scree slopes; 3000–4700 m. Guizhou, W Sichuan, SE Xizang, NW Yunnan [Bhutan, India (Sikkim), N Myanmar, E Nepal].

180. *Saussurea colpodes* Y. L. Chen & S. Yun Liang, Acta Phytotax. Sin. 19: 104. 1981.

鞘基风毛菊 *qiao ji feng mao ju*

Herbs 3–7 cm tall, perennial, shortly stemmed. Caudex

simple, covered with dark brown remains of petioles. Stem solitary, erect, simple. Rosette leaves petiolate; petiole 2–3.5 cm; leaf blade narrowly elliptic, 6–15 × 1.5–2 cm, bipinnatisect, abaxially whitish and densely lanate, adaxially green and with articulate glandular hairs; primary segments 10–15 pairs, ovate; secondary lobes 1–3 pairs, triangular, margin revolute, apex acute and mucronate. Capitulum solitary, terminal on stem. Involucre broadly campanulate, 2.2–2.5 cm in diam. Phyllaries in 4 or 5 rows, pale brown or yellowish green, scarious, glabrous, apex acuminate; outer phyllaries narrowly triangular-ovate, apically green and reflexed; inner phyllaries linear, erect. Receptacle bristles subulate, ca. 2 mm. Corolla bluish purple, 2.2–2.5 cm, tube 1–1.2 cm, limb 8–10 mm, lobes 5–6 mm. Achene brown, cylindrical, 3–4.5 mm, glabrous, apex with a short crown. Pappus pale brown; outer bristles 1.1–1.2 cm, plumose; inner bristles 1.5–1.7 cm. Fl. and fr. Jul–Aug.

• Forest margins, by trails; 3300–3400 m. S Xizang (Nyalam).

181. *Saussurea lingulata* Franchet, J. Bot. (Morot) 10: 423. 1896.

小舌风毛菊 *xiao she feng mao ju*

Herbs (6–)10–50 cm tall, perennial. Caudex simple or branched, densely covered with dark brown remains of petioles. Stem simple, purplish red, 1–4 mm in diam., erect, arachnoid. Basal leaves petiolate; petiole 2–7 cm, narrowly winged; leaf blade elliptic to narrowly elliptic, 3–15 × 1–2.5 cm, runcinate-pinnately lobed or undivided and margin obtusely dentate, abaxially grayish white and densely arachnoid tomentose, adaxially green and glabrous; lateral lobes 4–9 pairs, obliquely triangular, margin entire, apex obtuse to acute and mucronate; terminal lobe triangular, margin entire, apex acute. Stem leaves few, sessile or subsessile, similar and same in division as basal leaves. Capitula 2–5(–8), clustered in a corymbiform synflorescence or rarely solitary, subsessile. Involucre campanulate, 1–1.5 cm in diam. Phyllaries in ca. 5 rows, green, glabrous, apex long acuminate; outer and middle phyllaries narrowly ovate-elliptic, 4–13 × 1–2 mm; inner phyllaries linear, 14–16 × 1–1.5 mm. Receptacle bristles 4–6 mm. Corolla blackish purple, 1.2–1.4 cm, tube 6–8 mm, limb ca. 6 mm. Achene cylindrical, ca. 2.5 mm. Pappus pale brown; outer bristles 2–3 mm, scabrid; inner bristles 9–10 mm. Fl. and fr. Jul–Oct.

• Rocky slopes, grassy slopes; 3000–4200 m. W Sichuan, NW Yunnan.

182. *Saussurea przewalskii* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 494. 1882.

弯齿风毛菊 *wan chi feng mao ju*

Saussurea cirsioides Hemsley; *S. giraldii* Diels; *S. likiangensis* Franchet; *S. likiangensis* var. *integrifolia* Handel-Mazzetti; *S. likiangensis* var. *siningensis* Handel-Mazzetti.

Herbs (6–)10–80 cm tall, perennial. Caudex stout, covered with remains of petioles. Stem solitary, blackish purple, erect, simple, arachnoid lanate. Basal leaves petiolate; petiole 4–8 cm, winged; leaf blade narrowly elliptic, 6–18 × 1–3 cm, pinnately lobed, abaxially grayish white or rarely green, golden gland-dotted, densely arachnoid tomentose, and sometimes glabrescent, adaxially green and sparsely arachnoid or glabrous;

lateral lobes 4–6 pairs, triangular, margin denticulate, apex mucronate; terminal lobe triangular, apex acute to obtuse. Stem leaves 2–5, shortly petiolate to sessile, gradually smaller upward on stem. Uppermost stem leaves subtending synflorescence, sessile, narrowly elliptic to linear, pinnately lobed to pinnately cleft. Capitula 3–20, clustered in a corymbiform or globose synflorescence, subsessile. Involucre ovoid to globose, 6–10 mm in diam. Phyllaries in ca. 5 rows, apically blackish purple, sparsely villous; outer phyllaries narrowly ovate-elliptic, 5–6 × 2–3 mm, apex long acuminate; middle phyllaries elliptic, 6–8 × 1.5–2 mm apex acute; inner phyllaries narrowly elliptic, 8–9 × 1–1.5 mm. Corolla purple, 8–9(–15) mm, tube 4–5(–10) mm, limb 4–5 mm. Achene cylindrical, 2.5–4 mm, glabrous. Pappus pale brown; outer bristles ca. 2 mm, scabrid; inner bristles ca. 7 mm. Fl. and fr. Jul–Sep. $2n = 32^*$.

Alpine grasslands, scree slopes, thickets, forest margins; 3000–5100 m. Gansu, Qinghai, Shaanxi, W Sichuan, SE Xizang, NW Yunnan [Bhutan].

183. *Saussurea salwinensis* J. Anthony, Notes Roy. Bot. Gard. Edinburgh 18: 211. 1934.

怒江风毛菊 nu jiang feng mao ju

Saussurea ochrochlaena Handel-Mazzetti.

Herbs 1–5 cm tall, perennial, caespitose, stemless or shortly stemmed. Caudex densely covered with remains of petioles, sterile leaf rosettes, and flowering stems. Rosette leaves petiolate; petiole to 2.5 cm; leaf blade narrowly obovate, narrowly elliptic, or broadly linear, 2–7 × 0.5–1.5 cm, abaxially grayish white or rarely yellowish and arachnoid tomentose, adaxially green and glabrous, margin pinnately lobed, sinuate-dentate, or rarely entire; lateral lobes or teeth 4 or 5 pairs, triangular, apex acute and mucronate. Stem leaves if present few, narrowly elliptic to linear. Capitula 3–10, clustered in a corymbiform or hemispheric synflorescence or rarely solitary, shortly pedunculate. Involucre ovoid, 6–8 mm in diam. Phyllaries in 3 or 4 rows, basally straw-colored, apically green, sparsely villous, apex long acuminate; outer phyllaries narrowly ovate-elliptic, 6–7 × ca. 3 mm; middle phyllaries narrowly ovate-elliptic, 9–10 × 3–4 mm; inner phyllaries elliptic, 7–9 × 1–2 mm. Corolla pale purple, ca. 9 mm, tube ca. 5 mm, limb ca. 4 mm. Achene brown, cylindrical, 2–4 mm, smooth, glabrous. Pappus in 1 row, brown, bristles 8–10 mm, plumose. Fl. and fr. Aug–Sep.

• Thickets, alpine meadows, grasslands, scree slopes; 3500–4900 m. SE Xizang (Zayü), NW Yunnan (Dêqên, Gongshan, Weixi).

184. *Saussurea arenaria* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 490. 1882.

沙生风毛菊 sha sheng feng mao ju

Herbs 3–10 cm tall, perennial, stemless or shortly stemmed. Caudex simple or branched, apically covered with fibrously lacerate remains of petioles. Stem if present solitary, very short, erect, simple, densely white tomentose. Rosette leaves petiolate; petiole 1.5–4 cm; leaf blade narrowly elliptic, 3–11 × 1–3.5 cm, abaxially grayish white and densely tomentose, adaxially green, densely gland-dotted, and arachnoid, margin entire or sinuate-dentate, apex acute to acuminate. Capitulum

solitary, in center of leaf rosette or terminal on stem. Involucre broadly campanulate to ovoid, 2–3.5 cm in diam. Phyllaries in 5 or 6 rows, apically purplish, gland-dotted, sparsely tomentose, apex acuminate; outer phyllaries narrowly ovate-elliptic, 15–16 × ca. 4 mm; middle phyllaries narrowly elliptic, 1.6–2 × ca. 0.2 cm; inner phyllaries linear, 2–2.5 × ca. 0.1 cm. Corolla purple, 1.5–2.2 cm, tube 1–1.4 cm, limb 5–8 mm. Achene cylindrical, ca. 3 mm, smooth, glabrous. Pappus dirty white; outer bristles ca. 1 mm; inner bristles ca. 1.3 cm. Fl. and fr. Jun–Sep. $2n = 30^*$.

• Mountain slopes, mountaintops, meadows, sandy areas, dry riverbeds; 2800–4500 m. Gansu, Qinghai, E Xizang.

Saussurea arenaria is similar to *S. andryaloides*, which differs by smaller capitula, denser leaf indumentum, and lyrate or pinnately lobed leaves. Some specimens are intermediate between the two species.

185. *Saussurea dschungdienensis* Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 61: 205. 1924.

中甸风毛菊 zhong dian feng mao ju

Herbs 2–4 cm tall, perennial, stemless or shortly stemmed. Caudex slender, usually branched, apically covered with brown remains of petioles. Rosette leaves petiolate; petiole 1–1.5 cm; leaf blade narrowly elliptic to obovate, 1–4 × 0.8–1.7 cm, sublyrate with 5–8 pairs of lobes or undivided and margin shallowly crenate or subentire, abaxially grayish white and densely tomentose, adaxially green and glabrous, apex obtuse to rounded and mucronate. Capitula solitary or rarely 2, in center of leaf rosette or terminal on stem. Involucre campanulate, 1–1.5 cm in diam. Phyllaries in 3 or 4 rows, apically pale purple, glabrous, apex acuminate; outer phyllaries narrowly triangular, 7–10 × ca. 2 mm; middle phyllaries narrowly elliptic, ca. 12 × 2 mm; inner phyllaries broadly linear, ca. 15 × 2 mm. Receptacle naked. Corolla purple, ca. 1.5 cm, tube 9–10 mm, limb ca. 6 mm. Achene cylindrical, ca. 3 mm, transversely rugose, glabrous. Pappus pale brown; outer bristles ca. 3 mm, scabrid; inner bristles ca. 1.5 cm. Fl. and fr. Aug–Oct.

• Forest margins, grasslands by small streams, gravelly mountain slopes; 3000–4000 m. SW Sichuan (Muli), NW Yunnan (Dêqên, Zhongdian).

186. *Saussurea lavrenkoana* Lipschitz, Bot. Zhurn. (Moscow & Leningrad) 57: 532. 1972.

双齿风毛菊 shuang chi feng mao ju

Herbs 1–6 cm tall, perennial, stemless or shortly stemmed. Rootstock fibrously split. Caudex simple or few branched, covered with fibrously lacerate remains of petioles. Stem if present straw-colored, 1–3 cm, sparsely arachnoid, leafless or with 1 single leaf. Rosette leaves petiolate; leaf blade narrowly elliptic-linear, 3.5–5 × 0.6–1 cm, pinnatisect, abaxially white tomentose, adaxially green and glabrous; lateral segments 10–20 pairs, split in 2 unequal lobes or simple, linear, 3–5 × 0.8–1.5 mm, margin revolute, apex acuminate. Capitulum solitary, in center of leaf rosette or terminal on stem. Involucre cylindrical to narrowly campanulate, 1–1.5 cm in diam. Phyllaries in 4 or 5 rows, straw-colored or brown, glabrescent, apex acute to acuminate; outer phyllaries narrowly ovate-triangular, 9–10 × 2–3.5 mm; middle phyllaries narrowly ovate, 10–13 × 2–2.5 mm;

inner phyllaries linear, 13–17 × 1–1.5 mm. Receptacle bristles subulate, 1–2.5 mm. Corolla purple, 1.5–1.7 cm, tube 0.9–1.1 cm, limb 5.5–7 mm, lobes 3–4 mm. Achene straw-colored, gray, or ivory white, 3–4 mm, glabrous, apex with a short crenulate crown. Pappus in 1 row, light brown, bristles 1.3–1.5 cm and plumose. Fl. and fr. Sep–Oct.

- Alpine grasslands; ca. 4000 m. SW Sichuan (Muli).

187. *Saussurea andryaloides* (Candolle) Schultz Bipontinus, *Linnaea* 19: 331. 1846.

吉隆风毛菊 *ji long feng mao ju*

Aplotaxis andryaloides Candolle, *Prodr.* 6: 542. 1838;
Saussurea stoliczkae C. B. Clarke.

Herbs 2–6 cm tall, perennial, stemless or shortly stemmed. Caudex simple or few branched, apically covered with remains of petioles. Stem if present simple, whitish, erect, densely tomentose. Rosette leaves shortly petiolate or sessile, exceeding capitula; petiole to 2 cm; leaf blade broadly linear to narrowly ovate-elliptic, 2–8.5 × 0.3–1.5 cm, lyrate to runcinate-pinnately lobed, or undivided and margin sinuate-dentate, grayish green to grayish white and ± concolorous, abaxially densely tomentose, adaxially densely arachnoid pubescent; lateral lobes 2–5 pairs, obliquely triangular, apex acute and mucronate; terminal lobe narrowly triangular, apex acuminate to caudate. Capitulum solitary, in center of leaf rosette or terminal on stem. Involucre campanulate, 1–2 cm in diam. Phyllaries in 3–6 rows, purplish red, sparsely to densely tomentose, apex acuminate; outer phyllaries narrowly ovate-triangular, 11–12 × 3–4 mm; middle phyllaries narrowly ovate-elliptic, 12–17 × 3–4 mm; inner phyllaries narrowly elliptic, 15–20 × 1–3 mm. Corolla purplish red, 0.9–1.8 cm, tube 5–12 mm, limb 4–6 mm. Achene brown, cylindrical, 2.5–4.5 mm, ribbed, smooth, glabrous. Pappus pale brown; outer bristles 0.5–4 mm, scabrid; inner bristles 1.4–1.5 cm. Fl. and fr. Aug–Oct.

Scree slopes, steppes, meadows, thickets; 3200–5400 m. Qinghai, Xinjiang, Xizang [NW India, Kashmir].

Saussurea andryaloides is very widespread in the W and C parts of the Qinghai-Xizang Plateau. In Chinese provincial floras of Xizang and Xinjiang, it has been treated as *S. stoliczkae*. It is not quite clear if the records of *S. stoliczkae* from Qinghai belong to this species, to *S. arenaria*, or to *S. leiocarpa*. In the Hengduan Shan area (W Sichuan and NW Yunnan), records of *S. stoliczkae* mostly are misidentifications of *S. leiocarpa*, which is more closely related to *S. leontodontoides*.

188. *Saussurea andersonii* C. B. Clarke, *Compos. Ind.* 226. 1876.

卵苞风毛菊 *luan bao feng mao ju*

Saussurea flavovirens Y. L. Chen & S. Yun Liang.

Herbs 2–5[–15] cm tall, perennial, stemless or shortly stemmed. Caudex slender, simple or few branched, covered with dark brown remains of petioles. Rosette leaves petiolate; petiole 5–10 mm, base enlarged to an ovate sheath; leaf blade linear, 2.5–6[–11] × 0.2–0.5[–1.5] cm, pinnately lobed or pinnately dentate, abaxially pale green and sparsely pilose on veins and margin, adaxially green and glabrous; lateral lobes or teeth 3–7 pairs, obliquely triangular, recurved, margin entire or den-

tate, apex acuminate. Capitulum solitary, in center of leaf rosette or terminal on a short stem. Involucre campanulate, [0.6–]1–1.5 cm in diam. Phyllaries in 4 or 5 rows, yellowish green, glabrous, apex acuminate; outer phyllaries narrowly ovate, 8–11 × 3–4[–5] mm, apically green, apex reflexed; middle and inner phyllaries narrowly elliptic-linear, 10–15[–18] × 1–3 mm, apically purplish red. Receptacle naked or with few short bristles. Corolla purplish red, 2–2.3 cm, tube 1–1.2 cm, limb 8–11 mm, lobes 5–5.5 mm. Achene cylindrical, 3–4 mm, transversely rugose, apex with a short crown. Pappus reddish brown; outer bristles short, scabrid, sometimes very few or absent; inner bristles 1.5–1.8 cm. Fl. and fr. Aug–Oct.

Alpine meadows, thickets; 3500–4300 m. S Xizang (Yadong), NW Yunnan (Fugong, Gongshan) [India (Sikkim)].

189. *Saussurea purpurascens* Y. L. Chen & S. Yun Liang, *Acta Phytotax. Sin.* 19: 105. 1981.

紫苞风毛菊 *zi bao feng mao ju*

Herbs to 5 cm tall, perennial, shortly stemmed. Caudex covered with brown remains of petioles. Stem solitary, erect, simple, pubescent. Rosette leaves sessile or shortly petiolate; leaf blade linear, 4–9 × 0.3–0.8 cm, runcinate pinnately lobed, abaxially grayish green and densely tomentose, adaxially green and glabrous; lateral lobes 8–15 pairs, narrowly triangular, apex acute and mucronate. Capitulum solitary, terminal on stem. Involucre broadly campanulate, 2–2.5 cm in diam. Phyllaries in ca. 4 rows, glabrous, apex acuminate; outer phyllaries narrowly ovate-elliptic, 13–14 × ca. 4 mm, apically green, herbaceous, and reflexed; inner phyllaries linear, ca. 17 × 2 mm, basally pale green, apically purple and erect. Receptacle bristles ca. 2 mm. Corolla purplish red, 1.5–1.8 cm, tube 8–10 mm, limb 7–9 mm, lobes 4–5 mm. Achene brown, cylindrical, ca. 2 mm, smooth, glabrous, apically with a short crown. Pappus pale brown; outer bristles 8–10 mm; inner bristles ca. 1.2 cm. Fl. and fr. Jul–Aug.

- Thickets on mountain slopes; ca. 4200 m. S Xizang (Yadong) [?Bhutan].

Saussurea purpurascens is only known from the type and may well be only a variety of *S. andersonii* with developed short stems and adaxially tomentose leaves.

190. *Saussurea nyalamensis* Y. L. Chen & S. Yun Liang, *Acta Phytotax. Sin.* 19: 103. 1981.

聂拉木风毛菊 *nie la mu feng mao ju*

Herbs 2–3 cm tall, perennial, usually caespitose. Caudex simple or few branched, covered with brown fibrous remains of petioles. Rosette leaves petiolate; petiole base widened to a purplish red sheath; leaf blade linear, 2.5–4.5 × 0.3–0.7 cm, runcinately pinnatisect, abaxially grayish white and densely tomentose, adaxially densely pilose with articulate hairs; lateral lobes 6–9 pairs, triangular, margin revolute and usually entire, apex acuminate and mucronate. Capitulum solitary, in center of leaf rosette, sessile. Involucre narrowly campanulate, 6–10 mm in diam. Phyllaries in 3 or 4 rows, narrowly ovate-elliptic, yellowish brown to yellowish green, margin and apically dark purplish red. Receptacle bristles subulate, 1–2 mm. Corolla purplish red, 1.2–1.4 cm, tube 4–7 mm, limb ca. 7 mm. Achene ca.

2 mm, transversely rugose. Pappus yellowish brown; outer bristles scabrid. Fl. and fr. Jul–Aug.

• Alpine grasslands, scree slopes; ca. 4700 m. S Xizang (Nyalam, Zhongba).

191. *Saussurea nimborum* W. W. Smith, J. Proc. Asiat. Soc. Bengal 7: 73. 1911.

倒披针叶风毛菊 dao pi zhen ye feng mao ju

Herbs 5–10(–15) cm tall, perennial. Caudex usually simple, apically covered with fibrous remains of petioles. Leaves petiolate; petiole 1–7 cm; leaf blade obovate to narrowly obovate, 3.5–12 × 1–3 cm, shallowly pinnately lobed or undivided and margin sinuate-dentate, abaxially grayish white and densely arachnoid tomentose, adaxially green, scabrid, and densely covered with articulate hairs; lateral lobes 4–6 pairs, triangular-ovate to almost orbicular, 3–8 × 5–10 mm, margin denticulate, apex acute and mucronate. Capitula solitary or 2–5, in a corymbiform synflorescence, sessile or pedunculate. Involucre ovoid-campanulate, 5–12 mm in diam. Phyllaries in 3 or 4 rows, straw-colored with dark margin, sparsely arachnoid to subglabrous, apex acuminate; outer phyllaries ovate-elliptic, 5–7 × 1.5–2 mm; middle phyllaries narrowly ovate-elliptic, 7–12 × 1.5–2 mm; inner phyllaries linear, 12–15 × 1–1.5 mm. Receptacle with bristles. Corolla pale purplish red, 1.6–1.8 cm, tube 9–10 mm, limb 7–8 mm, lobes 4–5 mm. Achene cylindrical, 2–3 mm, transversely rugose, glabrous. Pappus dirty white; outer bristles 2–5 mm, barbellate; inner bristles 1.2–1.4 cm. Fl. and fr. Aug–Sep.

Alpine grasslands on slopes, near rivers; [3000–]4500–5000 m. ?SC Xizang [Bhutan, India (Sikkim)].

Specimens of *Saussurea nimborum* in PE do not match the type material of *S. nimborum* at K but belong to different *Saussurea* species. The presence of *S. nimborum* in China is doubtful.

192. *Saussurea ceterach* Handel-Mazzetti, Acta Horti Gothob. 12: 323. 1938.

康定风毛菊 kang ding feng mao ju

Herbs 2–2.5 cm tall, perennial, stemless. Caudex slender, usually branched, apically covered with remains of petioles. Rosette leaves petiolate; petiole 1–1.5 cm; leaf blade elliptic to obovate-elliptic, 1.5–4.5 × 0.8–1.5 cm, pinnately lobed, abaxially grayish white and densely tomentose, adaxially dull green, scabrid, and with articulate hairs; lateral lobes 4–8 pairs, ovate, oblong, or semiorbicular, margin entire or denticulate, apex rounded and mucronate. Capitulum solitary, in center of leaf rosette. Involucre campanulate, 0.8–1.3 cm in diam. Phyllaries in 3 or 4 rows, apically and near margin greenish or purple, pubescent; outer and middle phyllaries narrowly ovate-elliptic, 8–10 × 1.5–2 mm, apex long acuminate; inner phyllaries linear, 12–15 × ca. 1.5 mm, apex acute to subobtusate. Receptacle bristles to 1.5 mm. Corolla purplish red, 1.6–1.8 cm, tube 1.2–1.4 cm, limb ca. 4 mm. Achene cylindrical, ca. 2 mm, transversely rugose. Pappus pale brown; outer bristles ca. 3 mm, scabrid; inner bristles ca. 1.3 cm. Fl. and fr. Aug–Sep. $2n = 30^*$.

• Thickets, alpine grasslands; 3800–4900 m. Qinghai, W Sichuan, Xizang.

193. *Saussurea leontodontoides* (Candolle) Schultz Bipontinus, Linnaea 19: 330. 1846.

狮牙草状风毛菊 shi ya cao zhuang feng mao ju

Aplotaxis leontodontoides Candolle, Prodr. 6: 539. 1838; *Saussurea irregularis* Y. L. Chen & S. Yun Liang; *S. kunthiana* C. B. Clarke; *S. kunthiana* var. *filicifolia* J. D. Hooker; *S. leontodontoides* var. *filicifolia* (J. D. Hooker) Handel-Mazzetti; *S. rhytidocarpa* Handel-Mazzetti; *S. sungpanensis* Handel-Mazzetti.

Herbs 3–15 cm tall, perennial, stemless or shortly stemmed. Caudex usually branched, densely covered with remains of petioles, often with several leaf rosettes and flowering shoots. Stem if present simple, grayish white, arachnoid lanate, glabrescent. Rosette leaves petiolate; petiole 1–4 cm; leaf blade linear-oblong to narrowly elliptic, 3–18 × (0.4–)0.8–2.5 cm, pinnatisect, abaxially grayish white and densely tomentose, adaxially green, scabrid, strigose, and sometimes glabrescent; segments (5–)8–12 pairs, elliptic, semiorbicular, quadrangular, obliquely ovate, or subtriangular, 4–15 × 2–10 mm, margin entire, apex rounded to obtuse and mucronate. Capitulum solitary, in center of leaf rosette or terminal on stem. Involucre campanulate, 1–3 cm in diam. Phyllaries in 4–6 rows, straw-colored or yellowish green, green or purplish at margin, glabrous; outer and middle phyllaries narrowly ovate-triangular, 9–12 × 0.5–3 mm, apex acuminate; inner phyllaries narrowly elliptic to linear, 14–15 × 1.5–2 mm, apex acute. Receptacle bristles 2–3 mm. Corolla purplish red, (1.4–)1.7–2.2 cm, tube 1–1.4 cm, limb to 7–8 mm, lobes 4–5 mm. Achene cylindrical, 2–4 mm, transversely rugose, glabrous. Pappus pale brown; outer bristles 2–3 mm, scabrid; inner bristles 1–1.6 cm. Fl. and fr. Aug–Nov. $2n = 30^*$.

Scree slopes, forests, forest margins, thickets; 3200–5500 m. Qinghai, W Sichuan, Xizang, NW Yunnan [NE and NW India, Kashmir, Nepal].

Saussurea irregularis, described from a single specimen and not recorded again, is said to differ from *S. leontodontoides* by glabrous (not scabrid and strigose) leaf surface and remote, irregularly placed leaf lobes. We think it is only a slightly deviating form of the widespread and vegetatively very variable *S. leontodontoides*.

194. *Saussurea kansuensis* Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 648. 1937.

甘肃风毛菊 gan su feng mao ju

Herbs 3–5 cm tall, perennial, stemless or shortly stemmed. Caudex usually branched, apically covered with remains of petioles. Stem if present simple, purplish brown, densely covered with articulate hairs. Rosette leaves petiolate; petiole 0.5–3 cm; leaf blade narrowly elliptic-oblong, 4–20(–30) × 1–4 cm, pinnatisect, abaxially grayish white, gland-dotted, and densely tomentose, adaxially green, scabrid, and densely strigose with articulate hairs; lateral segments 8–20 pairs, obliquely triangular-ovate, ovate, or elliptic, 0.5–2 × 0.5–1.8 cm, margin entire or dentate. Capitulum solitary, in center of leaf rosette. Involucre campanulate, 2–4 cm in diam. Phyllaries in 4 or 5 rows, straw-colored with narrow dark margin, sparsely pilose but glabrescent, apically green and herbaceous, apex long acuminate;

outer phyllaries narrowly ovate-triangular, (1.4–)1.8–2(–3) × 0.4–0.5 cm; middle phyllaries narrowly elliptic, 1.5–2.2 × 0.3–0.4 cm; inner phyllaries linear, 2.3–2.6 × 0.1–0.2 cm. Receptacle bristles yellowish brown, subulate, 3–4 mm. Corolla dark purple, 2.5–3 cm, tube 1.7–2 cm, limb 8–10 mm, lobes 5–6 mm. Achene brown, cylindric, 4.5–5 mm, smooth, glabrous, apex with a short crown. Pappus dirty white; outer bristles 4–6 mm, scabrid; inner bristles 2–2.2 cm. Fl. and fr. Aug–Oct.

• Alpine grasslands and steppes, in sandy soils; 3400–4300 m. Gansu, Qinghai, NW Sichuan.

195. *Saussurea leiocarpa* Handel-Mazzetti, *Acta Horti Gothob.* 12: 330. 1938.

光果风毛菊 *guang guo feng mao ju*

Herbs 2–6 cm tall, perennial, stemless or shortly stemmed. Stem if present simple, 1–2 mm in diam., erect, covered at base with remains of petioles. Rosette leaves petiolate; petiole to 2 cm; leaf blade linear-oblong to narrowly elliptic, 3–8 × 0.5–1.5 cm, pinnatisect, abaxially grayish white and densely tomentose, adaxially green and sparsely arachnoid; lateral segments 6–15 pairs, obliquely quadrangular or triangular, 3–6 × 2–6 mm, margin and apex mucronulate. Stem leaves 1–3, similar to basal leaves, 1.5–2.5 × 0.3–0.6 cm; lateral segments 3–6 pairs. Uppermost stem leaves linear, undivided, margin dentate. Capitulum solitary, terminal on stem. Involucre campanulate, 1.5–2 cm in diam. Phyllaries in ca. 5 rows, sparsely pilose, apically ± reflexed, apex acuminate; outer phyllaries ovate-elliptic, 7–8 × 2–2.5 mm; middle phyllaries narrowly ovate-elliptic, 7–12 × 2.5–3 mm; inner phyllaries narrowly elliptic to linear, 12–14 × 1.5–2 mm, erect. Receptacle bristles subulate, 2–5 mm. Corolla dark purple, (1–)1.3–1.5 cm, tube 7–8 mm, limb 6–7 mm, lobes 3.5–4.5 mm. Achene cylindric, ca. 4.5 mm, smooth, glabrous. Pappus light brown; outer bristles 1–1.5(–2) mm, scabrid; inner bristles 1–1.1 cm. Fl. and fr. Jul–Oct.

• Alpine grasslands; 3800–4500 m. W Sichuan, Xizang, NW Yunnan (Zhongdian).

Saussurea leiocarpa is very close to *S. leontodontoides*, only differing in the smooth, not transversely rugose, achene and in the arachnoid, not scabrid-strigose, indumentum on the adaxial leaf surface. Intermediate forms do occur. *Saussurea leiocarpa* is different from *S. stoliczkae* from W Xizang, with which it has been synonymized and confused in the literature.

196. *Saussurea brachylepis* Handel-Mazzetti, *Acta Horti Gothob.* 12: 326. 1938.

短苞风毛菊 *duan bao feng mao ju*

Herbs 3–5 cm tall, perennial, stemless or shortly stemmed. Caudex usually branched, covered with fibrous remains of peti-

oles. Stem very short, simple. Rosette leaves petiolate; petiole to 2 cm; leaf blade narrowly obovate or elliptic, 3.5–9 × 0.8–3 cm, lyrate-pinnately lobed, abaxially white and densely tomentose, adaxially green, strigose, gland-dotted, and sparsely arachnoid floccose; lateral lobes 3–6 pairs, ovate, obliquely oblong, or triangular, margin entire or denticulate, apex rounded to obtuse and mucronate. Uppermost stem leaves subtending capitulum, linear, 1.5–3 × 0.1–0.2 cm, margin entire or denticulate. Capitulum solitary, in center of leaf rosette or terminal on stem. Involucre campanulate, 1.2–1.5 cm in diam. Phyllaries in 5 or 6 rows, leathery, straw-colored, sparsely arachnoid, apex acuminate; outer phyllaries ovate-triangular, 6–8 × 2.5–3.5 mm; middle phyllaries narrowly ovate-elliptic, 8–12 × 1.5–2.5 mm; inner phyllaries narrowly elliptic, 14–16 × 0.5–1.5 mm. Receptacle bristles to 4 mm. Corolla purple, 1.4–1.5 cm, tube 7–8 mm, limb 7–8 mm, lobes 4–4.5 mm. Achene brown, obovoid, 2–3 mm, smooth, glabrous, apically with a short crown. Pappus pale brown; outer bristles 2.5–6 mm, scabrid; inner bristles 1.3–1.5 cm. Fl. and fr. Aug–Oct.

• Mountain slopes; ca. 3600 m. W Sichuan (Dawu).

197. *Saussurea donkiah* C. B. Clarke ex Springate, *Edinburgh J. Bot.* 57: 405. 2000.

亚东风毛菊 *ya dong feng mao ju*

Herbs, perennial, caespitose, stemless or shortly stemmed. Stem if present to 1 cm. Basal leaves narrowly oblong-elliptic to narrowly obovate, 3.5–11 × 0.8–2.2 cm, pinnatisect, abaxially gland-dotted and sparsely arachnoid lanate with articulate hairs, adaxially green, gland-dotted, and sparsely pilose with articulate hairs; lateral segments 8–13 pairs, ovate-triangular to obovate, to 1 × 1 cm, margin denticulate, apex mucronulate. Capitulum solitary, in center of leaf rosette or terminal on stem. Involucre campanulate, 0.8–1.6 cm in diam. Phyllaries in ca. 5 rows, apically purplish and villous, glabrescent; outer phyllaries ovate to narrowly triangular-ovate, 13–15 × 3.5–5.5 mm, apically reflexed, apex acuminate; middle phyllaries narrowly ovate-elliptic, 16–18 × 2–2.5 mm, apically reflexed; inner phyllaries ca. 1.5 mm wide, erect. Receptacle bristles 6–9 mm. Corolla purple, 1.4–1.9 cm, with few small capitate hairs, tube 7.5–10 mm, limb 6.5–9 mm, lobes 3.7–4.5 mm. Achene obovoid, smooth, apically with a prominent crown of many narrow scales. Pappus outer bristles 8–11 mm, plumose; inner bristles 1.1–1.3 cm. Fl. and fr. Sep.

Alpine meadows, stony slopes, scree slopes; ca. 4500 m. S Xizang (Yadong) [?Bhutan, India (Sikkim), E Nepal].

No specimens of *Saussurea donkiah* from China were seen by the present authors, and the description here is based on the protologue, which cites a specimen from S Xizang (Yadong).

7. *Saussurea* sect. *Rosulascentes* (Kitamura) Lipschitz, *Rod Saussurea*, 171. 1979.

莲座风毛菊组 *lian zuo feng mao ju zu*

Saussurea subsect. *Rosulascentes* Kitamura, *Acta Phytotax. Geobot.* 24: 22. 1969.

Herbs, perennial, rhizomatous, with well-developed, simple or branched flowering stems. Basal and lower stem leaves rosulate or subrosulate, present at anthesis. Middle and upper stem leaves few, much reduced. Capitula solitary or several, sometimes supported by uppermost stem leaves. Involucre campanulate, ovoid, cylindric, funnel-shaped, turbinate, or subglobose. Phyllaries

imbricate, margin entire, apex obtuse or acuminate. Receptacle with bristles. Anther tails ciliate or lacerate. Achene usually ribbed, glabrous, sometimes with a small crown. Pappus usually in 2 rows; outer bristles scabrid, rarely lacking.

About 17 species: China, Korea, Russia (Far East, Siberia); nine species (eight endemic) in China.

Saussurea sect. *Rosulascentes* is rather ill-defined as there are many species with few and reduced stem leaves, which have been placed in other sections, and some of the following species can have a number of stem leaves as well. *Saussurea alatipes* and *S. huashanensis* are very similar to *S. fargesii*, so they have been placed in this section. However, these three species may also be placed in *S. sect. Saussurea*.

- 1a. Petiole of basal leaves broadly winged, wings dentate or lobed.
 - 2a. Petiole to 11 cm, with 1–6 pairs of lobes or teeth; leaf blade papery; capitula in ± clustered, corymbiform synflorescence; phyllaries papery, apex purple, shortly acuminate, reflexed 198. *S. alatipes*
 - 2b. Petiole to 6 cm, with 1–3 pairs of lobes or teeth; leaf blade leathery; capitula in lax synflorescence; phyllaries leathery, apical part green, herbaceous, reflexed 200. *S. fargesii*
- 1b. Petiole of basal leaves wingless or narrowly winged.
 - 3a. Leaf blade usually lyrate-pinnately lobed; plants 60–100 cm tall 203. *S. kungii*
 - 3b. Leaf blade not lyrate, pinnately lobed or undivided; plants 10–60 cm tall.
 - 4a. Leaf blade pinnately dentate, pinnately lobed to pinnatisect.
 - 5a. Stem simple; capitulum solitary at end of stem; leaf blade pinnately lobed or with large triangular teeth 201. *S. acrophila*
 - 5b. Stem apically few branched, capitula solitary or 2, at end of branches; leaf blade deeply pinnately lobed to pinnatisect 202. *S. paucijuga*
 - 4b. Leaf blade undivided, margin entire, sinuate-dentate, denticulate, or shallowly crenate.
 - 6a. Capitula solitary or rarely 2, terminal on stem.
 - 7a. Leaves green on both surfaces, concolorous 252. *S. superba* (see *S. sect. Saussurea*)
 - 7b. Leaves abaxially grayish white, densely tomentose, adaxially green 206. *S. tomentosa*
 - 6b. Capitula several (2–10), in corymbiform synflorescence.
 - 8a. Leaf blade obovate to narrowly obovate, 2–4.5 cm wide 204. *S. oligocephala*
 - 8b. Leaf blade ovate or elliptic, usually more than 5 cm wide.
 - 9a. Leaf blade usually ovate or triangular-ovate; leaf base cordate or truncate 199. *S. huashanensis*
 - 9b. Leaf blade usually elliptic; leaf base cuneate-attenuate 205. *S. oblongifolia*

198. *Saussurea alatipes* Hemsley, J. Linn. Soc., Bot. 29: 308. 1892.

翼柄风毛菊 yi bing feng mao ju

Herbs 15–40 cm tall, perennial. Rhizome oblique-ascending, covered with blackish brown remains of petioles. Stem solitary, 1–3 mm in diam., erect, simple or branched. Rosette and lower stem leaves petiolate; petiole winged, 3–11 cm, with 1–6 obliquely triangular lobes or large teeth; leaf blade ovate to narrowly ovate-elliptic, 6–10 × 3.5–8 cm, abaxially grayish to greenish white, gland-dotted, and densely tomentose, adaxially green, scabrid, and strigose, base cordate to rounded, margin sinuate-dentate, apex acuminate. Middle and upper stem leaves sessile, narrowly elliptic to linear, 2–7 × 0.1–1 cm. Capitula several, solitary or in groups of to 3 on end of branches in a corymbiform synflorescence, pedunculate. Involucre cylindrical to campanulate, 0.7–1.3 cm in diam. Phyllaries in 5–7 rows, pale green, arachnoid tomentose to glabrescent, apex acuminate to acute; outer phyllaries triangular-ovate, 3–4 × 1–2 mm, apex dark purple; middle phyllaries narrowly ovate-elliptic, 4–9 × 2–2.5 mm; inner phyllaries narrowly elliptic to linear, 9–12 × 1–1.5 mm, apically bearded. Corolla pale purple, 1–1.2 cm, tube 5–6 mm, limb 5.5–6.5 mm. Achene cylindrical, ca. 5 mm, 5-ribbed, glabrous. Pappus white; outer bristles 1.5–2.5 mm; inner bristles 8–10(–13) mm. Fl. and fr. Jul–Aug.

• Forests, grasslands, beside trails; 1500–2600 m. N and NE Chongqing (Chengkou, Wu Shan, Wuxi), W Hubei (Badong, Shennongjia).

199. *Saussurea huashanensis* (Y. Ling) X. Y. Wu, Fl. Tsinling. 1(5): 365. 1985.

华山风毛菊 hua shan feng mao ju

Saussurea eriolepis Bunge ex Candolle var. *huashanensis* Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 3: 163. 1935; *S. alatipes* Hemsley var. *huashanensis* (Y. Ling) Y. Ling; *S. nivea* Turczaninow var. *huashanensis* (Y. Ling) S. Y. Hu.

Herbs 40–60 cm tall, perennial. Rhizome stout, simple, apically covered with brown residue of petioles. Stem solitary, erect, apically branched, arachnoid lanate. Basal and lower stem leaves petiolate; petiole 8–11 cm, wingless or narrowly winged, 1–3-lobed or dentate; leaf blade ovate to elliptic, 7–18 × 4–10 cm, papery, abaxially grayish green and densely tomentose, adaxially green and glabrous, base cordate to rarely truncate, margin sinuate to sinuate-lobate, apex acute to acuminate. Middle and upper stem leaves few; petiole 1–4 cm; leaf blade ovate to elliptic, gradually smaller upward on stem. Capitula numerous, in a paniculiform or corymbiform synflorescence, pedunculate. Involucre narrowly campanulate, 8–10 mm in diam. Phyllaries in 6 or 7 rows, arachnoid, apex black, acuminate to acute, and mucronate; outer phyllaries ovate, ca. 2 × 2 mm; middle phyllaries oblong to narrowly elliptic, ca. 8 × 3 mm; inner phyllaries linear, ca. 11 × 2 mm. Corolla pale purple, 1.4–1.6 cm. Achene cylindrical, ca. 6 mm, ribbed, glabrous, apex with a short crenulate crown. Pappus white; outer bristles ca. 5 mm, scabrid; inner bristles ca. 1 cm. Fl. and fr. Aug–Sep.

• Tallgrass meadows, thickets; 1800–2100 m. W Henan, E Shaanxi (Hua Shan).

Saussurea huashanensis is very close to *S. alatipes* but differs by the unwinged or narrowly winged petioles. *Saussurea huashanensis* seems to replace *S. alatipes* in the E part of the Qin Ling range.

200. *Saussurea fargesii* Franchet, J. Bot. (Morot) 8: 344. 1894.

川东风毛菊 chuan dong feng mao ju

Herbs 50–60 cm tall, perennial. Rhizome stout, simple. Stem solitary, erect, apically branched, sparsely strigose. Rosette and lower stem leaves petiolate; petiole 3–6 cm, broadly winged, wing sinuate and decurrent on stem; leaf blade broadly ovate, 16–20 × 7–10 cm, leathery, abaxially grayish white and densely tomentose, adaxially green and sparsely strigose, base cordate, truncate, or obtuse, margin shallowly crenate, apex shortly acuminate. Upper stem leaves 2, sessile, ovate-elliptic, 7–10 × 2.5–4.5 cm, base decurrent, margin subentire, apex acuminate. Uppermost stem leaves linear, 2.5–5 × 0.1–0.3 cm. Capitula 1–4, at end of branches, in a lax racemiform synflorescence. Involucre broadly campanulate, 1–2 cm in diam. Phyllaries in 4 or 5 rows, leathery, straw-colored with brown margin, villous; outer phyllaries suborbicular to broadly ovate, 8–10 × 3–5 mm, apical part green, herbaceous, and erect or reflexed, apex acuminate; inner phyllaries oblong, 10–12 × 1.5–2 mm, apex obtuse. Receptacle bristles 2–5 mm. Corolla purple, 1–1.2 cm, tube 5–6 mm, limb 5–6 mm, lobes 3–3.5 mm. Achene obconic, 2.5–3 mm, glabrous. Pappus in 1 row, 8–9 mm, plumose.

- N Chongqing (Chengkou).

Saussurea fargesii is apparently only known from the type and may be conspecific with *S. alatipes*.

201. *Saussurea acrophila* Diels, Bot. Jahrb. Syst. 36(Beibl. 82): 108. 1905.

破血丹 po xue dan

Herbs 10–20 cm tall, perennial. Rhizome apically covered with brown residue of petioles. Stem solitary, erect, simple, apically white arachnoid, glabrescent. Basal and lower stem leaves petiolate; petiole 2–4.5 cm; leaf blade elliptic to obovate, 2.5–6.5 × 1–3 cm, papery, both surfaces green and glabrous, base cuneate, margin with large triangular teeth or rarely pinnately lobed, apex acute; lateral lobes 3 or 4 pairs, broadly triangular. Middle stem leaves petiolate; petiole 1–2.5 cm; leaf blade obovate-elliptic to linear, base cuneate, margin sinuate or entire. Upper stem leaves linear, small, margin entire. Capitulum solitary, terminal on stem. Involucre broadly campanulate to campanulate, 1–2 cm in diam. Phyllaries in 4 or 5 rows, glabrous or sparsely arachnoid lanate, apex acute to obtuse; outer phyllaries ovate, ca. 3 × 2 mm; middle phyllaries narrowly elliptic, ca. 7 × 3 mm; inner phyllaries linear, ca. 11 × 2 mm. Corolla purple, ca. 1.1 cm, tube ca. 5 mm, limb ca. 6 mm. Achene pale brown, cylindrical, ca. 3 mm, glabrous, apex with denticulate crown. Pappus pale brown; outer bristles ca. 2 mm; inner bristles ca. 1 cm. Fl. and fr. Jul–Oct.

- Montane forests; 2800–3100 m. S Shaanxi (Qin Ling).

202. *Saussurea paucijuga* Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 6: 88. 1949.

深裂风毛菊 shen lie feng mao ju

Herbs 10–32 cm tall, perennial. Rhizome short, apically covered with dull brown remains of petioles. Stem solitary, slender, erect, simple or few branched, sparsely white arachnoid lanate. Basal and lower stem leaves petiolate; petiole 1.5–4 cm; leaf blade narrowly elliptic to obovate-elliptic, 3–11 × 0.9–2 cm, papery, pinnately lobed to pinnatisect, abaxially pale green and sparsely arachnoid, adaxially green and glabrous, apex acute to shortly acuminate; lateral lobes 3–6 pairs, elliptic-ovate to triangular, margin entire, apex acuminate and long mucronate; terminal lobe triangular. Middle and upper stem leaves very few, narrowly elliptic to linear, ca. 10 × 2 mm. Capitula 1 or 2, at end of branches, long pedunculate. Involucre campanulate to funnel-shaped, 7–12 mm in diam. Phyllaries in ca. 4 rows, straw-colored, apically green or purple, and arachnoid, glabrescent, apex acuminate with a cartilaginous mucro; outer phyllaries ovate, 3–4 × ca. 2 mm; middle phyllaries narrowly elliptic, 4–6 × 2–3 mm; inner phyllaries narrowly obovate-elliptic to linear, 6–8 × 1–2 mm. Corolla purple, 1–1.1 cm, tube 4–5 mm, limb ca. 6 mm. Achene pale brown, cylindrical, ca. 3 mm, glabrous. Pappus dirty white; outer bristles ca. 2 mm; inner bristles 7–8 mm. Fl. Aug–Oct.

- Mountain slopes; 2400–2800 m. S Shaanxi (Qin Ling).

Saussurea paucijuga is very close to and probably conspecific with *S. acrophila*.

203. *Saussurea kungii* Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 3: 158. 1935.

洋县风毛菊 yang xian feng mao ju

Herbs 60–100 cm tall, perennial. Rhizome stout, obliquely ascending. Stem solitary, brownish purple, slender, erect, apically branched, arachnoid, basally glabrescent. Basal leaves petiolate; petiole 2–3.5 cm; leaf blade narrowly obovate-elliptic, 15–20 × 3–6 cm, thinly papery, lyrate-pinnately lobed, abaxially pale green and glabrous, adaxially green or purple and glabrous; lateral lobes 1–4 pairs, margin entire or subentire; terminal lobe narrowly ovate-triangular to narrowly elliptic, large, apex acute to acuminate. Middle and upper stem leaves 1 or 2, narrowly elliptic to linear, 1.5–3 × 0.2–0.5 cm, margin entire, apex acute. Capitula few to numerous, in a corymbiform synflorescence. Involucre turbinate, 5–12 mm in diam. Phyllaries in 4 or 5 rows, arachnoid; outer phyllaries triangular-ovate, ca. 11 × 3 mm, green, apex acute; middle phyllaries oblong to narrowly elliptic, ca. 9 × 1–2 mm, herbaceous, purple, apex rounded to obtuse; inner phyllaries linear, ca. 11 × 1 mm, apex acute. Receptacle bristles 5–8 mm. Corolla purple, ca. 1.3 cm. Achene oblong, ca. 4 mm, ribbed, glabrous. Pappus dirty white; outer bristles ca. 3 mm; inner bristles 6–8 mm. Fl. and fr. Sep–Oct.

- Forests on mountain slopes; 1800–1900 m. S Shaanxi (Qin Ling).

204. *Saussurea oligocephala* (Y. Ling) Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 6: 83. 1949.

少头风毛菊 shao tou feng mao ju

Saussurea acrophila Diels var. *oligocephala* Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 3: 155. 1935.

Herbs 10–60 cm tall, perennial. Rhizome obliquely ascending, apically covered with remains of petioles. Stem solitary, slender, erect, apically branched, sparsely arachnoid, glabrescent. Basal leaves petiolate; leaf blade obovate to narrowly obovate-elliptic, 4–12 × 2–4.5 cm, thinly papery, abaxially purplish red and subglabrous, adaxially green and with multicellular articulate hairs, base cuneate-attenuate, margin sinuate or dentate, apex acute to obtuse. Stem leaves few, linear, small, margin entire. Capitula solitary or 2–9 in a lax corymbiform synflorescence. Involucre turbinate to narrowly campanulate, 6–9 mm in diam. Phyllaries in 4 or 5 rows, arachnoid; outer phyllaries ovate, ca. 3 × 2 mm, apex obtuse; middle phyllaries elliptic, ca. 8 × 1.8 mm, apex obtuse; inner phyllaries narrowly ovate-elliptic to broadly linear, ca. 11 × 1 mm, apex obtuse. Corolla purple, ca. 1.2 cm, tube ca. 6 mm, limb ca. 6 mm. Achene oblong, ca. 3 mm, ribbed, glabrous, apex with a short crown. Pappus white; outer bristles 2–3 mm; inner bristles ca. 7 mm. Fl. and fr. Sep–Oct.

- Forests, thickets; 2000–3000 m. S Shaanxi (Qin Ling).

205. *Saussurea oblongifolia* F. H. Chen, Bull. Fan Mem. Inst. Biol., Bot. 6: 99. 1935.

长圆叶风毛菊 chang yuan ye feng mao ju

Herbs 40–50 cm tall, perennial. Rhizome simple. Stem solitary, erect, apically branched, arachnoid. Basal and lower stem leaves long petiolate; petiole to 5 cm; leaf blade ovate to elliptic, 12–15 × 5–6 cm, abaxially pale green and sparsely arachnoid, adaxially green and scabrid, base cuneate-attenuate, margin denticulate, apex acute. Middle and upper stem leaves sessile, narrowly elliptic, base attenuate, apex acuminate. Capitula 5–10, in a lax corymbiform synflorescence, pedunculate. Involucre campanulate or subglobose, 1–2 cm in diam. Phyllaries in 4–6 rows, yellowish brown with brown margin,

sparsely pubescent; outer phyllaries ovate, 3–5 × 2–3.5 mm, apex acute; inner phyllaries narrowly elliptic, 5–10 × 1–2 mm, apex acuminate. Corolla ca. 1.2 cm. Achene immature. Pappus dirty white; outer bristles scabrid; inner bristles ca. 1 cm. Fl. Sep.

- NW Yunnan (Binchuan).

206. *Saussurea tomentosa* Komarov, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 2: 135. 1921.

高岭风毛菊 gao ling feng mao ju

Saussurea alpicola Kitamura; *S. eriophylla* Nakai var. *alpina* Nakai.

Herbs 10–30 cm tall, perennial. Stem erect, simple, sparsely tomentose. Basal and lower stem leaves petiolate; petiole 2–4 cm; leaf blade triangular to triangular-ovate, 3–12 × 1–3.5 cm, abaxially grayish white and densely tomentose, adaxially green and sparsely arachnoid tomentose to subglabrous, base cordate, truncate, or cuneate, margin sharply dentate or entire, apex acuminate, acute, or sometimes obtuse. Middle and upper stem leaves few, narrowly elliptic to linear, margin sharply dentate or entire. Capitula solitary or 2, terminal on stem, usually subtended by 1 or 2 linear leaves. Involucre campanulate, 2–2.5 cm in diam. Phyllaries in 4 or 5 rows, whitish, tomentose, apex acute; outer phyllaries ovate, 5–7 × 2.5–3 mm; middle phyllaries narrowly ovate-elliptic, 7–10 × 2.5–3.5 mm; inner phyllaries narrowly ovate-elliptic, 10–12 × 1.5–2 mm. Corolla purple, 1.2–1.4 cm, tube 6–8 mm, limb ca. 6 mm. Achene pale brown tinged purple, cylindrical, ca. 5 mm, ribbed, apex with a denticulate crown. Pappus pale brown; outer bristles 2–3 mm; inner bristles 1–1.1 cm. Fl. and fr. Jul–Sep.

By waterfalls, grasslands, rock crevices; 1500–2600 m. Jilin (Changbai Shan) [Korea, Russia (Far East)].

8. *Saussurea* sect. *Saussurea*

风毛菊组 feng mao ju zu

Herbs, perennial, often rhizomatous, usually with well-developed stems, rarely caespitose. Stems solitary, rarely few, ascending to erect, simple to branched, usually leafy. Leaves petiolate or sessile; leaf blade very varied, mostly undivided, sometimes pinnately lobed to pinnatisect, base auriculate, cordate, rounded, truncate, or cuneate, margin entire of dentate, apex rounded to acuminate. Capitula usually several to numerous, in a lax or dense corymbiform, racemiform, or paniculiform synflorescence or sometimes solitary. Involucre cylindrical, narrowly to broadly campanulate, or obconic, medium-sized. Phyllary margin entire or rarely pectinate. Receptacle with subulate bristles. Corolla pink, purple, red, or rarely white, usually glabrous. Anther tails lacinate. Achene smooth, sometimes ribbed, glabrous. Pappus usually in 2 rows, rarely outer row lacking.

About 160 species: mainly in high mountains and boreal to arctic regions of Asia, Europe, and W North America; 83 species (60 endemic) in China.

1a. Phyllary margins pectinate, with 2–5 pairs of teeth.

2a. Involucre 5–8 mm in diam.; phyllaries with 2 or 3 pairs of teeth; leaves with 8–17 pairs of lobes, lobes

oblong to narrowly elliptic-linear 207. *S. odontolepis*

2b. Involucre 8–12 mm in diam.; phyllaries with 3–5 pairs of teeth; leaves with 4–9 pairs of lobes, lobes

ovate to narrowly ovate-elliptic 208. *S. pectinata*

1b. Phyllary margins entire or subentire.

3a. Basal and lower stem leaves with a shallowly or deeply cordate base.

4a. Leaf blade adaxially green, abaxially grayish white or grayish green and densely tomentose, arachnoid, or lanate.

5a. Basal and lower stem leaves narrowly ovate-elliptic, 0.7–2.5 cm wide 226. *S. graciliformis*

5b. Basal and lower stem leaves 2–17 cm wide.

- 6a. Lower stem leaves triangular-ovate, base cordate or hastate.
- 7a. Leaf blade leathery, adaxially pale green or grayish green, sparsely arachnoid floccose, glabrescent; involucre narrowly campanulate, 4–7 mm in diam. 225. *S. firma*
- 7b. Leaf blade papery, adaxially white or grayish white, densely tomentose; involucre campanulate, 6–12 mm in diam. 227. *S. nivea*
- 6b. Lower stem leaves ovate, ovate-elliptic, or reniform.
- 8a. Apex of phyllaries without a mucro.
- 9a. Stem much branched; capitula in paniculiform synflorescence; involucre cylindric, 0.7–0.9 cm in diam. 233. *S. pinetorum*
- 9b. Stem apically few branched; capitula in racemiform or lax corymbiform synflorescence; involucre campanulate-obconic, 1.2–1.5 cm in diam. 235. *S. chetchozensis*
- 8b. Apex of phyllaries with a black mucro.
- 10a. Stem densely leafy; capitula numerous, in paniculiform to lax corymbiform synflorescence 229. *S. vestitifomis*
- 10b. Stem with few leaves; capitula few or numerous, in clustered corymbiform synflorescence.
- 11a. Stem with brown multicellular articulate hairs 230. *S. baroniana*
- 11b. Stem white arachnoid or lanate.
- 12a. Leaf blade 2.5–6 × 2–5 cm; stem slender; involucre obconic to cylindric, 5–6 mm in diam. 231. *S. flaccida*
- 12b. Leaf blade 3–11 × 7–10(–17) cm; stem stout; involucre campanulate, 6–10 mm in diam. 232. *S. acromelaena*
- 4b. Leaf blade green, concolorous or abaxially paler green, abaxially glabrous or glabrescent.
- 13a. Capitulum usually solitary, terminal on stem, sometimes 2–5, solitary on end of branches; involucre 2–2.5 cm in diam. 209. *S. populifolia*
- 13b. Capitula usually numerous or few, rarely solitary; involucre usually less than 2 cm in diam.
- 14a. Apical part of phyllaries either herbaceous or leathery and saber-shaped, usually patent or reflexed.
- 15a. Apical part of phyllaries leathery, saber-shaped and reflexed, apex long acuminate.
- 16a. Leaf blade undivided but margin dentate 212. *S. subtriangulata*
- 16b. Leaf blade pinnately lobed or pinnately dentate.
- 17a. Capitula numerous, shortly pedunculate; involucre narrowly campanulate, 5–7 mm in diam. 210. *S. mongolica*
- 17b. Capitula few, long pedunculate; involucre obconic, 10–15 mm in diam. 211. *S. sinuata*
- 15b. Apical part of phyllaries herbaceous, not saber-shaped, reflexed, patent, or erect, apex shortly acuminate.
- 18a. Leaf blade hastate or narrowly cordate, longer than wide.
- 19a. Capitula 6–12, in paniculiform to corymbiform synflorescence; involucre narrowly campanulate, 0.7–1 cm in diam. 215. *S. stricta*
- 19b. Capitula 1–3, long pedunculate, in corymbiform synflorescence; involucre campanulate, 1–2 cm in diam. 216. *S. hylophila*
- 18b. Leaf blade cordate or broadly cordate, ± as long as wide.
- 20a. Lower and middle stem leaves broadly cordate, 8–20 × 7–18 cm; stem glabrous 213. *S. cordifolia*
- 20b. Lower and middle stem leaves ovate-cordate, 5–11 × 5–11 cm; stem with sparse articulate hairs but glabrescent 214. *S. oligantha*
- 14b. Apical part of phyllaries neither herbaceous nor leathery and saber-shaped, erect, usually appressed.
- 21a. Involucre ca. 5 mm in diam.; corolla ca. 8 mm; inner pappus bristles 6–7 mm 221. *S. tenerifolia*
- 21b. Involucre 5–15 mm in diam.; corolla 10–16 mm; inner pappus bristles 7–13 mm.
- 22a. Involucre campanulate to globose, 10–15 mm in diam.
- 23a. Phyllaries long acuminate 223. *S. hwangshanensis*
- 23b. Phyllaries acute to obtuse and sometimes mucronate.
- 24a. Leaf blade sparsely strigose on both surfaces 222. *S. grandifolia*
- 24b. Leaf blade abaxially thinly arachnoid tomentose but glabrescent, adaxially sparsely strigose 219. *S. bullockii*
- 22b. Involucre tubular to campanulate, 5–10 mm in diam.
- 25a. Leaf blade leathery, abaxially grayish green and sparsely arachnoid floccose but glabrescent 225. *S. firma*
- 25b. Leaf blade papery, abaxially pale green and subglabrous.
- 26a. Involucre campanulate, 8–10 mm in diam.
- 27a. Phyllaries appressed, not patent or recurved 220. *S. pseudobullockii*
- 27b. Phyllaries apically patent to recurved 234. *S. paleata*
- 26b. Involucre tubular to narrowly campanulate, 5–8 mm in diam.
- 28a. Plants 30–40 cm tall; stem simple or apically few branched; capitula 3–5, subsessile in a clustered corymbiform synflorescence 218. *S. triangulata*

- 28b. Plants 50–120 cm tall; stem much branched; capitula more numerous, shortly or long pedunculate.
- 29a. Capitula shortly pedunculate, clustered at end of branches in a corymbiform synflorescence 224. *S. ussuriensis*
- 29b. Capitula long pedunculate, in a paniculiform synflorescence 217. *S. manshurica*
- 3b. Basal and lower leaves with an attenuate, cuneate, rounded, truncate, or auriculate-amplexicaul base.
- 30a. Leaf blade base auriculate and amplexicaul.
- 31a. Capitula ca. 5, sessile, clustered in a hemispheric synflorescence 236. *S. lyratifolia*
- 31b. Capitula either few and long pedunculate or numerous and shortly pedunculate, in a corymbiform synflorescence.
- 32a. Capitula 1–4, large, long pedunculate, not in a clustered corymbiform synflorescence; involucre 1.2–2 cm in diam.
- 33a. Leaf blade ovate to narrowly ovate-elliptic, 1.5–5 cm wide 237. *S. neofranchetii*
- 33b. Leaf blade narrowly oblong to linear, 1–1.5 cm wide 238. *S. caudata*
- 32b. Capitula numerous, small or medium-sized, shortly pedunculate, in a clustered corymbiform synflorescence; involucre 0.4–1 cm in diam.
- 34a. Leaf blade base inconspicuously auriculate.
- 35a. Stem winged; leaf blade abaxially grayish green or grayish white, densely arachnoid tomentose 239. *S. leclerei*
- 35b. Stem wingless; leaf blade abaxially green, puberulent only on veins 240. *S. merinoi*
- 34b. Leaf blade base broadly auriculate and amplexicaul.
- 36a. All leaves sessile; leaf blade elliptic, 8–23 × 2.5–6 cm 241. *S. macrota*
- 36b. Lower stem leaves petiolate; leaf blade narrowly ovate-elliptic, 6–9 × 2.5–4 cm 242. *S. semiamplexicaulis*
- 30b. Leaf blade base not auriculate or amplexicaul.
- 37a. Leaf blade lyrate or lyrate pinnatilobed; petiole with 1 or several pairs of lobes.
- 38a. Receptacle without bristles 178. *S. porphyroleuca* (see *S. sect. Strictae*)
- 38b. Receptacle with bristles.
- 39a. Leaf blade decurrent on stem; stem winged.
- 40a. Leaf blade glabrous or subglabrous on both surfaces.
- 41a. Outer phyllaries acute to obtuse 243. *S. peduncularis*
- 41b. Outer phyllaries apically with a 3–4 mm subulate awn 244. *S. frondosa*
- 40b. Leaf blade adaxially green and glabrous or pubescent, abaxially grayish white and arachnoid or lanate.
- 42a. Involucre campanulate, 1–1.7 cm in diam. 245. *S. eriocephala*
- 42b. Involucre ovoid or campanulate, 0.5–0.8 cm in diam.
- 43a. Plants 5–15 cm tall 261. *S. kiraiensis*
- 43b. Plants 20–90 cm tall.
- 44a. Stem wings entire; leaf blade ovate, undivided 228. *S. dimorphaea*
- 44b. Stem wings sinuate-dentate; leaf blade narrowly ovate-elliptic, runcinate-pinnately lobed 246. *S. dzeurensis*
- 39b. Leaf blade not decurrent on stem; stem wingless.
- 45a. Leaf blade adaxially green and glabrous, abaxially grayish white or grayish green and arachnoid tomentose.
- 46a. Terminal lobe of leaf blade ovate, base cuneate to subtruncate 131. *S. flexuosa* (see *S. sect. Laguranthera*)
- 46b. Terminal lobe of leaf blade ovate-triangular or ovate, base conspicuously cordate.
- 47a. Stem with few reduced leaves; basal leaves numerous, in a basal rosette 198. *S. alatipes* (see *S. sect. Rosulascentes*)
- 47b. Stem with many well-developed leaves; basal leaves few, usually withered at anthesis 250. *S. lampsanifolia*
- 45b. Leaf blade green, ± concolorous, glabrous or subglabrous.
- 48a. Capitulum solitary, terminal on stem, or 2–4; phyllaries long acuminate, reflexed 249. *S. morifolia*
- 48b. Capitula numerous, in a racemiform or corymbiform synflorescence; phyllaries not reflexed.
- 49a. Involucre hemispheric, 2–2.5 cm in diam. 247. *S. carduiformis*
- 49b. Involucre narrowly campanulate, 0.4–0.9 cm in diam. 248. *S. mutabilis*
- 37b. Leaf blade undivided or pinnately lobed but not lyrate; petiole without lobes.
- 50a. Leaf blade pinnately lobed or coarsely pinnately dentate.
- 51a. Plants 15–35 cm tall; capitulum solitary 286. *S. grosseserrata*
- 51b. Plants 40–100 cm tall; capitula 3–5 in a clustered corymbiform synflorescence 289. *S. recurvata*
- 50b. Leaf blade undivided, margin entire, denticulate, or shallowly sinuate-dentate.
- 52a. Leaf blade adaxially green, smooth, and glabrous or scabrous and strigose, abaxially white, grayish white, or grayish green and densely tomentose or thinly arachnoid.

- 53a. Plants stemless or shortly stemmed, 3–8 cm tall; capitulum solitary; involucre 2–2.5 cm in diam. 272. *S. woodiana*
- 53b. Plants always with a developed stems, more than 10 cm tall; capitula usually several; involucre less than 1.5 cm in diam.
- 54a. Capitula 1–6.
- 55a. Stem and leaf petioles wingless.
- 56a. Plants 40–65 cm tall; involucre 0.8–1 cm in diam. 270. *S. iodoleuca*
- 56b. Plants 10–30 cm tall; involucre 1–1.2 cm in diam. 275. *S. alaschanica*
- 55b. Stem and leaf petioles distinctly winged.
- 57a. Plants 30–40 cm tall; leaf blade ovate to elliptic 271. *S. smithiana*
- 57b. Plants 10–35 cm tall; leaf blade broadly ovate to orbicular.
- 58a. Involucre narrowly campanulate to cylindric, 5–7 mm in diam. 273. *S. komarnitzkii*
- 58b. Involucre ovoid to obconic, ca. 13 mm in diam. 274. *S. rotundifolia*
- 54b. Capitula numerous, in a racemiform, paniculiform, or corymbiform synflorescence.
- 59a. Stem wingless.
- 60a. Leaf blade orbicular to broadly ovate, abaxially white and densely tomentose 281. *S. bullata*
- 60b. Leaf blade ovate, elliptic, or oblong to narrowly elliptic, abaxially grayish green and arachnoid.
- 61a. Plants to 1.2 m tall; capitula in a paniculiform to lax corymbiform synflorescence 285. *S. undulata*
- 61b. Plants to 70 cm tall; capitula in a clustered corymbiform synflorescence.
- 62a. Leaf blade ovate to elliptic, adaxially grayish green, and arachnoid floccose 283. *S. elliptica*
- 62b. Leaf blade narrowly ovate-elliptic to narrowly elliptic, adaxially green and glabrous.
- 63a. Plants 30–70 cm tall; leaves and phyllaries usually without glands 282. *S. alpina*
- 63b. Plants 10–20 cm tall; leaves and phyllaries abaxially densely gland-dotted 284. *S. pseudoalpina*
- 59b. Stem winged.
- 64a. Capitula 4–10, in a lax racemiform synflorescence 276. *S. polygonifolia*
- 64b. Capitula usually more numerous, in a clustered or lax corymbiform or paniculiform synflorescence.
- 65a. Stem stout, much branched; leaf blade oblong to narrowly elliptic, less than 2 cm wide 278. *S. platypoda*
- 65b. Stem slender, simple or apically few branched; leaf blade ovate to narrowly elliptic, usually more than 2 cm wide.
- 66a. Middle stem leaves 2–4 cm wide, apex acuminate.
- 67a. Middle stem leaves narrowly elliptic to linear, 10–20 cm 280. *S. amurensis*
- 67b. Middle stem leaves ovate to elliptic, 5–8 cm 228. *S. dimorphaea*
- 66b. Middle stem leaves 3–7.5 cm wide, apex acute to obtuse.
- 68a. Phyllaries yellowish green, apically purplish, densely arachnoid pubescent; outer phyllaries acuminate but without a black mucro; leaf blade apex obtuse to subacute 277. *S. vestita*
- 68b. Phyllaries straw-colored, brownish, or purple, pubescent or arachnoid; outer phyllaries with a long black mucro; leaf blade apex acute 279. *S. cauloptera*
- 52b. Leaf blade green, concolorous, glabrous, sparsely pubescent, or glandular hairy.
- 69a. Capitulum solitary, terminal on stem.
- 70a. Leaf blade margin coarsely sinuate-dentate.
- 71a. Phyllaries not reflexed; leaf blade obovate-elliptic, apex rounded to acute and mucronate 286. *S. grosseserrata*
- 71b. Phyllaries reflexed; leaf blade ovate, narrowly ovate-elliptic, or triangular, apex acuminate 288. *S. tunglingensis*
- 70b. Leaf blade margin entire or inconspicuously denticulate.
- 72a. Plants stemless or with a developed stem; involucre 1.5–4 cm in diam. 252. *S. superba*
- 72b. Plants always with a developed stem; involucre 1–2 cm in diam.
- 73a. Leaf blade oblong to broadly linear, margin sinuate 287. *S. pratensis*
- 73b. Leaf blade narrowly obovate, narrowly ovate, or narrowly elliptic, margin entire or denticulate.
- 74a. Leaf blade narrowly oblong to linear, glabrous; phyllaries reflexed 257. *S. micradenia*
- 74b. Leaf blade narrowly ovate-elliptic to narrowly elliptic, sparsely villous; phyllaries not reflexed.
- 75a. Involucre obconic; phyllaries glabrous; leaf blade margin denticulate 254. *S. acutisquama*
- 75b. Involucre campanulate; phyllaries villous; leaf blade margin entire and densely ciliate.

- 76a. Leaf blade base oblique and rounded or cuneate, apex obtuse to acute; phyllaries densely villous; corolla 1.8–2.4 cm 251. *S. hieracioides*
- 76b. Leaf blade base attenuate, apex acute to acuminate; phyllaries sparsely villous; corolla 1.2–1.4 cm 253. *S. tatsienensis*
- 69b. Capitula 2–6 or numerous, in a corymbiform synflorescence.
- 77a. Capitula 2–6.
- 78a. Leaf blade margin retrorsely dentate or serrate 258. *S. retroserrata*
- 78b. Leaf blade margin entire or dentate to serrate but not retrorsely so.
- 79a. Leaf blade broadly ovate to narrowly elliptic, more than 3 cm wide, margin dentate to serrate.
- 80a. Middle and upper stem leaves narrowly ovate to narrowly elliptic 256. *S. hulthenii*
- 80b. Middle and upper stem leaves broadly ovate to ovate-elliptic 255. *S. euodonta*
- 79b. Leaf blade narrowly ovate, narrowly elliptic, narrowly oblong, or linear, 0.8–2.5 cm wide, margin entire or denticulate.
- 81a. Leaf blade narrowly oblong to linear, glabrous; phyllaries reflexed 257. *S. micradenia*
- 81b. Leaf blade narrowly ovate-elliptic to narrowly elliptic, sparsely villous; phyllaries not reflexed.
- 82a. Involucre campanulate; phyllaries villous; leaf blade margin entire and densely ciliate 253. *S. tatsienensis*
- 82b. Involucre obconic; phyllaries glabrous; leaf blade margin denticulate 254. *S. acutisquama*
- 77b. Capitula numerous.
- 83a. Phyllaries apically saber-shaped.
- 84a. Stem and petioles wingless 262. *S. epilobioides*
- 84b. Stem and petioles narrowly winged.
- 85a. Leaf blade margin denticulate; involucre 5–6 mm in diam. 259. *S. acuminata*
- 85b. Leaf blade margin dentate; involucre ca. 10 mm in diam. 263. *S. umbrosa*
- 83b. Phyllaries apically not saber-shaped.
- 86a. Stem and petioles wingless; leaf blade triangular-ovate to ovate 268. *S. dielsiana*
- 86b. Stem and petioles distinctly winged; leaf blade obovate to elliptic or narrowly so.
- 87a. Leaf blade abaxially glandular; involucre ca. 3 mm in diam.; phyllaries acuminate 260. *S. glandulosa*
- 87b. Leaf blade abaxially not glandular; involucre 5–8 mm in diam.; phyllaries acute to obtuse.
- 88a. Leaf blade 3–9 cm wide.
- 89a. Leaf blade green, concolorous; lower stem leaves with base cordate and apex acute to acuminate 267. *S. latifolia*
- 89b. Leaf blade adaxially green, abaxially glaucous-green; lower stem leaves with base attenuate and apex very long acuminate 269. *S. neoserrata*
- 88b. Leaf blade 1–4 cm wide.
- 90a. Outer phyllaries with apex acuminate 266. *S. candolleana*
- 90b. Outer phyllaries with apex obtuse or subacute.
- 91a. Leaf blade of middle stem leaves ovate, base abruptly narrowed into a winged petiole to 5.5 cm; leaf blade adaxially smooth; phyllaries usually yellowish green ... 264. *S. hemsleyi*
- 91b. Leaf blade of middle stem leaves narrowly elliptic, base attenuate into a petiole to 1(–2) cm; leaf blade adaxially scabrid; phyllaries usually dark purple 265. *S. parviflora*

207. *Saussurea odontolepis* Schultz Bipontinus ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 29: 176. 1883.

齿苞风毛菊 chi bao feng mao ju

Saussurea aspera Handel-Mazzetti; *S. pectinata* Bunge ex Candolle var. *amurensis* Maximowicz; *S. ussuriensis* Maximowicz var. *odontolepis* Herder, nom. illeg. superfl.

Herbs 20–100 cm tall, perennial. Stem solitary, erect, apically branched. Basal, lower, and middle stem leaves petiolate; petiole 5–14 cm; leaf blade narrowly ovate-elliptic, 7–21 × 3–12 cm, pinnately lobed to pinnatisect, both surfaces green, abaxially sparsely strigose on veins and usually gland-dotted, adaxially scabrid and densely strigose; lateral lobes 8–17 pairs, oblong to linear-elliptic, margin entire or with 1 or 2 teeth, apex acute; terminal lobe narrowly triangular. Upper stem leaves

shortly petiolate, gradually smaller upward on stem. Capitula several, in a corymbiform synflorescence, shortly pedunculate. Involucre narrowly campanulate, 5–8(–10) mm in diam. Phyllaries in 5–7 rows, arachnoid lanate, apex acute to obtuse; outer phyllaries narrowly ovate-triangular, 4–5 × 1–2 mm, usually reflexed, margin with 2 or 3 dark purple subulate teeth; middle phyllaries narrowly ovate-elliptic, 5–7 × 1.5–2 mm, margin entire or with 1 or 2 teeth; inner phyllaries narrowly elliptic-linear, 7–11 × 1.5–2 mm, margin entire. Receptacle bristles 6–7 mm. Corolla purple, 1–1.3 cm, tube 5–7 mm, limb 5–6 mm, lobes 4–5 mm. Achene purplish brown with dark spots, cylindrical, 3–5 mm, glabrous. Pappus dirty white; outer bristles 1.5–3 mm; inner bristles (6–)8–9 mm. Fl. and fr. Aug–Oct. $2n = 26$.

Forest margins, grasslands; 100–700 m. Heilongjiang, Jilin, Liaoning, Nei Mongol, Shanxi [Korea, Mongolia, Russia (Far East)].

The validation of *Saussurea odontolepis* was effected by Maximowicz, not by Herder who treated the name as a synonym of his illegitimate *Saussurea ussuriensis* var. *odontolepis*.

208. *Saussurea pectinata* Bunge ex Candolle, Prodr. 6: 538. 1838.

篦苞风毛菊 bi bao feng mao ju

Saussurea davidii Franchet; *S. davidii* var. *macrocephala* Franchet; *S. pectinata* var. *macrocephala* (Franchet) Handel-Mazzetti; *S. pectinata* var. *pekinensis* Maximowicz.

Herbs 20–100 cm tall, perennial. Stem solitary, erect, apically branched. Basal and lower stem leaves petiolate; petiole 3.5–9.5(–17) cm; leaf blade ovate, ovate-oblong, or elliptic, 5–22 × 2–12 cm, pinnately lobed, abaxially pale green, gland-dotted, and strigose especially on veins but glabrescent, adaxially green, scabrid, and strigose; lateral lobes 4–9 pairs, ovate to narrowly ovate-elliptic, margin sinuate or lobed-dentate, apex acute to obtuse and mucronate. Middle and upper stem leaves shortly petiolate; leaf blade pinnately lobed or undivided and margin entire. Capitula several, in a corymbiform synflorescence, usually long pedunculate. Involucre campanulate, 0.8–1.2(–2) cm in diam. Phyllaries in 4 or 5 rows, apically arachnoid; outer phyllaries narrowly ovate, 10–13 × 3–4 mm, usually reflexed, margin pectinate with 3–5 teeth; middle phyllaries narrowly ovate-elliptic, 11–13 × 1.5–2.5 mm, margin pectinate; inner phyllaries purple, linear, 13–14 × 1–1.5 mm, margin entire. Corolla purple, 1.2–1.4 cm, tube 5–8 mm, limb 6–7 mm, lobes 4–5 mm. Achene blackish brown with black spots, cylindrical, 3–5 mm, glabrous. Pappus dirty white; outer bristles 3–4 mm; inner bristles 8–10 mm. Fl. and fr. Aug–Oct.

• Forests, forest margins, trailsides, steppes, ravines; 300–1900 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi.

209. *Saussurea populifolia* Hemsley, J. Linn. Soc., Bot. 29: 311. 1892.

杨叶风毛菊 yang ye feng mao ju

Saussurea acropilina Diels.

Herbs 25–90 cm tall, perennial. Stems solitary or sometimes 2, erect, simple or apically branched. Basal leaves withered at anthesis. Lower and middle stem leaves petiolate; petiole 2–8 cm, not winged, glabrous; leaf blade broadly ovate, 5–11 × 3–8 cm, abaxially pale green and glabrous, adaxially dark green, scabrid, and strigose, base cordate to rounded, margin dentate, apex acuminate. Upper stem leaves shortly petiolate or sessile, gradually smaller upward on stem; leaf blade ovate to narrowly ovate-elliptic, base cuneate, apex acuminate. Capitulum usually solitary, terminal on stem or sometimes 2–5 in a lax corymbiform synflorescence, long pedunculate. Involucre broadly campanulate, 2–2.5 cm in diam. Phyllaries in 5–7 rows, straw-colored, tinged purple, puberulent; outer phyllaries ovate, 8–18 × 2–3 mm, apical part green, herbaceous, long acuminate, and reflexed; middle phyllaries narrowly ovate, 8–12 × 2.5–3 mm, apical part patent to reflexed; inner phyllaries linear, 14–16 × 1–1.5 mm, apex acuminate and erect. Receptacle bristles 6–8 mm. Corolla purple, 1.4–1.5 cm, tube 8–9 mm,

limb 5–6 mm, lobes 3–3.5 mm. Achene brown, subcylindric, ca. 5 mm, glabrous. Pappus pale brown; outer bristles 1–3 mm, scabrid; inner bristles 1.1–1.3 cm. Fl. and fr. Jul–Oct.

• Grasslands on mountain slopes, marshes; 1700–3600 m. Chongqing, Gansu, Henan, Hubei, Shaanxi, Sichuan, ?SE Xizang, ?NW Yunnan.

The records of *Saussurea populifolia* from SE Xizang and NW Yunnan are doubtful. These records may belong to one-headed specimens of *S. cordifolia* or *S. oligantha*.

210. *Saussurea mongolica* (Franchet) Franchet, Bull. Herb. Boissier 5: 539. 1897.

蒙古风毛菊 meng gu feng mao ju

Saussurea ussuriensis Maximowicz var. *mongolica* Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 6: 61. 1883; *S. hopeiensis* F. H. Chen; *S. matsumurae* Nakai; *S. mongolica* var. *rigidior* Handel-Mazzetti; *S. mongolica* f. *shansiensis* (F. H. Chen) Y. Ling; *S. sinuata* Komarov var. *shansiensis* F. H. Chen.

Herbs 30–90 cm tall, perennial. Stem solitary, erect, apically branched, glabrous or sparsely strigose. Lower stem leaves petiolate; petiole 5–16 cm; leaf blade ovate-triangular to ovate, 5–20 × 2–9 cm, pinnately lobed or basal half pinnately lobed and apical part coarsely dentate, abaxially pale green and glabrescent, adaxially green and sparsely strigose but glabrescent, base cordate, apex acute; lateral lobes 1–3 pairs, oblong-elliptic, margin dentate or entire, apex acute to obtuse. Middle and upper stem leaves oblong to narrowly ovate-elliptic, margin coarsely dentate. Capitula numerous, in a corymbiform synflorescence, shortly pedunculate. Involucre narrowly campanulate, 5–7 mm in diam. Phyllaries in 5–7 rows, sparsely arachnoid, apical part saber-shaped and reflexed, apex long acuminate; outer phyllaries ovate, ca. 3 × 1 mm; middle phyllaries narrowly ovate, 7–8 × ca. 2 mm; inner phyllaries narrowly elliptic to linear, ca. 10 × 2 mm. Corolla purplish red, 0.9–1.3 cm, tube 5–6 mm, limb 4–7 mm. Achene brown, cylindrical, 4–5 mm, glabrous. Pappus basally pale brown, apically white; outer bristles ca. 3 mm, scabrid; inner bristles 8–10 mm. Fl. and fr. Jul–Oct. $2n = 26^*$.

Mountain slopes, forests, thickets, trailsides, grassy slopes; 500–2900 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi [Korea, Mongolia].

Saussurea mongolica var. *rigidior* was described as having pectinate phyllaries just like *S. pectinata*. For these plants from Hebei (Xiaowutai Shan), Handel-Mazzetti (Acta Horti Gothob. 12: 321. 1938) postulated hybrid origin, with *S. mongolica* and *S. pectinata* as parents.

211. *Saussurea sinuata* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 25: 735. 1907.

林风毛菊 lin feng mao ju

Saussurea aristata Lipschitz; *S. stenolepis* Nakai.

Herbs 40–80(–110) cm tall, perennial. Stem solitary, erect, apically branched. Basal and lower stem leaves usually withered at anthesis. Middle stem leaves petiolate; petiole to 14 cm; leaf blade narrowly triangular-cordate, triangular-ovate, or ovate, 5–15 × 3–8 cm, pinnately lobed to pinnatisect or undivi-

ded and margin coarsely dentate; base cordate to truncate, apex acute. Upper stem leaves shortly petiolate, smaller; leaf blade usually undivided, margin dentate to entire, both surfaces green and glabrous. Uppermost stem leaves linear to subulate. Capitula several, in a lax corymbiform or paniculiform synflorescence, long pedunculate. Involucre obconic, (0.5–)1–1.5 cm in diam. Phyllaries in 5 or 6 rows, apical part reflexed, apex long acuminate; outer phyllaries ovate, 5–6 × 1–2 mm; middle phyllaries narrowly ovate-elliptic, ca. 10 × 2 mm; inner phyllaries narrowly elliptic to linear, ca. 15 × 2 mm. Receptacle bristles ca. 7 mm. Corolla purplish red, 1.2–1.5 cm, tube 6–9 mm, limb 5–6 mm. Achene brown, cylindrical, 4–7 mm, ribbed. Pappus dirty white; outer bristles 2–3 mm, smooth or scabrid; inner bristles ca. 1 cm. Fl. and fr. Jul–Sep. $2n = 26$.

Montane forests, forest margins. Heilongjiang, Jilin, Nei Mongol [Korea, Russia (Far East)].

212. *Saussurea subtriangulata* Komarov, Bot. Mater. Gerb. Glavn. Bot. Sada S.S.S.R. 6: 18. 1926.

吉林风毛菊 *ji lin feng mao ju*

Saussurea eriolepis Bunge ex Candolle var. *caudata* Herder; *S. grandifolia* Maximowicz var. *caudata* (Herder) Komarov.

Herbs 40–80(–100) cm tall, perennial. Stem solitary, slender, erect, many branched, brown arachnoid. Basal and lower stem leaves petiolate; petiole to 12 cm; leaf blade 7–16 × 4–6 cm, base cordate to cuneate, margin dentate, apex acuminate. Middle stem leaves sessile, narrowly obovate to narrowly ovate-elliptic, 6–8 × 0.7–1.2 cm. Upper stem leaves narrowly ovate-elliptic to linear, smaller. Capitula numerous, in a paniculiform synflorescence, long pedunculate. Involucre campanulate, 1–1.5(–2) cm in diam. Phyllaries in 4 or 5(–8) rows, purple, apical part saber-shaped and recurved, apex long acuminate; outer phyllaries triangular-ovate, ca. 4 × 1 mm; middle phyllaries elliptic, ca. 7 × 3 mm; inner phyllaries linear-oblong, ca. 11 × 2 mm. Receptacle bristles 1–1.2 cm. Corolla purple, 1.3–1.5(–2) cm, tube 7–9 mm, limb 6–7 mm, lobes ca. 4 mm. Achene blackish brown with dark spots, cylindrical, 3–4 mm, glabrous. Pappus dirty white; outer bristles 3–5 mm, scabrid; inner bristles 1–1.1 cm. Fl. and fr. Jul–Sep. $2n = 26$.

Forest margins, forests. Heilongjiang, Jilin [Korea, Russia (Far East)].

213. *Saussurea cordifolia* Hemsley, J. Linn. Soc., Bot. 29: 310. 1892.

心叶风毛菊 *xin ye feng mao ju*

Saussurea aegirophylla Diels; *S. cavaleriei* H. Léveillé & Vaniot; *S. cordifolia* var. *ombrophila* Handel-Mazzetti; *S. dutaillyana* Franchet.

Herbs 40–150 cm tall, perennial. Stem solitary, erect, apically branched, subglabrous. Basal leaves withered at anthesis. Lower and middle stem leaves petiolate; petiole 8–20 cm; leaf blade cordate, 8–20 × 7–18 cm, both surfaces green, abaxially glabrous or sparsely strigose on veins, adaxially scabrid and sparsely strigose, base deeply cordate, margin coarsely dentate, apex acuminate. Uppermost stem leaves shortly petiolate or

sessile; leaf blade ovate, elliptic, or narrowly ovate-elliptic, base rounded to broadly truncate. Capitula usually numerous, in a lax corymbiform synflorescence but rarely solitary, long pedunculate. Involucre campanulate, (0.8–)1.5–2 cm in diam. Phyllaries in 4–6 rows, straw-colored, leathery, conspicuously veined, glabrous or white to brown arachnoid tomentose at margin, apical part green, herbaceous, and reflexed to erect, apex acuminate; outer phyllaries ovate, 2–4(–7) × 2–3 mm; middle phyllaries narrowly ovate, 4–15 × 3–5 mm; inner phyllaries linear, 13–16 × 1.5–2 mm. Receptacle bristles 6–9 mm. Corolla pink to dark purple, (1.2–)1.5–1.7 cm, tube 6–8 mm, limb 8–9 mm, lobes 3–4 mm. Achene brown, cylindrical, 5–7 mm, glabrous. Pappus pale brown; outer bristles 2–6 mm, scabrid; inner bristles 1.1–1.5 cm. Fl. and fr. Aug–Oct.

• Montane forests, forest margins; 700–2200 m. Anhui, Chongqing, Guizhou, Henan, Hubei, Hunan, Shaanxi, Sichuan, Zhejiang.

Saussurea dutaillyana, characterized by dense brown indumentum of articulate hairs on stem and petioles, by basal leaves crowded in a rosette, and by ample lax paniculiform synflorescences, may deserve separate taxonomic status. It has been accepted in several provincial floras and is recorded from Chongqing, Henan, Hubei, S Shaanxi (Qin Ling), Sichuan, and Zhejiang.

The following species, *Saussurea oligantha*, also belongs to this species group and is not well separated from *S. cordifolia*.

214. *Saussurea oligantha* Franchet, J. Bot. (Morot) 10: 421. 1896.

少花风毛菊 *shao hua feng mao ju*

Saussurea oligantha var. *oligolepis* (Y. Ling) X. Y. Wu; *S. oligantha* var. *parvifolia* Y. Ling; *S. oligolepis* Y. Ling.

Herbs 40–70 cm tall, perennial. Stem solitary, erect, simple or apically few branched, with sparse multicellular articulate hairs or glabrescent. Leaves green, sparsely strigose to subglabrous. Basal leaves withered at anthesis. Lower and middle stem leaves petiolate; petiole 9–15 cm, covered with brown articulate hairs or glabrous; leaf blade broadly ovate-cordate, 5–11 × 5–11 cm, base cordate to hastate, margin coarsely dentate, apex acuminate. Upper stem leaves sessile, narrowly ovate to narrowly elliptic, gradually smaller upward on stem, apex long acuminate. Capitula 2–8, in a lax paniculiform or corymbiform synflorescence or sometimes solitary, long pedunculate. Involucre obconic to campanulate, 1.2–1.5 cm in diam. Phyllaries in 4–6 rows, apical part green, herbaceous, and reflexed to erect, apex acuminate; outer phyllaries ovate, ca. 6 × 2 mm; middle phyllaries oblong to elliptic, 8–10 × 3–3.5 mm; inner phyllaries linear, ca. 10 × 2 mm. Corolla purple, 1.1–1.4 cm, tube 6–7 mm, limb 5–7 mm, lobes 3–3.5 mm. Achene oblong, 3–4 mm, glabrous. Pappus dirty white; outer bristles 3–4 mm, scabrid; inner bristles ca. 9 mm. Fl. and fr. Jul–Sep.

• Mountain slopes, forest margins, forests; 1300–3800 m. Chongqing, Gansu, Henan, Hubei, Shaanxi, Sichuan, SE Xizang, NW Yunnan.

215. *Saussurea stricta* Franchet, J. Bot. (Morot) 8: 342. 1894.

喜林风毛菊 *xi lin feng mao ju*

Saussurea subcordata F. H. Chen.

Herbs 75–120 cm tall, perennial. Stem solitary, erect, api-

cally branched. Basal leaves usually withered at anthesis. Lower and middle stem leaves petiolate; petiole 2–13(–18) cm; leaf blade ovate-triangular, 6–12 × 4–7(–13) cm, both surfaces green and subglabrous with a few brown articulate hairs, base cordate, margin dentate, apex acuminate. Upper stem leaves subsessile; leaf blade ovate to narrowly ovate-elliptic, base cuneate, margin denticulate or entire, apex acuminate. Capitula numerous, in a paniculate or corymbiform synflorescence, pedunculate. Involucre narrowly campanulate, 0.8–1.2 cm in diam. Phyllaries in 4 or 5 rows, apically purple, conspicuously 3–5-veined, glabrous or sparsely arachnoid; outer phyllaries broadly ovate, 3–4 × 2–3 mm, patent to recurved, apex rounded and very shortly acuminate; middle phyllaries oblong, 4–8 × 2–3 mm, apex acuminate; inner phyllaries linear, 10–11 × 1–2 mm, apex obtuse and mucronate. Receptacle bristles 7–9 mm. Corolla dark purple, 1–1.2 cm, tube 4–5 mm, limb 6–7 mm, lobes 2–2.5 mm. Achene straw-colored, tinged purple, cylindrical, 6–6.5 mm, glabrous. Pappus pale brown; outer bristles 2.5–5 mm, scabrid or almost smooth; inner bristles 8–10 mm. Fl. and fr. Aug–Oct.

• Montane forests; 1400–2200 m. N Chongqing, SE Gansu, N Sichuan.

Saussurea stricta is very close to *S. cordifolia*. Specimens determined as *S. stricta* from W Henan match typical *S. cordifolia*, whereas those from SE Xizang and NW Yunnan must be referable to *S. hylophila*.

216. *Saussurea hylophila* Handel-Mazzetti, Symb. Sin. 7: 1148. 1936.

林地风毛菊 lin di feng mao ju

Herbs 60–100 cm tall, perennial. Stem solitary, erect, simple or apically branched, subglabrous. Basal leaves usually withered at anthesis. Lower and middle stem leaves petiolate; petiole 2–11 cm; leaf blade cordate to ovate-cordate, 5–11 × 3–7 cm, papery, abaxially pale green and strigose, adaxially green and sparsely strigose but glabrescent, base deeply cordate, margin dentate, apex acuminate. Upper stem leaves subsessile; leaf blade narrowly ovate-elliptic, base rounded to attenuate, margin entire or denticulate, apex acuminate. Capitula 2 or 3, in a corymbiform synflorescence or sometimes solitary, long pedunculate. Involucre campanulate, 1–1.5(–2) cm in diam. Phyllaries in 4 or 5 rows, straw-colored, sometimes apically tinged purple, ± villous and glabrescent; outer phyllaries ovate, 3–6 × 2–3 mm, apex acuminate; middle phyllaries narrowly ovate, 8–12 × 2–3 mm, apex long acuminate and 3–6 mm; inner phyllaries narrowly elliptic to linear, 14–16 × 1.5–2 mm, apex acute. Corolla purple, 1.2–1.4 cm, tube 5–6 mm, limb 7–8 mm, lobes 3–4 mm. Achene straw-colored with dark spots, cylindrical, 5–6 mm, glabrous, apex with a short crown. Pappus dirty white; outer bristles 4–7 mm, scabrid to shortly plumose; inner bristles 1.2–1.3 cm. Fl. and fr. Aug–Oct.

• Montane forests; 3000–3200 m. S and SE Xizang (Cona, Zayü), NW Yunnan (Gongshan).

Saussurea hylophila has been treated under *S. stricta* by S. W. Liu (Fl. Yunnan. 13: 557. 2004). However, all specimens seen from Yunnan and Xizang clearly differ from that species occurring in N Sichuan.

217. *Saussurea manshurica* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 18: 424. 1901.

东北风毛菊 dong bei feng mao ju

Saussurea manshurica var. *pinnatifida* Nakai; *S. triangulata* Trautvetter & C. A. Meyer subsp. *manshurica* (Komarov) Kitamura; *S. triangulata* var. *pinnatifida* (Nakai) Kitamura.

Herbs (25–)50–100 cm tall, perennial. Stem solitary, erect, apically branched, subglabrous. Basal leaves petiolate; petiole 4–14 cm, sparsely strigose; leaf blade triangular-hastate to rarely ovate or oblong, 6.5–16 × 2–5(–8) cm, thin, papery, both surfaces green, abaxially glabrous, adaxially subglabrous to sparsely strigose, base cordate, cuneate, or rarely truncate, margin sinuate-dentate, apex acute to acuminate. Lower and middle stem leaves ovate to narrowly ovate, smaller. Upper stem leaves sessile, narrowly ovate-elliptic, oblong, or linear, margin entire. Capitula numerous, in a paniculiform synflorescence, long pedunculate. Involucre narrowly campanulate, 5–8(–12) mm in diam. Phyllaries in 5–7 rows, straw-colored, apically flushed purple, ± arachnoid, glabrescent, apex obtuse; outer phyllaries broadly ovate, 2–2.5 × 1–1.5 mm; middle phyllaries ovate to narrowly ovate, 3–10 × 1–1.5 mm; inner phyllaries linear, 13–14 × 0.8–1.1 mm. Receptacle bristles to 7 mm. Corolla purple, 1–1.3 cm, tube 5–6 mm, limb 6–7 mm, lobes 3–4 mm. Achene brown, cylindrical, 3–5 mm, glabrous. Pappus pale brown; outer bristles 2–4 mm; inner bristles 0.9–1.2 cm. Fl. and fr. Jul–Sep. $2n = 26$.

Mixed or coniferous forests, stony slopes, rock crevices; 900–1500 m. Heilongjiang, Jilin, Liaoning [Korea, Russia (Far East)].

218. *Saussurea triangulata* Trautvetter & C. A. Meyer in Middendorff, Reise Sibir. 1(2): 58. 1856.

毛苞风毛菊 mao bao feng mao ju

Saussurea lanatocephala F. H. Chen; *S. triangulata* var. *alpina* Nakai.

Herbs 30–40[–70] cm tall, perennial. Stem solitary, erect, simple or apically branched. Basal leaves often withered at anthesis. Basal and lower stem leaves petiolate; petiole to 14 cm; leaf blade ovate-triangular, triangular-hastate, or narrowly ovate-triangular, 4–10[–12] × 2.5–6 cm, abaxially pale green and pubescent or glabrous, adaxially green, base truncate, cuneate, or cordate, margin sinuate-dentate, apex acuminate. Middle and upper stem leaves sessile or subsessile, gradually smaller upward on stem; leaf blade elliptic to narrowly ovate, base truncate, cuneate, or rounded, margin dentate to entire, apex acuminate. Capitula 3–5[–20], in a ± clustered corymbiform synflorescence, shortly pedunculate. Involucre tubular-campanulate, 5–10 mm in diam. Phyllaries in 4 or 5 rows, dark or green with dark apical part and margin, to 1.5 cm, sparsely arachnoid to almost glabrous, apex subobtusely; outer and middle phyllaries ovate; inner phyllaries oblong-linear. Receptacle bristles ca. 7 mm. Corolla pale purple, 1–1.2 cm, tube 5–6 mm, limb 5–6 mm, lobes 2.5–3 mm. Achene dark brown, cylindrical, 4–6 mm, glabrous. Pappus brownish; outer bristles to 3 mm; inner bristles 9–10 mm. Fl. and fr. Jul–Oct.

Alpine meadows, deciduous and coniferous forests. Jilin (Changbai Shan) [Korea, Russia (Far East)].

219. *Saussurea bullockii* Dunn, J. Linn. Soc., Bot. 35: 509. 1903.

庐山风毛菊 lu shan feng mao ju

Saussurea kwangtungensis F. H. Chen; *S. tienmoshanensis* F. H. Chen.

Herbs 30–100 cm tall, perennial. Stem solitary, 2–10 mm in diam., erect, apically branched, thinly arachnoid lanate, glabrescent. Lower stem leaves petiolate; petiole 5–17 cm; leaf blade triangular-cordate, 8–15(–25) × 4–14 cm, abaxially pale green and thinly arachnoid tomentose but glabrescent, adaxially green and sparsely strigose, base cordate, margin sharply sinuate-dentate, apex acuminate. Upper stem leaves shortly petiolate; leaf blade ovate to ovate-triangular, gradually smaller upward on stem. Capitula numerous, in a lax paniculiform to corymbiform synflorescence. Involucre campanulate to obconic, (0.8–)1–1.3(–1.5) cm in diam. Phyllaries in 5 or 6 rows, arachnoid or glabrescent, margin and apex usually slightly purple; outer phyllaries ovate, 2–3 × 1.5–2 mm, apex obtuse and mucronate; middle phyllaries oblong to narrowly elliptic, 4–10 × ca. 2 mm, apex obtuse; inner phyllaries narrowly oblong, 10–12 × 1–2 mm, apex obtuse. Corolla purple, 1.3–1.6 cm, minutely gland-dotted, tube 6–9 mm, limb ca. 8 mm, lobes ca. 4 mm. Achene pale brown, cylindrical, 3–4 mm, ribbed, glabrous, apex with a short crown. Pappus apically white, basally pale brown; outer bristles 2–4 mm, scabrid; inner bristles 1.2–1.3 cm. Fl. and fr. Jul–Oct.

• Montane forests, meadows, near streams; 800–2100 m. Anhui, Fujian, Guangdong, Hubei, Hunan, Jiangxi, Shaanxi, Zhejiang.

220. *Saussurea pseudobullockii* Lipschitz, Novosti Sist. Vyssh. Rast. 1964: 321. 1964.

洮河风毛菊 tao he feng mao ju

Herbs 25–40 cm tall, perennial. Stems several, straw-colored, 3–5 mm in diam., erect, apically branched, sparsely arachnoid, glabrescent. Basal leaves almost withered at anthesis. Lower stem leaves petiolate; petiole 1–3 cm; leaf blade narrowly ovate-triangular, 7.5–9.5 × 2–4 cm, abaxially light green, gland-dotted, and tomentose but glabrescent, adaxially dark green and glabrous, base shallowly cordate, truncate, or cuneate, margin dentate, apex acute. Middle and upper stem leaves shortly petiolate, smaller, base truncate. Uppermost leaves subsessile; leaf blade narrowly ovate to linear, margin entire. Capitula numerous, in a clustered corymbiform or paniculiform synflorescence, shortly pedunculate. Involucre cylindrical or obconic, 8–10 mm in diam. Phyllaries in 4 or 5 rows, arachnoid, apically purplish; outer phyllaries ovate-triangular, 3–4 × 1.5–2 mm; middle phyllaries ovate-triangular, 4–8 × 1.8–2.2 mm, apex acuminate and mucronate; inner phyllaries 8–10 × 1–1.5 mm, apex acute to obtuse. Receptacle bristles subulate, 3–5 mm. Corolla purple to pink, 1.2–1.3 cm, tube 6.5–7 mm, limb 5.5–6 mm, lobes 4–4.5 mm. Achene ca. 3 mm, glabrous, apex with a small crown. Pappus dirty white; outer bristles 2.5–4 mm, scabrid; inner bristles 8–10 mm. Fl. Jul.

• Montane meadows and grasslands; 2700–2800 m. Gansu (Jonê, Lintan).

221. *Saussurea tenerifolia* Kitagawa, Rep. Inst. Sci. Res. Manchoukuo 5: 159. 1941.

长白山风毛菊 chang bai shan feng mao ju

Herbs 50–70 cm tall, perennial. Stem solitary, erect, simple or apically branched, glabrous. Basal leaves withered at anthesis. Lower and middle stem leaves petiolate; petiole 7–17 cm; leaf blade ovate-cordate, 9–15 × 7–9 cm, abaxially pale green and pilose on veins, adaxially green and sparsely strigose but glabrescent, base cordate to hastate, margin dentate, apex acuminate. Upper stem leaves sessile or subsessile; leaf blade ovate to narrowly ovate-elliptic, gradually smaller upward on stem, base rounded to cuneate, margin denticulate or entire, apex acuminate. Capitula 5–14, in a dense corymbiform synflorescence, pedunculate. Involucre cylindrical, ca. 5 mm in diam. Phyllaries in ca. 4 rows, straw-colored but purple apically, rigid, leathery, sparsely arachnoid, apex acute to rounded and mucronate; outer phyllaries broadly ovate, 2–3 × 2–3 mm; middle and inner phyllaries elliptic, ca. 5 × 3 mm. Corolla purple, ca. 8 mm, tube ca. 4 mm, limb ca. 4 mm. Achene cylindrical, ca. 3 mm. Pappus dirty white; outer bristles 1–2 mm, scabrid; inner bristles 6–7 mm. Fl. Jul.

• Montane forests and forest margins; 1100–1700 m. Jilin (Changbai Shan).

222. *Saussurea grandifolia* Maximowicz, Mém. Acad. Imp. Sci. St.-Petersbourg Divers Savans 9: 169. 1859.

大叶风毛菊 da ye feng mao ju

Saussurea coarctata (Herder) Kitamura; *S. grandifolia* var. *asperifolia* Herder; *S. grandifolia* var. *coarctata* Herder; *S. grandifolia* var. *tenuior* Herder.

Herbs 35–120 cm tall, perennial. Stem solitary, erect, apically branched, sparsely strigose to subglabrous. Basal leaves withered at anthesis. Lower and middle stem leaves petiolate; petiole 3–9(–13) cm; leaf blade cordate-ovate to triangular-ovate, 7–20 × 4–13 cm, rigid, both surfaces green, scabrid, and sparsely strigose, base shallowly cordate to truncate, margin coarsely dentate, apex acuminate. Upper stem leaves shortly petiolate to subsessile; leaf blade ovate-triangular, ovate-rhombic, or narrowly ovate-elliptic, gradually smaller upward on stem, base cuneate, apex acuminate. Capitula 3–18, in a corymbiform or paniculiform synflorescence or rarely solitary, pedunculate. Involucre campanulate, 1.2–1.5 cm in diam. Phyllaries in 5 or 6(–9) rows, arachnoid, apex acute to obtuse and mucronate; outer phyllaries ovate-elliptic, 3–5 × 2–3 mm; middle phyllaries elliptic, 5–8 × 2–3 mm; inner phyllaries linear, 8–12 × 1.5–2 mm. Receptacle bristles 7–8 mm. Corolla dull red, 1.3–1.5 cm, tube 6–8 mm, limb 6–7 mm, lobes 4–5 mm. Achene straw-colored, cylindrical, 4–5 mm, glabrous. Pappus dirty white; outer bristles 1–2 mm, scabrid; inner bristles 0.9–1.1 cm. Fl. and fr. Aug–Oct. *2n* = 26.

Forests, forest margins, meadows, mountain slopes; 200–1100 m. Heilongjiang, Jilin, Liaoning [Korea, Russia (Far East)].

223. *Saussurea hwangshanensis* Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 6: 79. 1949.

黄山风毛菊 huang shan feng mao ju

Saussurea sinuata Komarov var. *cordata* F. H. Chen.

Herbs to 50 cm tall, perennial. Stem solitary, erect, apically branched, glabrous. Basal leaves withered at anthesis. Lower and middle stem leaves petiolate; petiole 4–16 cm; leaf blade ovate-cordate, 8–17 × 6–12 cm, both surfaces green, abaxially glabrous, adaxially sparsely strigose, base cordate, margin coarsely dentate, apex acuminate. Upper stem leaves shortly petiolate to sessile; leaf blade ovate, gradually smaller upward on stem. Capitula 4–8, in a corymbiform synflorescence, pedunculate. Involucre campanulate to globose, 1–1.5 cm in diam. Phyllaries in 4 or 5(–7) rows, straw-colored, basally leathery, apically herbaceous, purplish and densely white arachnoid, and patent to recurved, apex long acuminate; outer phyllaries narrowly triangular-ovate, 4–6 × ca. 2(–3) mm; middle phyllaries narrowly elliptic, 6–10 × ca. 2 mm; inner phyllaries narrowly linear-elliptic, 10–14 × 1.5–2 mm. Receptacle bristles to 5 mm. Corolla purplish red, 1.2–1.5 cm, tube 6–9 mm, limb 5–6 mm, lobes 3.5–4 mm. Achene purplish brown, cylindrical, 3.5–4 mm, glabrous. Pappus pale brown to dirty white; outer bristles 2–3 mm, scabrid; inner bristles 9–10 mm. Fl. and fr. Aug–Sep.

• Forests, grasslands; 1000–1700 m. Anhui (Huang Shan), Zhejiang.

224. *Saussurea ussuriensis* Maximowicz, Mém. Acad. Imp. Sci. St.-Petersbourg Divers Savans 9: 167. 1859.

乌苏里风毛菊 wu su li feng mao ju

Saussurea ussuriensis var. *incisa* Maximowicz; *S. ussuriensis* var. *laxiodontolepis* Q. Z. Han & Shu Y. Wang; *S. ussuriensis* var. *pinnatifida* Maximowicz.

Herbs 30–120 cm tall, perennial. Stem solitary, erect, apically branched. Basal and lower stem leaves petiolate; petiole 3.5–20 cm; leaf blade ovate or oblong, 6–18 × 2.5–6[–10] cm, pinnately lobed or undivided, both surfaces green, ± colorous, usually gland-dotted, and sparsely strigose but glabrescent, base cordate to truncate, apex acuminate; lateral lobes 3–7 pairs, triangular-oblong, margin entire or coarsely dentate. Middle and upper stem leaves shortly petiolate; leaf blade oblong to linear, gradually smaller upward on stem. Capitula numerous, clustered at end of branches in a corymbiform synflorescence, shortly pedunculate. Involucre narrowly campanulate, 5–8 mm in diam. Phyllaries in 5–7 rows, margin and apically usually purplish, arachnoid to glabrescent, apex acuminate to acute; outer phyllaries ovate, 2–3 × 0.5–1 mm; middle phyllaries oblong, 3–9 × 1.5–2 mm; inner phyllaries linear, 9–11(–14) × 1–1.5 mm. Receptacle bristles 5–6 mm. Corolla purplish red, 1–1.3 cm, tube 5–6 mm, limb 5–5.5 mm, lobes 3.5–4 mm. Achene pale brown with dark spots, 4–5 mm, glabrous, apex with a short crown. Pappus straw-colored; outer bristles 2–4 mm, scabrid; inner bristles 7–9 mm. Fl. and fr. Jul–Sep. *2n* = 26.

Montane forests, thickets, grasslands, by rivers, ravines; 1100–2900 m. Gansu, Hebei, Heilongjiang, Henan, Jiangsu, Jilin, Liaoning, Nei Mongol, ?Ningxia, Qinghai, Shaanxi, Shandong, Shanxi [Japan, Korea, Mongolia, Russia (Far East)].

A single plant of *Saussurea ussuriensis* from Liaoning has been

described as *S. ussuriensis* var. *laxiodontolepis*. The description matches the typical variety of *S. ussuriensis*, except for the dentate phyllaries, which may be the result of introgression from *S. odontolepis* or *S. pectinata*. Also, Lipschitz (Fl. URSS 27: 448. 1962) reported hybrids of *S. ussuriensis* with *S. odontolepis*.

225. *Saussurea firma* (Kitagawa) Kitamura, Acta Phytotax. Geobot. 9: 112. 1940.

硬叶风毛菊 ying ye feng mao ju

Saussurea ussuriensis Maximowicz var. *firma* Kitagawa, Rep. Exped. Manchoukuo Sect. IV, 4: 97. 1936; *S. controversa* Candolle var. *firma* (Kitagawa) Kitagawa; *S. controversa* f. *sinuata* (Kitagawa) Kitagawa; *S. discolor* (Willdenow) Candolle var. *firma* (Kitagawa) Kitagawa; *S. discolor* f. *sinuata* (Kitagawa) Kitagawa; *S. ussuriensis* f. *sinuata* Kitagawa.

Herbs 30–80 cm tall, perennial. Stem solitary, erect or ascending, simple or apically branched. Basal and lower stem leaves petiolate; petiole 3–12 cm; leaf blade ovate to elliptic, 3–12 × 2–6 cm, leathery, abaxially grayish green to grayish white and sparsely arachnoid to densely tomentose, adaxially green, gland dotted, and subglabrous, base cordate to truncate, margin denticulate, apex acute to acuminate. Middle and upper stem leaves sessile, gradually smaller upward on stem; leaf blade narrowly ovate-elliptic to linear. Capitula numerous, in a corymbiform synflorescence, pedunculate. Involucre narrowly campanulate, 4–7(–10) mm in diam. Phyllaries in 5–7 rows, straw-colored but apically usually purple, sparsely arachnoid, glabrescent, apex acute to subacute or shortly mucronate; outer phyllaries ovate, 2–3 × 1–2 mm; middle phyllaries narrowly oblong, 3–6 × 1–1.5 mm; inner phyllaries linear, 6–8 × 1–1.5 mm. Corolla purple, 1–1.2 cm, tube 5–6 mm, limb 5–6 mm, lobes ca. 4 mm. Achene 4–9 mm, glabrous. Pappus white; outer bristles 1–2 mm, scabrid; inner bristles 8–10 mm. Fl. and fr. Jul–Sep. *2n* = 26.

Grasslands on mountain slopes, ravines; 1100–1800 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol [Russia (Far East)].

For *Saussurea firma*, the name *S. discolor* was misapplied by C. Y. Li (Fl. Liaoning. 2: 593. 1992) and W. Wang and C. Y. Li (Fl. Pl. Herb. Chin. Bor.-Orient. 9: 339. 2004). *Saussurea discolor* is a distinct taxon from the mountains of C Europe and is not present in Asia.

226. *Saussurea graciliformis* Lipschitz, Bot. Zhurn. (Moscow & Leningrad) 57: 532. 1972.

纤细风毛菊 xian xi feng mao ju

Herbs 10–40 cm tall, perennial. Stem solitary, slender, erect, apically few branched, subglabrous. Basal and lower stem leaves petiolate; petiole 1.5–8 cm; leaf blade ovate to narrowly ovate-elliptic, 1–11 × 0.7–2.5 cm, thick, abaxially grayish white and densely tomentose, adaxially green and glabrous, base shallowly cordate to truncate, margin sinuate and denticulate, apex acute. Middle stem leaves gradually smaller upward on stem. Upper stem leaves narrowly elliptic to linear. Capitula 2–5, in a clustered corymbiform synflorescence, shortly pedunculate to sessile. Involucre narrowly cylindrical, 4–6(–10) mm in diam. Phyllaries in ca. 5 rows, thin, glabrous, apex acute; outer phyllaries ovate, 3–5 × ca. 1.5 mm, apex mucronate; middle phyl-

laries elliptic, ca. 7×1.8 mm, apex mucronate; inner phyllaries narrowly elliptic, ca. 8×1.6 mm. Corolla purplish red, 0.9–1.1 cm, tube 4–6 mm, limb ca. 5 mm. Achene cylindrical, 3–5 mm, ribbed, glabrous. Pappus white; outer bristles ca. 2 mm, scabrid; inner bristles ca. 8 mm. Fl. and fr. Jul–Sep.

• Montane forests, among rocks, river edges; 2200–3400 m. Gansu, Qinghai.

227. *Saussurea nivea* Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 10(7): 153. 1837.

银背风毛菊 yin bei feng mao ju

Saussurea erirolepis Bunge ex Candolle.

Herbs 30–120 cm tall, perennial. Stem solitary, erect, apically branched, sparsely arachnoid or glabrescent. Basal leaves usually withered at anthesis. Lower and middle stem leaves petiolate; petiole 3–8 cm; leaf blade narrowly triangular-ovate, $9\text{--}12 \times 4\text{--}6.5$ cm, abaxially white and densely arachnoid lanate, adaxially green and glabrous, base cordate, hastate, or truncate, margin dentate, apex acuminate. Upper stem leaves petiolate to sessile; leaf blade triangular-ovate to narrowly ovate-elliptic, gradually smaller upward on stem. Uppermost leaves linear, subtending synflorescence. Capitula in a corymbiform synflorescence, pedunculate. Involucre campanulate, (0.6–)1–1.2 cm in diam. Phyllaries in 6 or 7 rows, white lanate; outer phyllaries ovate, ca. 4×2 mm, apex acuminate and with a dark purple mucro; middle phyllaries elliptic to ovate-elliptic, ca. 7×3 mm, apex acute to subobtusate; inner phyllaries linear, ca. 10×1.5 mm, apex acute. Corolla purple, 1–1.2(–1.4) cm, tube 5–6 mm, limb 5–6 mm. Achene brown, cylindrical, ca. 5 mm, glabrous. Pappus white; outer bristles ca. 4 mm, scabrid; inner bristles 9–10 mm. Fl. and fr. Jul–Sep. $2n = 26^*$.

Forests, forest margins, thickets; 400–2200 m. Gansu, Hebei, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shanxi [Korea].

Saussurea komaroviana Lipschitz was described from the Korean side of the Yalu Jiang, opposite the Chinese province of Liaoning. According to W. Wang and C. Y. Li (Fl. Pl. Herb. Chin. Bor.-Orient. 9: 339. 2004), there are no known records from China, so the species is not being treated here. The species is very close to *S. nivea*, from which it differs by the smaller capitula and the less dense indumentum on the abaxial leaf surface (which therefore looks grayish green, not white) and on the phyllaries. *Saussurea komaroviana* occurs in shady and moist cliffs and rock fissures in mountains of the Korean peninsula.

Saussurea splendida Komarov, known from the Russian part of the Heilongjiang region, has apparently not yet been found in China. It also belongs to the group of *Saussurea* with cordate leaves and white, densely tomentose abaxial leaf surface. It is a large, ca. 1 m tall plant and differs from *S. nivea* by the very large, broadly ovate lower stem leaves ($14\text{--}16 \times 8\text{--}11$ cm with up to 15 cm petiole) and the very diffuse, much-branched paniculiform-corymbiform synflorescence with 2–6 clustered, sessile capitula at branch ends. *Saussurea splendida* may eventually be found in Heilongjiang or Jilin.

228. *Saussurea dimorphaea* Franchet, J. Bot. (Morot) 8: 340. 1894.

东川风毛菊 dong chuan feng mao ju

Herbs 25–35 cm tall, perennial. Stem solitary, erect, flexuous, apically few branched, conspicuously winged. Basal and

lower stem leaves withered at anthesis. Middle stem leaves crowded, petiolate; petiole 1–4 cm, winged, sometimes with a pair of lobes; leaf blade broadly ovate, cordate, or ovate-triangular, $5\text{--}8 \times 2\text{--}4$ cm, abaxially grayish white and densely tomentose, adaxially green and scabrid, base cordate, truncate, or cuneate, margin dentate. Upper stem leaves sessile, ovate to narrowly ovate-elliptic, gradually smaller upward on stem. Capitula to 3–5 in a clustered corymbiform synflorescence at end of stem or branches, shortly pedunculate to sessile. Involucre narrowly campanulate, 5–7 mm in diam. Phyllaries in ca. 5 rows, sparsely arachnoid; outer phyllaries ovate-triangular, $2\text{--}3 \times 1.5\text{--}2$ mm, apex shortly acuminate; middle phyllaries narrowly ovate-elliptic, $3\text{--}6 \times 1\text{--}1.5$ mm, apex obtuse; inner phyllaries narrowly elliptic to linear, $7\text{--}8 \times 1\text{--}1.5$ mm, apex obtuse. Corolla purple, 8–9 mm, tube 3.5–4 mm, limb 4–5 mm, lobes 2.5–3 mm. Achene obconic, ca. 2 mm, glabrous. Pappus straw-colored; outer bristles 2–3 mm, scabrid; inner bristles 6–7 mm.

• N Chongqing (Chengkou).

229. *Saussurea vestitiformis* Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 643. 1937.

河谷风毛菊 he gu feng mao ju

Herbs 30–70 cm tall, perennial. Stem solitary, erect, apically branched, densely leafy, apically arachnoid tomentose. Basal and lower stem leaves petiolate; petiole 10–13 cm; leaf blade ovate, $6\text{--}13 \times 3.5\text{--}8.5$ cm, thick, abaxially grayish green to grayish white and densely tomentose, adaxially green and sparsely arachnoid but glabrescent, base deeply cordate, margin sinuate-denticulate, apex acute. Middle stem leaves petiolate; leaf blade base truncate, rounded, or cuneate. Upper stem leaves sessile, narrowly elliptic to ovate-elliptic, gradually smaller upward on stem. Capitula numerous, in a paniculiform or laxly corymbiform synflorescence, pedunculate. Involucre campanulate, 8–10 mm in diam. Phyllaries in 5 or 6 rows, pale yellow sericeous, apex obtuse to rounded and with a black mucro; outer phyllaries narrowly ovate, $2\text{--}3 \times 1\text{--}1.5$ mm; middle phyllaries narrowly ovate-elliptic, $5\text{--}7 \times$ ca. 1 mm; inner phyllaries linear, $8\text{--}10 \times$ ca. 1 mm. Corolla dark purple, ca. 1.2 cm. Achene obconic, glabrous. Pappus straw-colored; outer bristles simple, ca. 1/4 as long as inner ones. Fl. and fr. Aug–Sep.

• Montane forests and grasslands; ca. 2900 m. NW Yunnan (Lijiang, Zhongdian).

230. *Saussurea baroniana* Diels, Bot. Jahrb. Syst. 29: 625. 1901.

棕脉风毛菊 zong mai feng mao ju

Saussurea broussonetifolia F. H. Chen; *S. rufotricha* Y. Ling.

Herbs 20–60 cm tall, perennial. Stem solitary, erect, apically branched, with brown multicellular articulate hairs. Lower and middle stem leaves petiolate; petiole 2–13 cm, with brown articulate hairs; leaf blade ovate to ovate-cordate, $8.5\text{--}14 \times 4.5\text{--}9$ cm, abaxially grayish white and densely arachnoid lanate, adaxially green, scabrid, and strigose, base cordate to rarely rounded, margin coarsely dentate, apex acuminate. Upper stem

leaves shortly petiolate to sessile, gradually smaller upward on stem; leaf blade ovate, base cuneate. Capitula 2 or 3 clustered at end of branches, in a corymbiform synflorescence, shortly pedunculate. Involucre narrowly campanulate to ovoid, 6–10 mm in diam. Phyllaries in 6 or 7 rows, arachnoid; outer phyllaries ovate-triangular, leathery, apically black, apex mucronate; inner phyllaries oblong to narrowly ovate-elliptic, apically purple, apex obtuse. Corolla purple, ca. 1.1 cm. Achene ca. 5 mm, glabrous. Pappus grayish white to pale brown; outer bristles scabrid. Fl. and fr. Aug–Oct.

• Montane forests, forest margins; 2200–2800 m. S Shaanxi (Qin Ling).

231. *Saussurea flaccida* Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 3: 165. 1935.

萎软风毛菊 wei ruan feng mao ju

Herbs 25–50 cm tall, perennial. Stem solitary, slender, erect, simple or apically few branched, sparsely arachnoid. Basal and lower stem leaves petiolate; petiole 6–13 cm; leaf blade ovate to broadly ovate, 2.5–6 × 2–5 cm, thinly papery, abaxially grayish white and densely white tomentose, adaxially green, scabrid, and densely strigose, base cordate, margin sinuate-dentate to denticulate, apex acute to acuminate. Upper stem leaves shortly petiolate to sessile, gradually smaller upward on stem; leaf blade narrowly ovate-elliptic to oblong. Capitula 2–4, in a corymbiform synflorescence or sometimes solitary, pedunculate. Involucre obconic to oblong, 5–6 mm in diam. Phyllaries in ca. 4 rows, rigid, leathery, densely arachnoid, apex with a blackish purple mucro; outer phyllaries ovate-triangular, ca. 3 × 2 mm, apex acute; middle phyllaries elliptic, ca. 6 × 2 mm, apex obtuse; inner phyllaries broadly linear, ca. 7 × 1 mm, apex acute. Corolla pale yellowish brown, ca. 1 cm, tube ca. 5 mm, limb ca. 5 mm. Achene cylindrical, ca. 5 mm, ribbed, glabrous. Pappus straw-colored; outer bristles 2–3 mm, scabrid; inner bristles ca. 8 mm. Fl. and fr. Aug–Sep.

• Montane grasslands, thickets; 2700–2800 m. S Shaanxi (Qin Ling).

232. *Saussurea acromelaena* Handel-Mazzetti, Symb. Sin. 7: 1151. 1936.

肾叶风毛菊 shen ye feng mao ju

?*Saussurea discolor* (Willdenow) Candolle var. *nana* F. H. Chen; ?*S. nivea* Turczaninow var. *nana* (F. H. Chen) Handel-Mazzetti; *S. reniformis* Y. Ling.

Herbs 40–50 cm tall, perennial. Stem solitary, stout, erect, apically branched, sparsely lanate. Basal and lower stem leaves petiolate; petiole 6–12 cm; leaf blade broadly ovate, cordate, or reniform, 3–11 × 7–10(–17) cm, abaxially grayish white and densely lanate, adaxially yellowish green and glabrous or sparsely pilose, base cordate, margin dentate, apex rounded to emarginate. Middle and upper stem leaves petiolate; petiole 0.5–5 cm; leaf blade ovate, triangular-ovate, or ovate-elliptic, gradually smaller upward on stem, base cordate, truncate, or cuneate, apex acute to acuminate. Capitula numerous, in a corymbiform synflorescence. Involucre campanulate, 6–10 mm in diam. Phyllaries in ca. 5 rows, leathery, densely white lanate,

apex with a blackish purple mucro; outer phyllaries ovate, ca. 4 × 3 mm; middle phyllaries oblong, ca. 7 × 3 mm; inner phyllaries oblong to narrowly elliptic-linear, 8–10 × 1–2.5 mm. Corolla pale purple, 1–1.2 cm, tube 5–6 mm, limb 4–5 mm, lobes 3–4 mm. Achene brown, cylindrical, 4–5 mm, glabrous. Pappus pale brown; outer bristles 2–3 mm, scabrid; inner bristles 8–9 mm. Fl. and fr. Sep–Oct.

• Montane forests; 1400–2500 m. Hebei, Henan, W Hubei, Shaanxi.

233. *Saussurea pinetorum* Handel-Mazzetti, Symb. Sin. 7: 1150. 1936.

松林风毛菊 song lin feng mao ju

Saussurea ionodasys Handel-Mazzetti.

Herbs 30–50 cm tall, perennial. Stem solitary, erect, branched, narrowly winged, with rusty multicellular articulate hairs. Basal and lower stem leaves petiolate; petiole 1.5–3 cm, winged, wing margin sparsely dentate or entire; leaf blade oblong to ovate, 3–10 × 2.5–6 cm, abaxially grayish white and densely tomentose, adaxially green, scabrid, and with rust-colored multicellular articulate hairs, base subcordate to truncate, margin dentate, apex rounded, obtuse, or acute. Middle stem leaves shortly petiolate to sessile; petiole if present winged, wings or leaf base decurrent on stem; leaf blade oblong, narrowly ovate-elliptic, or linear, smaller upward on stem. Capitula 2–12 at end of branches, in a corymbiform or paniculiform synflorescence, pedunculate. Involucre cylindrical, 7–9 mm in diam. Phyllaries in ca. 5 rows, subglabrous, apex subacute to rounded; outer phyllaries ovate, 2.8–3 × ca. 1.5 mm; middle phyllaries narrowly elliptic, 5–8 × 1.8–2 mm; inner phyllaries linear, ca. 9 × 1 mm. Corolla purple, ca. 1 cm, tube ca. 5 mm, limb ca. 5 mm. Achene pale brown, 2–3 mm, glabrous. Pappus white; outer bristles ca. 2 mm, scabrid; inner bristles ca. 9 mm. Fl. and fr. Jul–Sep.

• *Pinus* forests, grassy slopes; 1900–3800 m. NE Chongqing, W Sichuan, NW Yunnan (Lijiang).

234. *Saussurea paleata* Maximowicz, Mém. Acad. Imp. Sci. St.-Petersbourg Divers Savans 9: 168. 1859.

膜片风毛菊 mo pian feng mao ju

?*Saussurea corymbosa* F. H. Chen; *S. eriolepis* Bunge ex Candolle var. *paleata* (Maximowicz) Herder.

Herbs to 60 cm tall, perennial. Stem solitary, erect, apically branched, arachnoid or glabrescent. Basal and lower stem leaves petiolate; petiole 5–7 cm; leaf blade narrowly ovate-cordate to oblong-cordate, 6–8 × 4–5 cm, abaxially grayish green and thinly arachnoid tomentose, adaxially green and glabrous, base cordate, margin serrate to dentate, apex acuminate. Middle stem leaves petiolate; leaf blade ovate to narrowly ovate-elliptic, gradually smaller upward on stem. Upper stem leaves shortly petiolate to sessile; leaf blade narrowly ovate-elliptic to linear, apex acute. Capitula several, in a paniculiform or corymbiform synflorescence, pedunculate. Involucre campanulate, 7–10 mm in diam. Phyllaries in 3 or 4 rows, apically purplish red, arachnoid near margin, apex acute; outer phyllaries triangular, ca. 3 × 1 mm; middle phyllaries oblong, 3–6 ×

1–1.5 mm; inner phyllaries linear-elliptic, 6–8 × ca. 1 mm. Corolla purplish red, ca. 8 mm, tube ca. 4 mm, limb ca. 4 mm. Achene brown, ca. 2 mm, glabrous. Pappus basally brownish but apically white; outer bristles 1–2 mm, scabrid; inner bristles ca. 7 mm. Fl. and fr. Jul–Sep. $2n = 26^*$.

- Mountain slopes; 1700–2200 m. Hebei, ?Liaoning.

Saussurea paleata is a doubtful taxon, probably only a glabrescent form of *S. nivea*; it was already reduced to a variety of the latter (as *S. eriolepis*) by Herder (Bull. Soc. Imp. Naturalistes Moscou 41(3): 32. 1868). The type specimen of *S. corymbosa* has not been examined by the present authors; therefore, the identity of that taxon remains unclear.

235. *Saussurea chetchozensis* Franchet, J. Bot. (Morot) 2: 359. 1888.

大坪风毛菊 da ping feng mao ju

Herbs to 70 cm tall, perennial. Stem solitary, erect, apically few branched, usually narrowly winged in middle part, arachnoid. Basal and lower stem leaves petiolate; petiole 4–6 cm; leaf blade broadly ovate, 8–10 × 4–6 cm, abaxially grayish white or green and densely tomentose or glabrous, adaxially green and scabrid, base cordate to cuneate, margin denticulate, apex acute to obtuse. Middle stem leaves petiolate; petiole 1–2 cm, winged, base decurrent on stem; leaf blade ovate to narrowly elliptic, 5–7 × 1.5–2 cm. Upper stem leaves sessile, narrowly elliptic to linear, base decurrent, apex acute. Capitula 2–9, in a lax corymbiform synflorescence or sometimes solitary, pedunculate. Involucre campanulate-obconic, 1.2–1.5 cm in diam. Phyllaries in 5 or 6 rows, densely arachnoid tomentose; outer phyllaries triangular-ovate, 3–5 × 3–4 mm, apex acute and usually with a dark mucro; middle phyllaries ovate, 5–10 × 2–3 mm, apex acute to obtuse; inner phyllaries narrowly ovate, 12–14 × 1–1.5 mm, apex obtuse. Corolla bluish purple, 1.3–1.4 cm, tube 6–7 mm, limb 6.5–7 mm, lobes 3–3.5 mm. Achene brown, ca. 3 mm, glabrous. Pappus dirty white; outer bristles 1–2 mm, scabrid; inner bristles 1–1.2 cm. Fl. and fr. Aug–Oct.

- Montane forests and thickets, grasslands; 2000–3700 m. Guizhou, Sichuan, Yunnan.

- 1a. Leaf blade abaxially grayish white and densely tomentose 235a. var. *chetchozensis*
 1b. Leaf blade abaxially green and glabrous 235b. var. *glabrescens*

235a. *Saussurea chetchozensis* var. *chetchozensis*

大坪风毛菊(原变种) da ping feng mao ju (yuan bian zhong)

Saussurea coeruleoviolacea H. Léveillé; *S. lanuginosa* Vaniot.

Leaf blade abaxially grayish white and densely tomentose.

- Montane forests, grasslands; 2000–3700 m. Guizhou, Sichuan, Yunnan.

235b. *Saussurea chetchozensis* var. *glabrescens* (Handel-Mazzetti) Lipschitz, Novosti Sist. Vyssh. Rast. 8: 248. 1971.

光叶风毛菊 guang ye feng mao ju

Saussurea lanuginosa var. *glabrescens* Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 643. 1937.

Leaf blade abaxially green and glabrous.

- Montane thickets, grasslands; 3000–3600 m. SW Sichuan, NW Yunnan.

236. *Saussurea lyratifolia* Y. L. Chen & S. Yun Liang, Acta Phytotax. Sin. 19: 95. 1981.

大头羽裂风毛菊 da tou yu lie feng mao ju

Herbs to 60 cm tall, perennial. Stem solitary, erect, simple, basally covered with dark brown remains of old leaf sheaths. Lower stem leaves ca. 2, elliptic, lyrate-pinnately parted, abaxially pale green and sparsely arachnoid lanate, adaxially green and pilose, base auriculate-amplexicaul, margin irregularly sinuate-dentate; lateral lobes oblong, 2.5–3.5 × 1.2–1.5 cm; terminal lobe ca. 10 × 8 cm. Middle and upper stem leaves ca. 2, narrowly ovate-elliptic, 7–14 × 2.5–6 cm, base auriculate, margin irregularly dentate, apex acuminate and mucronate. Capitula ca. 5, clustered in a hemispheric synflorescence, subsessile. Involucre ovoid, 9–10 mm in diam. Phyllaries in ca. 4 rows, pale yellowish green, apically and near margin dark purple, pilose, apex long acuminate; outer phyllaries broadly ovate-elliptic; inner phyllaries narrowly oblong. Receptacle bristles ca. 4 mm. Corolla purplish red, 1.1–1.2 cm, tube 4.5–5 mm, limb 3.5–4 mm, lobes ca. 2 mm. Achene cylindrical, ca. 2 mm, smooth, glabrous, apex with a denticulate crown. Pappus brown; outer bristles short, scabrid; inner bristles plumose. Fl. and fr. Jul–Aug.

- Forests; ca. 3800 m. SE Xizang (Bomi).

Saussurea lyratifolia was placed in *S.* subg. *Frolovia* by C. Shih and S. Y. Jin (FRPS 78(2): 58. 1999). As all other former members of this subgenus are now accommodated in different genera, *S. lyratifolia* is now placed in *S.* subg. *Saussurea*. The typical double pappus and the capitula and synflorescence structure leave no doubt that this species belongs to *Saussurea* s.s. and not to one of the segregates. It is very similar to *S. laneana* W. W. Smith from India (Sikkim). Further studies are needed to investigate if this is indeed the same species.

237. *Saussurea neofranchetii* Lipschitz, Bot. Zhurn. (Moscow & Leningrad) 57: 676. 1972.

耳叶风毛菊 er ye feng mao ju

Saussurea auriculata Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 10: 40. 1887, not (Candolle) Schultz Bipontinus (1846).

Herbs 50–100 cm tall, perennial. Stem solitary, erect, simple or apically few branched, glabrous. Basal leaves petiolate, sometimes withered at anthesis; petiole to 12 cm; leaf blade ovate to narrowly ovate-elliptic, 5.5–15 × 1.5–5 cm, abaxially pale green, often tinged purple, and glabrous, adaxially dark green and glabrous, base cuneate-attenuate, margin serrulate, apex acuminate. Lower, middle, and upper stem leaves usually sessile, gradually smaller upward on stem; leaf blade narrowly ovate-elliptic to oblong, to 15 × 3 cm, basally slightly constricted, base auriculate and amplexicaul. Capitula 1–3, long pedunculate. Involucre campanulate, 1.5–2 cm in diam. Phyllaries in 4 or 5 rows, dark purplish brown, leathery, glabrous or sparsely pilose, apex acute to acuminate and reflexed; outer phyllaries ovate, 8–10 × 4–5 mm; middle phyllaries 10–16 × 2–4 mm; inner phyllaries narrowly ovate-elliptic, 16–19 × ca. 2

mm. Corolla purplish red, 1.4–1.6 cm, tube 7–8 mm, limb 7–8 mm, lobes 4–5 mm. Achene blackish brown, cylindric, 4–5 mm, ribbed, glabrous, apex with a short crown. Pappus straw-colored to reddish; outer bristles scabrid. Fl. and fr. Jul–Aug.

• Forest margins, thickets, montane grasslands; 3000–3800 m. W Sichuan, NW Yunnan (Lijiang, Zhongdian).

Saussurea neofranchetii was described from a specimen without basal leaves. Whereas the lower stem leaves can either be sessile or petiolate, the basal leaves are always distinctly petiolate.

238. *Saussurea caudata* Franchet, Bull. Annuel Soc. Philom. Paris, sér. 8, 3: 147. 1891.

尾叶风毛菊 wei ye feng mao ju

Herbs 20–85 cm tall, perennial. Stem solitary, purple, erect, simple or apically few branched, glabrous. Basal leaves petiolate; petiole 7–9 cm; leaf blade narrowly ovate-elliptic to oblong, 8–15 × 1–1.5 cm, abaxially pale green, glabrous, adaxially green and glabrous or sparsely strigose on veins, base cuneate-attenuate, margin serrulate-denticulate, apex caudate-acuminate. Lower stem leaves broadly linear, base attenuate into a winged petiole, apex caudate-acuminate. Middle and upper stem leaves sessile, narrowly ovate-elliptic to oblong, basally slightly narrowed, base auriculate and amplexicaul, apex caudate-acuminate. Capitula 2–4, terminal on stem or branches in a lax corymbiform synflorescence or sometimes solitary, long pedunculate. Involucre campanulate, 1.2–2 cm in diam. Phyllaries in 4 or 5 rows, leathery; outer phyllaries ovate, 8–9 × 4–7 mm, apex acuminate and reflexed; middle phyllaries oblong, ca. 12 × 4 mm; inner phyllaries linear, ca. 15 × 2 mm, apex acute. Corolla purple, ca. 1.6 cm, tube ca. 9 mm, limb ca. 6 mm. Achene cylindric, ca. 3 mm, ribbed, glabrous. Pappus dirty white; outer bristles ca. 3 mm; inner bristles ca. 1.3 cm. Fl. and fr. Jul–Sep.

• Forest margins, meadows, open rocky pastures; 3000–4000 m. W Sichuan, NW Yunnan (Zhongdian).

239. *Saussurea leclerei* H. Léveillé, Bull. Géogr. Bot. 25: 18. 1915.

利马川风毛菊 li ma chuan feng mao ju

Saussurea mollis Franchet (1894), not (Cavanilles) Sprengel (1826).

Herbs to 1 m tall, perennial. Stem solitary, erect, apically branched, narrowly winged, glabrous. Basal and lower stem leaves usually withered at anthesis. Middle and upper stem leaves shortly petiolate; petiole base inconspicuously small auriculate and decurrent on stem; leaf blade ovate to elliptic, 6–11 × 2.5–4.5 cm, abaxially grayish green and arachnoid tomentose, adaxially dark green and glabrous, base cuneate-attenuate and decurrent on petiole, margin sinuate-denticulate, apex caudate-acuminate. Uppermost stem leaves subsessile, narrowly ovate-elliptic, smaller, margin subsinuate or entire. Capitula numerous, in a clustered corymbiform synflorescence at end of stem and branches, shortly pedunculate. Involucre campanulate, 5–6 mm in diam. Phyllaries in ca. 5 rows, brown, glabrous; outer phyllaries ovate, 2–3 × 1–1.5 mm, apex acute; middle phyllaries ovate, 3–6 × 1.5–2 mm, apex obtuse; inner phyllaries

linear, 6–8 × 1–1.5 mm, apex rounded. Corolla purple, 8–9(–12) mm, tube 3–5 mm, limb 4.5–5 mm, lobes ca. 3 mm. Achene cylindric, ca. 3 mm, glabrous. Pappus pale brown; inner bristles 7–8 mm. Fl. and fr. Aug–Oct.

• Montane grasslands; 2000–3300 m. Chongqing, Hubei, Sichuan, NC Yunnan.

240. *Saussurea merinoi* H. Léveillé, Bull. Géogr. Bot. 25: 19. 1915.

截叶风毛菊 jie ye feng mao ju

Herbs to 1 m tall, perennial. Stem solitary, erect, apically branched, not winged, glabrous. Basal and lower stem leaves usually withered at anthesis. Middle stem leaves shortly petiolate; leaf blade ovate, elliptic, or oblong, 6–10 × 2–3.5 cm, surfaces dark green and ± concolorous, abaxially puberulent on veins, adaxially glabrous, base truncate to cuneate, margin sinuate-denticulate, apex caudate-acuminate. Upper stem leaves sessile, ovate-elliptic to narrowly ovate-elliptic, smaller. Capitula numerous, in a clustered corymbiform synflorescence at end of stem and branches, shortly pedunculate. Involucre narrowly campanulate, 4–6 mm in diam. Phyllaries in ca. 5 rows, brown, glabrous; outer phyllaries ovate, 2–3 × 1–2 mm, apex acuminate; middle phyllaries ovate-elliptic, 3–6 × 1.5–2 mm, apex subacute; inner phyllaries linear, 7–10 × 1–1.5 mm, apex subacute. Corolla purple, 8–10 mm, tube 3.5–5 mm, limb 4.5–5 mm, lobes ca. 3 mm. Achene brown, cylindric, ca. 4 mm, glabrous. Pappus pale reddish brown; outer bristles 0.2–3 mm; inner bristles 7–8 mm. Fl. and fr. Aug–Oct.

• Montane grasslands; ca. 3200 m. NE Yunnan (Qiaojia).

Apparently, *Saussurea merinoi* is only known from the type specimens, which lack the basal and underground parts of the plants. This species is probably close to *S. leclerei*.

241. *Saussurea macrota* Franchet, J. Bot. (Morot) 8: 343. 1894.

大耳叶风毛菊 da er ye feng mao ju

Saussurea auriculata Hemsley (1892), not (Candolle) Schultz Bipontinus (1846), nor Franchet (1887); *S. hemsleyana* Handel-Mazzetti; *S. kitamurae* S. Y. Hu; *S. macrota* var. *papyracea* Lipschitz; *S. otophylla* Diels; *S. otophylla* var. *cinerea* Y. Ling.

Herbs 25–85 cm tall, perennial. Stem solitary, erect, apically branched, apically flexuous, wingless, subglabrous. Basal leaves withered at anthesis. Lower and middle stem leaves sessile, elliptic to ovate-elliptic, 8–23 × 2.5–6 cm, abaxially sparsely arachnoid or glabrous and sometimes gland-dotted, adaxially green and sparsely strigose or glabrous, base auriculate and amplexicaul, margin denticulate to coarsely serrate, apex acute to acuminate. Upper stem leaves narrowly ovate to narrowly elliptic, gradually smaller upward on stem. Capitula numerous, in a clustered corymbiform synflorescence at end of stem and branches, pedunculate. Involucre narrowly campanulate, 6–10 mm in diam. Phyllaries in 5 or 6 rows, brownish, apically and near margin purple, glabrous or sparsely arachnoid; outer phyllaries ovate, 3–4 × 2–2.5 mm, apex usually obtuse; middle phyllaries narrowly ovate, 5–11 × 1.5–3 mm, apex obtuse to acute; inner phyllaries linear, 11–13 × 1–1.5 mm, apex

subacute. Corolla dark purple, 1–1.2 cm, tube 5–6 mm, limb 5–7 mm, lobes 3–3.5 mm. Achene cylindrical, 3–4.5 mm, ribbed, glabrous. Pappus pale brown; outer bristles 1.5–3 mm, scabrid; inner bristles 8–10 mm. Fl. and fr. Jul–Aug.

● Montane forests, thickets; 2200–3300 m. N Chongqing, Gansu, W Hubei, Ningxia, Shaanxi, Sichuan.

242. *Saussurea semiamplexicaulis* Lipschitz, Bot. Zhurn. (Moscow & Leningrad) 57: 528. 1972.

半抱茎风毛菊 ban bao jing feng mao ju

Herbs 50–70 cm tall, perennial. Stem solitary, erect, apically branched, wingless, apically with brown articulate hairs. Leaves green and golden gland-dotted, margin dentate-denticulate. Lower stem leaves petiolate; petiole 3–5 cm, winged, base enlarged, auriculate, and semiamplexicaul; leaf blade narrowly ovate-elliptic, 6–9 × 2.5–4 cm, both surfaces green, abaxially gland-dotted and sparsely arachnoid, adaxially ± sparsely gland-dotted and glabrous, base subcordate to truncate, apex acute. Middle and upper stem leaves sessile, gradually smaller upward on stem, base auriculate and semiamplexicaul. Capitula numerous, to 4–10 in a clustered corymbiform synflorescence at end of branches, shortly pedunculate or sessile. Involucre cylindrical to narrowly campanulate, 5–7(–10) mm in diam. Phyllaries in 5 or 6 rows, brown, leathery, glabrous, apex obtuse to acuminate; outer phyllaries ovate, 3–4 × 2–2.5 mm; middle phyllaries narrowly ovate, 4–8 × 1.5–2 mm, apex acute to obtuse; inner phyllaries linear, 8–10 × 1–1.5 mm. Receptacle bristles 5–7 mm. Corolla purple, 1.2–1.3 cm, tube 6–7 mm, limb 5.5–6.5 mm, lobes 3–3.5 mm. Achene gray with dark black spots, 3–3.5 mm, glabrous. Pappus dirty white; outer bristles scabrid, 2–4 mm; inner bristles 9–10 mm. Fl. and fr. Sep.

● Montane grasslands; ca. 2700 m. NW Yunnan (Dèqên).

243. *Saussurea peduncularis* Franchet, J. Bot. (Morot) 2: 357. 1888.

显梗风毛菊 xian geng feng mao ju

Saussurea peduncularis var. *corymbosa* Franchet; *S. peduncularis* var. *diversifolia* Franchet; *S. peduncularis* var. *lobata* Franchet.

Herbs 25–90 cm tall, perennial. Stem erect, apically branched, winged, glabrous. Lower stem leaves petiolate; petiole to 4 cm, winged with 1 or 2 pairs of teeth; leaf blade narrowly ovate, elliptic, or ovate, 8–18 × 4–8 cm, lyrate-pinnate, abaxially sparsely strigose on veins or glabrous, adaxially green and glabrous, base cuneate-attenuate into winged petiole, margin toothed, apex acute to obtuse. Middle and upper stem leaves sessile, narrowly elliptic, gradually smaller upward on stem, base decurrent on stem, margin dentate. Capitula numerous, in a corymbiform or paniculiform synflorescence, pedunculate. Involucre ovoid to campanulate, 6–12(–15) mm in diam., apically usually constricted. Phyllaries in ca. 5 rows, margin sparsely arachnoid; outer phyllaries ovate, ca. 4 × 2 mm, apex acute to obtuse; middle phyllaries elliptic, ca. 7 × 3 mm, apex acute; inner phyllaries narrowly elliptic, ca. 9 × 2 mm, apex obtuse. Corolla dark bluish purple, 1–1.3 cm, tube ca. 7 mm, limb ca. 6 mm. Achene brown, cylindrical, ca. 2.5 mm, glabrous. Pappus

pale brown; outer bristles ca. 2 mm, scabrid; inner bristles ca. 1 cm. Fl. and fr. Aug–Oct.

● Montane forests, forest margins, thickets, open meadows; 2800–3500 m. NW Yunnan.

244. *Saussurea frondosa* Handel-Mazzetti, Acta Horti Gothob. 12: 312. 1938.

狭翼风毛菊 xia yi feng mao ju

Herbs 50–60 cm tall, perennial. Stem solitary, erect, apically branched, narrowly winged, densely pubescent. Basal leaves withered at anthesis. Lower and middle stem leaves shortly petiolate or sessile; petiole winged if present; leaf blade ovate to elliptic, 10–17 × 3–8 cm, undivided or lyrate-pinnately lobed, both surfaces green and glabrous, base cuneate-attenuate and decurrent, margin serrulate, apex acute to acuminate; lateral lobes inconspicuous, 1 pair, triangular to elliptic; terminal lobe ovate to elliptic. Upper stem leaves subsessile; leaf blade elliptic to narrowly elliptic, 7–10 × 3–3.5 cm, gradually smaller upward on stem, margin entire. Capitula numerous, in a corymbiform synflorescence, shortly pedunculate. Involucre ovoid-oblong, ca. 5 mm in diam. Phyllaries in ca. 5 rows, abaxially sparsely arachnoid; outer and middle phyllaries ovate to elliptic, 5–6 × 2–3 mm, apex with a 3–4 mm subulate awn; inner phyllaries oblong, 7–10 × 2–3 mm, apex obtuse and mucronate. Corolla purplish red or white, ca. (1–)1.6 cm, tube ca. 9.5 mm, limb ca. 6.5 mm. Achene brown, cylindrical, ca. 5 mm, glabrous. Pappus pale brown; outer bristles 2–3 mm, scabrid; inner bristles ca. 9 mm. Fl. and fr. Jul–Sep(–Nov).

● Montane forests; 1400–2300 m. Fujian, Henan, ?Shaanxi, Shanxi, ?Sichuan, Yunnan.

245. *Saussurea eriocephala* Franchet, J. Bot. (Morot) 8: 339. 1894.

棉头风毛菊 mian tou feng mao ju

Saussurea pallidiceps Handel-Mazzetti.

Herbs 45–75 cm tall, perennial. Stem solitary, erect, apically branched, winged, arachnoid; wing entire. Lower stem leaves shortly petiolate; petiole to 3 cm, base widened, semiamplexicaul, and decurrent; leaf blade ovate, 5–10 × 3–7 cm, lyrate-pinnatisect or pinnately lobed, abaxially grayish white and thinly arachnoid, adaxially green and glabrous; lateral segments 1–3 pairs, elliptic, broadly ovate, or suborbicular, 0.3–2 cm; terminal segment broadly ovate, 3.5–8 cm, base shallowly cordate, margin denticulate or subentire, apex acute to obtuse. Middle and upper stem leaves petiolate or sessile, gradually smaller upward on stem; leaf blade lyrate-pinnate or undivided; lateral segments 1 pair and elliptic or absent; terminal segment ovate-cordate, 2.5–7 × 2–4.5 cm. Capitula numerous, in a corymbiform or paniculiform synflorescence, pedunculate. Involucre campanulate, 1–1.7 cm in diam. Phyllaries in ca. 5 rows, apically densely yellowish brown villous, apex acuminate and mucronate; outer phyllaries ca. 5 × 2–3 mm; middle and inner phyllaries narrowly elliptic to linear, 10–14 × 2–2.5 mm. Corolla purple, ca. 1 cm. Achene glabrous. Pappus brown; outer bristles ca. 4 mm, scabrid; inner bristles ca. 1 cm. Fl. Aug–Sep.

● Montane grasslands; 1900–2900 m. SW Sichuan (Muli), NW Yunnan (Lijiang).

246. *Saussurea dzeurensis* Franchet, J. Bot. (Morot) 8: 339. 1894.

川西风毛菊 chuan xi feng mao ju

Herbs 20–90 cm tall, perennial. Stem solitary, erect, apically branched, winged, sparsely lanate or glabrescent; wing sinuate-dentate. Basal and lower stem leaves long petiolate; petiole to 7 cm; leaf blade narrowly ovate-elliptic, 3–12 × 0.4–3 cm, runcinate-pinnately lobed or dentate, abaxially grayish white and arachnoid, adaxially green and sparsely strigose, base decurrent, apex acuminate; lateral lobes 3–6 pairs, triangular-ovate, margin dentate. Middle and upper stem leaves sessile, narrowly ovate-elliptic, gradually smaller upward on stem, base decurrent, margin coarsely dentate. Capitula numerous, in corymbiform synflorescence, pedunculate. Involucre ovoid, 5–8 mm in diam. Phyllaries in 5 or 6 rows, brown but black near margin, leathery, sericeous, apex acute to obtuse; outer phyllaries ovate, ca. 3 mm; middle phyllaries narrowly ovate-elliptic; inner phyllaries linear. Corolla purple, 8–10 mm. Achene ca. 3 mm, glabrous. Pappus pale yellowish brown; outer bristles scabrid. Fl. and fr. Jul–Oct.

• Alpine steppes and grasslands; 2600–4000 m. Gansu, Qinghai, W Sichuan.

247. *Saussurea carduiformis* Franchet, J. Bot. (Morot) 8: 343. 1894.

蓟状风毛菊 ji zhuang feng mao ju

Herbs 50–60 cm tall, perennial. Stem solitary, erect, apically branched, basally strigose. Basal and lower stem leaves sessile, obovate to elliptic, 8–15 × 4–6 cm, abaxially pale green and sparsely arachnoid or glabrous but sparsely strigose on veins, adaxially green and scabrid but glabrescent, base semiamplexicaul and decurrent, margin basally pinnately lobed and apically coarsely dentate, apex acuminate. Middle and upper stem leaves sessile, elliptic to narrowly elliptic, gradually smaller upward on stem, base cuneate and semiamplexicaul, margin coarsely sinuate-dentate to subentire, apex acuminate. Capitula 2–7, in a racemiform to corymbiform synflorescence or solitary, long pedunculate. Involucre hemispheric, 1.5–2.5 cm in diam. Phyllaries in 4–6 rows, brownish, leathery, sparsely arachnoid, apically usually patent or reflexed; outer phyllaries triangular-ovate, 4–5 × 2–2.5 mm, apex long acuminate; middle phyllaries narrowly triangular-ovate, 5–10 × 2–3 mm, apex long acuminate; inner phyllaries narrowly elliptic, 10–11 × 1.5–2 mm, apex shortly acuminate. Corolla bluish purple, 1.2–1.4 cm, tube 6–7 mm, limb 6–7 mm, lobes 3.5–4 mm. Achene cylindrical, ca. 3 mm, glabrous. Pappus dirty white; outer bristles ca. 2 mm; inner bristles 8–10 mm. Fl. and fr. Sep–Oct.

• Open montane forests, mountain trails; 2600–2800 m. Chongqing, Gansu, Shaanxi, Sichuan.

248. *Saussurea mutabilis* Diels, Bot. Jahrb. Syst. 36(Beibl. 82): 109. 1905.

变叶风毛菊 bian ye feng mao ju

Saussurea mutabilis var. *diplochaeta* Y. Ling.

Herbs 40–70(–100) cm tall, perennial. Stem solitary, erect,

apically much branched, sparsely pubescent. Lower stem leaves withered at anthesis. Middle stem leaves petiolate; petiole 5–11 cm; leaf blade ovate to elliptic, 7–15 × 5–9 cm, thin, lyrate-pinnately parted or undivided, both surfaces green and glabrous or subglabrous; lateral lobes 1 or 2 pairs, elliptic to triangular; terminal lobe ovate, margin sinuate-dentate, apex acute. Upper stem leaves shortly petiolate or sessile, gradually smaller upward on stem; leaf blade lyrate-pinnately parted or undivided; lateral lobes if present 1 pair, ovate-elliptic. Capitula numerous, in a paniculiform or corymbiform synflorescence. Involucre narrowly campanulate, 4–9 mm in diam. Phyllaries in 5 or 6 rows, arachnoid; outer phyllaries ovate, apex recurved; inner phyllaries narrowly ovate-elliptic, apex acute to subobtusate. Corolla white, 8–11 mm. Achene pale brown, ca. 5 mm, glabrous. Pappus white; outer bristles ca. 3 mm, scabrid; inner bristles ca. 1 cm. Fl. and fr. Aug–Sep.

• Montane forests; 1300–1800 m. Gansu, S Shaanxi (Qin Ling).

249. *Saussurea morifolia* F. H. Chen, Bull. Fan Mem. Inst. Biol., Bot. 8: 123. 1938.

桑叶风毛菊 sang ye feng mao ju

Herbs 20–60 cm tall, perennial. Stem solitary, erect, simple or few branched, glabrous. Basal and lower stem leaves petiolate; petiole 8–11 cm; leaf blade obovate to elliptic, 7–11 × 3.5–6 cm, lyrate-pinnatisect, both surfaces green and glabrous; lateral segments 2–4 pairs, elliptic to narrowly triangular, margin denticulate or subentire, apex obtuse to acute; terminal segment ovate to triangular-ovate, margin sparsely denticulate, apex acute to acuminate. Middle stem leaves shortly petiolate; leaf blade elliptic; lateral segments 1 or 2 pairs, elliptic; terminal segment triangular-hastate. Upper stem leaves small, with 1 pair of lobes or undivided; terminal lobe or leaf blade narrowly elliptic to broadly linear. Capitula solitary and terminal on stem or 2–4 in a corymbiform synflorescence, pedunculate. Involucre campanulate, 7–12 mm in diam. Phyllaries in 4–6 rows, subglabrous, apically reflexed; outer phyllaries ovate, ca. 5 × 3 mm; middle phyllaries elliptic, 6–8 × 1.5–2 mm, apex long acuminate; inner phyllaries linear, 9–10 × ca. 1 mm, apex acute. Corolla purple, ca. 1.5 cm, tube ca. 9 mm, limb ca. 6 mm, lobes ca. 4 mm. Achene brown, 4–5 mm, glabrous. Pappus dirty white; outer bristles ca. 2 mm, scabrid; inner bristles ca. 1 cm. Fl. and fr. Jul–Sep.

• Montane forests, trailsides; 1800–2700 m. SE Gansu, S Shaanxi (Qin Ling).

250. *Saussurea lampsanifolia* Franchet, J. Bot. (Morot) 2: 357. 1888.

鹤庆风毛菊 he qing feng mao ju

Herbs 25–40 cm tall, perennial. Stems erect, simple or apically branched, narrowly winged, many leaved. Basal and lower stem leaves petiolate; petiole broadly winged, margin dentate; leaf blade ovate to elliptic, 7–10 × 3–4 cm, lyrate-pinnatisect, abaxially whitish and densely tomentose, adaxially green and scabrid; lateral lobes 2 or 3 pairs, ovate to triangular, base truncate or shallowly cordate, margin entire or dentate; terminal lobe ovate-triangular, apex acute to shortly acuminate. Upper stem leaves gradually smaller upward on stem. Capitula

numerous, in 3–5 corymbiform synflorescences at end of axillary branches, subsessile. Involucre narrowly campanulate, 5–7 mm in diam. Phyllaries in 5 or 6 rows, straw-colored, subglabrous, apex long acuminate and patent or reflexed; outer phyllaries ovate, 2–3 × 1–1.5 mm; middle phyllaries narrowly ovate-elliptic, 3–6 × ca. 1.5 mm; inner phyllaries linear, 6–8 × ca. 1 mm. Corolla and achene unknown. Pappus pale white; outer bristles scabrid; inner bristles ca. 7 mm. Fl. and fr. Sep–Oct.

- Forests, thickets. Yunnan (Heqing).

Saussurea lampsanifolia is apparently only known from the single type specimen with not yet developed florets.

251. *Saussurea hieracioides* J. D. Hooker, Fl. Brit. India 3: 371. 1881.

长毛风毛菊 chang mao feng mao ju

Saussurea levilleana Maire; *S. villosa* Franchet.

Herbs 5–20(–35) cm tall, perennial. Stem solitary, well developed, erect, simple, densely white villous. Basal leaves distinctly petiolate; petiole to 8 cm; leaf blade elliptic to narrowly elliptic-oblongate, 2–16 × 0.8–4 cm, abaxially pale green and sparsely villous, adaxially dark green and sparsely villous, base oblique and rounded to cuneate, margin entire and ciliate, apex acute to obtuse. Stem leaves few, sessile, narrowly ovate-elliptic to linear, gradually smaller upward on stem. Capitulum solitary, terminal on stem. Involucre campanulate, 1–1.5 cm in diam. Phyllaries in 4 or 5 rows, blackish purple, densely villous, apex long acuminate; outer phyllaries narrowly ovate-triangular, ca. 10 × 3 mm; middle phyllaries narrowly ovate-elliptic, ca. 13 × 2.5 mm; inner phyllaries narrowly lanceolate to linear, ca. 2 × 0.2 cm. Corolla purple, 1.8–2.4 cm, tube 1–1.6 cm, limb ca. 8 mm, lobes 5–6 mm. Achene brown, cylindrical, 2–4 mm, glabrous. Pappus pale brown; outer bristles 2–7 mm, scabrid; inner bristles ca. 1.4 cm. Fl. and fr. Jun–Sep. $2n = 64$.

Alpine scree slopes, grasslands, rocky slopes; 4400–5200 m. W Sichuan, Xizang, NW Yunnan [Bhutan, India (Sikkim), Nepal].

252. *Saussurea superba* J. Anthony, Notes Roy. Bot. Gard. Edinburgh 18: 212. 1934.

横断山风毛菊 heng duan shan feng mao ju

Saussurea superba f. *pygmaea* J. Anthony; *S. tatsienensis* Franchet var. *monocephala* Diels.

Herbs 3–25(–35) cm tall, perennial, stemless or cauliferous. Stem solitary, erect, simple, densely villous. Rosette leaves sessile or shortly petiolate; petiole winged if present; leaf blade elliptic to narrowly obovate-elliptic, 3–10 × 1–3.5 cm, both surfaces green and subglabrous, base attenuate, margin entire or inconspicuously denticulate, apex obtuse to subacute. Stem leaves sessile, narrowly elliptic to linear, smaller. Capitulum solitary, sessile in center of leaf rosette or terminal on stem. Involucre broadly campanulate, 1.5–4 cm in diam. Phyllaries in 4 or 5 rows, blackish purple, subglabrous, apex long acuminate; outer phyllaries narrowly ovate-triangular, 10–15 × 3–5 mm; middle phyllaries narrowly ovate-elliptic, 12–18 × 2–3 mm; inner phyllaries narrowly ovate-elliptic to linear, 15–25 × 1–2 mm. Corolla bluish purple, 1.8–2.6 cm, tube 1–1.8 cm, limb 8–

11 mm, lobes 5–6 mm. Achene brown, cylindrical, 3–4 mm, glabrous. Pappus pale brown; outer bristles 2–5 mm, scabrid; inner bristles 1.3–2 cm. Fl. and fr. Jun–Sep.

- Alpine grasslands, rocky slopes; 2800–5200 m. Gansu, Qinghai, W Sichuan, Xizang, NW Yunnan (Dêqên, Zhongdian).

253. *Saussurea tatsienensis* Franchet, Bull. Annuel Soc. Philom. Paris, sér. 8, 3: 146. 1891.

打箭风毛菊 da jian feng mao ju

Herbs 10–60 cm tall, perennial. Stem solitary, erect, simple or apically few branched, villous. Lower stem leaves petiolate; petiole to 7 cm; leaf blade narrowly ovate-elliptic to narrowly elliptic, 4–15(–20) × 1–3(–5) cm, both surfaces green and pubescent, base attenuate, margin entire or denticulate and ciliate, apex acute to acuminate. Middle stem leaves sessile, gradually smaller upward on stem, base semiamplexicaul. Uppermost stem leaves linear-subulate, subtending synflorescence. Capitula 2–8, in a corymbiform synflorescence or sometimes solitary, pedunculate. Involucre campanulate to obconic, 1–2 cm in diam. Phyllaries in 4 or 5 rows, blackish purple, glabrous or sparsely villous, apex acuminate; outer phyllaries narrowly triangular-ovate, 8–10 × 2–3 mm; middle phyllaries narrowly ovate-elliptic, 10–12 × 1.5–2 mm; inner phyllaries linear, 12–15 × 1–1.5 mm. Corolla bluish purple, 1.2–1.4 cm, tube 6–8 mm, limb 5–6 mm, lobes 3–3.5 mm. Achene glabrous. Pappus dirty white; outer bristles 2–3.5 mm, scabrid; inner bristles 9–10 mm. Fl. Jul–Sep.

- Alpine meadows, montane grasslands; 3000–4600 m. Qinghai, W Sichuan, NW Yunnan.

In Qinghai, several specimens have been found that are morphologically intermediate between *Saussurea nigrescens* and *S. tatsienensis*. Both species are very common in the high montane grasslands in the NE part of the Qinghai-Xizang Plateau and probably hybridize where they occur together.

254. *Saussurea acutisquama* Raab-Straube, Willdenowia 41: 83. 2011.

尖苞风毛菊 jian bao feng mao ju

Herbs 5–45 cm tall, perennial. Stems solitary or several, erect, simple or apically few branched, sparsely villous. Basal and lower stem leaves petiolate; petiole to 12 cm; leaf blade narrowly elliptic, 2–13 × 0.5–1.5(–2) cm, both surfaces green and sparsely villous, base attenuate, margin denticulate and ciliate, apex acute to acuminate. Middle stem leaves sessile, narrowly elliptic to linear, smaller, base semiamplexicaul. Upper stem leaves linear. Capitula 2 or 3(–6), in corymbiform synflorescence or sometimes solitary, pedunculate. Involucre obconic, 1–1.5 cm in diam. Phyllaries in 4 or 5 rows, blackish purple, glabrous or subglabrous, apex acute to acuminate; outer phyllaries narrowly ovate-elliptic, 10–13 × 2–3 mm; middle phyllaries narrowly triangular, 13–17 × 2–2.5 mm; inner phyllaries narrowly elliptic to linear, 17–20 × 1–2 mm. Receptacle bristles 5–7 mm. Corolla blackish to bluish purple, 1.4–1.5 cm, tube 6–7 mm, limb 7–8 mm, lobes 3.5–4 mm. Achene brown or gray with black spots, ellipsoid, 3–3.5 mm, glabrous. Pappus apically white, basally straw-colored to pale brown; outer bris-

tlers 3–5 mm, scabrid; inner bristles 13–15 mm. Fl. and fr. Jul–Oct.

- Alpine meadows, montane grasslands; 3400–4900 m. Gansu, Qinghai, W Sichuan, Xizang, NW Yunnan.

Saussurea acutisquama is a taxon that has been recognized as *S. polycolea* var. *acutisquama* (e.g., Lipschitz, *Rod Saussurea*, 64. 1979; S. W. Liu, *Fl. Qinghai*. 3: 451. 1996) or as *S. nigrescens* var. *acutisquama* (e.g., S. Y. Liang, *Fl. Xizang*. 4: 871. 1985). Both names are based on a type that represents an entirely different taxon, *S. erubescens*. *Saussurea acutisquama* is widespread in the grasslands of the NE part of the Qinghai-Xizang Plateau and is a good species, quite different from both *S. polycolea* and *S. nigrescens*.

255. *Saussurea euodonta* Diels, *Notes Roy. Bot. Gard. Edinburgh* 5: 198. 1912.

锐齿风毛菊 rui chi feng mao ju

Herbs 30–150 cm tall, perennial. Stem solitary, erect, 5–6 mm in diam., apically few branched, apically flexuous, basally glabrous, apically strigose with brown articulate hairs. Lower and middle stem leaves petiolate; petiole 1–3 cm; leaf blade ovate, elliptic, or narrowly ovate-elliptic, 6–20 × (2–)3.5–7 cm, both surfaces green, abaxially sparsely pubescent on veins or glabrous, adaxially scabrid and sparsely strigose, base slightly cordate, truncate, or cuneate-attenuate, margin coarsely dentate-serrate, apex acuminate. Upper stem leaves shortly petiolate to subsessile, smaller; leaf blade narrowly ovate-elliptic. Capitula 2 or 3(–6), in a lax corymbiform synflorescence or sometimes solitary, long pedunculate. Involucre campanulate, (0.8–)1.3–2 cm in diam. Phyllaries in 4–6 rows, brown but dark purple apically, sparsely pilose, apex acute to acuminate and patent to reflexed; outer phyllaries narrowly ovate-triangular, 8–11 × 3–3.5 mm; middle phyllaries narrowly ovate-elliptic, 8–16 × 2–3 mm; inner phyllaries narrowly elliptic to linear, 16–20 × 1.5–2 mm. Receptacle bristles 0.8–1.2 cm. Corolla purple, 1.2–1.4 cm, tube 6–7 mm, limb 6–7 mm, lobes 4–5 mm. Achene brown, cylindrical, ca. 4 mm, glabrous. Pappus dirty white; outer bristles few or sometimes lacking, 1.5–5 mm, scabrid; inner bristles 1–1.1 cm. Fl. and fr. Aug–Oct.

- Montane grasslands, *Pinus* forest margins; 2300–3700 m. Sichuan, NW Yunnan.

256. *Saussurea hultenii* Lipschitz, *Bot. Zhurn. (Moscow & Leningrad)* 57: 528. 1972.

雅龙凤毛菊 ya long feng mao ju

Herbs 65–70 cm tall, perennial. Stem solitary, 5–6 mm in diam., erect, apically few branched, apically flexuous, sparsely arachnoid and with brown articulate hairs. Lower and middle stem leaves petiolate; petiole 1.5–2.5 cm; leaf blade ovate-elliptic to narrowly ovate-elliptic, 11–16 × 3–6 cm, abaxially light green and sparsely pubescent or glabrous, adaxially dark green and glabrous, base cuneate, margin coarsely dentate-serrate, apex acuminate. Upper stem leaves shortly petiolate to subsessile; leaf blade narrowly ovate to narrowly elliptic, 9–13 × 2.5–4 cm. Capitula 3–6, in a lax corymbiform synflorescence, long pedunculate. Involucre campanulate, 1.5–2 cm in diam. Phyllaries in 4–6 rows, straw-colored, apically and near margin dark brown or purplish, sparsely pilose, apex acute to acuminate and usually patent to reflexed; outer phyllaries triangular-

ovate, 7–9 × 2–4 mm; middle phyllaries narrowly ovate-elliptic, 8–13 × 2.5–3 mm; inner phyllaries narrowly ovate-elliptic, 13–14 × 2–3 mm. Receptacle bristles straw-colored, 5–7 mm. Corolla purple, 1.2–1.4 cm, tube 6–7 mm, limb 6–7 mm, lobes 3.5–4 mm. Achene brown, cylindrical, ca. 4 mm. Pappus dirty white; outer bristles usually lacking; inner bristles 1–1.1 cm. Fl. and fr. Aug.

- Mountain slopes, thickets; ca. 2300 m. Yunnan (Gongshan).

257. *Saussurea micradenia* Handel-Mazzetti, *Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl.* 62: 16. 1925.

滇风毛菊 dian feng mao ju

Herbs to 60 cm tall, perennial. Stem solitary, erect, simple, sparsely arachnoid. Basal and lower stem leaves petiolate; petiole 3–10 cm; leaf blade narrowly oblong, elliptic, or linear, 8–30 × 1–1.5 cm, abaxially pale green, gland-dotted, and glabrescent, adaxially dark green, base attenuate, margin subentire to sparsely denticulate, apex acute to acuminate. Middle and upper stem leaves few, sessile, linear, gradually smaller upward on stem, base semiamplexicaul. Capitula 1 or 2, long pedunculate. Involucre campanulate, ca. 2 cm in diam. Phyllaries in 5 or 6 rows, sparsely villous, apex long acuminate; outer phyllaries narrowly ovate-triangular, 5–6 × 1–1.5 mm, apically herbaceous and reflexed; inner phyllaries narrowly ovate-elliptic to linear, 10–12 × ca. 1 mm. Receptacle bristles 5–6 mm. Corolla blackish purple, ca. 1.5 cm, tube ca. 7 mm. Achene gland-dotted. Pappus in 1 row, pale yellowish brown, 1–1.1 cm. Fl. and fr. Aug.

- Montane forests; 2300–3100 m. NW Yunnan (Gongshan).

258. *Saussurea retroserrata* Y. L. Chen & S. Yun Liang, *Acta Phytotax. Sin.* 19: 97. 1981.

倒齿风毛菊 dao chi feng mao ju

Herbs 30–40 cm tall, perennial. Stem solitary, erect, apically few branched, with reddish brown hairs. Basal and lower stem leaves petiolate; petiole 2–3 cm; leaf blade narrowly elliptic, 12–16 × 1–1.6 cm, both surfaces green, adaxially with reddish brown hairs, base attenuate, margin retrorsely serrate, apex acuminate. Middle and upper stem leaves few, shortly petiolate or sessile, gradually smaller upward on stem. Capitula 3 or 4, in a lax racemiform or corymbiform synflorescence, long pedunculate. Involucre ovoid to narrowly campanulate, 1.2–1.5 cm in diam. Phyllaries in 5 or 6 rows, straw-colored to brown but purplish apically and near margin, sparsely villous or glabrescent, apex acuminate; outer phyllaries narrowly triangular-ovate, 8–10 × ca. 3 mm, apically reflexed; inner phyllaries narrowly ovate-elliptic, 10–12 × 2–3 mm. Receptacle bristles linear, 2–3 mm. Corolla purplish red, 1.8–1.9 cm, tube 6–7 mm, limb 6–7 mm, lobes 3.5–4 mm. Achene cylindrical, 2.5–3 mm, glabrous. Pappus brownish; outer bristles scabrid. Fl. and fr. Aug–Oct.

- *Picea* forest margins; ca. 3500 m. SE Xizang (Zayü).

259. *Saussurea acuminata* Turczaninow ex Fischer & C. A. Meyer, *Index Sem. Hort. Petrop.* 1: 37. 1835.

渐尖风毛菊 jian jian feng mao ju

Herbs 30–60 cm tall, perennial. Stem solitary, erect, apically branched, narrowly winged, subglabrous. Basal leaves petiolate; leaf blade narrowly ovate-elliptic to oblong, both surfaces green and glabrous, usually withered at anthesis. Lower and middle stem leaves petiolate; petiole winged; leaf blade narrowly elliptic to linear, 10–18 × 2–2.5 cm, base attenuate, margin revolute and entire or denticulate, apex long acuminate. Upper stem leaves sessile, smaller ones linear. Capitula numerous, in a clustered hemispheric-corymbiform synflorescence at end of stem and branches, shortly pedunculate or sessile. Involucre narrowly campanulate, 5–6 mm in diam. Phyllaries in ca. 4 rows, sparsely pubescent; outer phyllaries ovate, apex long acuminate to caudate and usually reflexed; middle phyllaries oblong, apex acute; inner phyllaries linear, apex subacute. Corolla pale purplish red, 1.2–1.5 cm, tube ca. 8 mm, limb ca. 7 mm. Achene cylindrical, 1.5–2 mm. Pappus white; outer bristles 2–3 mm, scabrid; inner bristles ca. 1.4 cm. Fl. and fr. Jul–Sep.

Moist meadows, forests, steppes. Heilongjiang, Nei Mongol [Mongolia, Russia (Siberia)].

260. *Saussurea glandulosa* Kitamura, Acta Phytotax. Geobot. 3: 137. 1934.

腺点风毛菊 xian dian feng mao ju

Saussurea yatagaiana Mori.

Herbs 10–75 cm tall, perennial. Stem solitary, erect, apically branched, flexuous, distinctly winged. Basal leaves usually withered at anthesis. Lower and middle stem leaves petiolate; petiole winged; leaf blade ovate, elliptic, or narrowly ovate-elliptic, (3–)6–20 × (1–)2–4.5 cm, abaxially pale green, gland-dotted, and sparsely pubescent, adaxially green and scabrid, base cuneate and decurrent, margin sinuate-dentate, apex acute. Upper stem leaves sessile, narrowly ovate-elliptic, gradually smaller upward on stem, base cuneate and decurrent, apex acuminate. Capitula several, in a clustered corymbiform synflorescence at end of branches, shortly pedunculate. Involucre cylindrical, ca. 3 mm in diam. Phyllaries in 3 or 4 rows, purplish, apically tomentose, apex acuminate; outer phyllaries narrowly triangular-ovate; middle phyllaries narrowly ovate-elliptic; inner phyllaries narrowly elliptic to linear. Receptacle with bristles. Corolla purple, 1–1.1 cm, tube 4–6 mm, limb 4–5 mm. Pappus outer bristles scabrid; inner bristles 7–8 mm. Fl. and fr. Aug.

• Montane forests; 2000–3700 m. Taiwan.

261. *Saussurea kiraisiensis* Masamune, J. Soc. Trop. Agric. 2: 241. 1930.

台岛风毛菊 tai dao feng mao ju

Herbs 5–15 cm tall, perennial. Stem solitary, slender, erect, simple, puberulent. Lower stem leaves petiolate; petiole 1.5–4 cm, sometimes winged; leaf blade oblong, ovate, or broadly ovate, 2–5 cm, pinnately lobed, abaxially whitish and lanate, adaxially green and puberulent, base truncate to cuneate and decurrent into petiole, margin denticulate, apex acuminate, acute, or obtuse; lateral lobes oblong, small. Upper stem leaves petiolate or sessile, gradually smaller upward on stem; leaf blade oblong, ovate, or narrowly ovate-elliptic, base cuneate to

truncate, apex acute to acuminate. Capitula 2–4, clustered in a corymbiform synflorescence or sometimes solitary, shortly pedunculate. Involucre campanulate, 4–6 mm in diam. Phyllaries in ca. 4 rows; outer phyllaries narrowly ovate-elliptic, apex acuminate; middle phyllaries oblong, apex acute; inner phyllaries linear, apex acute. Corolla pink, 7–9 mm. Achene unknown by authors. Pappus dirty white; inner bristles ca. 8 mm.

• Alpine rocky areas or scree slopes; 2900–3500 m. Taiwan.

The misspelling “*Saussurea kiraisanensis*,” established by Kitamura, has been widely used in the literature, including in Fl. Taiwan, ed. 2 (4: 1051. 1998).

262. *Saussurea epilobioides* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 495. 1882.

柳叶菜风毛菊 liu ye cai feng mao ju

Saussurea epilobioides var. *cana* Handel-Mazzetti; *S. karlongensis* Handel-Mazzetti.

Herbs 25–60 cm tall, perennial. Stems solitary or few, erect, simple, subglabrous. Basal leaves withered at anthesis. Lower and middle stem leaves sessile, narrowly elliptic to linear, 7–12 × 0.9–2 cm, abaxially grayish green, usually gland-dotted, densely to sparsely tomentose or glabrescent, adaxially green and subglabrous, base auriculate and semiamplexicaul, margin denticulate, apex long acuminate. Upper stem leaves gradually smaller upward on stem, base cuneate. Capitula numerous, in a clustered corymbiform synflorescence, shortly pedunculate. Involucre narrowly campanulate, 6–8 mm in diam. Phyllaries in 4 or 5 rows, apically usually arachnoid; outer phyllaries ovate-triangular, 9–13 × 1.5–3 mm, apical part blackish green, saber-shaped, 5–9 mm, and reflexed, apex acuminate; middle phyllaries narrowly ovate-elliptic, 7–9 × 2–3 mm, apical part blackish purple and 1–4 mm; inner phyllaries linear, 8–10 × 1–1.5 mm, apex acute to subobtusate. Corolla purple, 8–10 mm, tube 4–5 mm, limb 4–5 mm, lobes 3–3.5 mm. Achene cylindrical, 3–4 mm, glabrous. Pappus dirty white; outer bristles 1.5–3.5 mm, scabrid; inner bristles 7–8 mm. Fl. and fr. Jul–Sep.

• Mountain slopes, alpine meadows; 2600–4200 m. Gansu, Ningxia, Qinghai, W Sichuan.

263. *Saussurea umbrosa* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 18: 423. 1901.

湿地风毛菊 shi di feng mao ju

Herbs 50–100 cm tall, perennial. Stem solitary, erect, apically branched, narrowly winged, pubescent. Basal leaves petiolate; petiole narrowly winged; leaf blade elliptic to narrowly ovate-elliptic, 10–25 × 2–4(–6) cm, abaxially grayish green, gland-dotted, and sparsely arachnoid, adaxially green and sparsely brown pubescent, base truncate to rounded, margin dentate, apex acute. Lower and middle stem leaves sessile, narrowly elliptic to narrowly oblong, 9–18 × 1–3 cm, base cuneate, margin dentate, apex acute to acuminate. Upper stem leaves narrowly elliptic to linear, margin entire. Capitula several, in a paniculiform or corymbiform synflorescence. Involucre campanulate, ca. 1 cm in diam. Phyllaries in ca. 5 rows, gland-dotted and puberulent; outer and middle phyllaries ovate, apical

part saber-shaped and reflexed, apex acuminate-caudate; inner phyllaries narrowly elliptic to linear, apex acuminate. Corolla pale purple, 1.2–1.5 cm, tube 6–8 mm, limb 6–7 mm. Achene cylindrical, 3–4 mm. Pappus pale brown; outer bristles 2–3 mm, scabrid; inner bristles ca. 1 cm. Fl. and fr. Jul–Aug.

Forests, forest meadows. Heilongjiang, Jilin, Nei Mongol [Korea, Russia (Far East, E Siberia)].

264. *Saussurea hemsleyi* Lipschitz, Bot. Zhurn. (Moscow & Leningrad) 51: 1947. 1966.

湖北风毛菊 hu bei feng mao ju

Saussurea decurrens Hemsley, J. Linn. Soc., Bot. 29: 310. 1892, not Hemsley (1888).

Herbs 30–60(–75) cm tall, perennial. Stem solitary, erect, apically branched, narrowly winged, sparsely arachnoid and glandular hairy. Lower and middle stem leaves petiolate; petiole 0.5–5.5 cm, winged, base decurrent; leaf blade ovate, oblong, or narrowly ovate-elliptic, 5–10(–15) × 2–3.5 cm, abaxially green, gland-dotted, and sparsely tomentose, adaxially dark green and glabrescent, base cuneate and abruptly narrowed into petiole, margin crenate to dentate, apex acuminate to caudate. Upper stem leaves shortly petiolate or sessile, gradually smaller upward on stem; leaf blade narrowly ovate-elliptic, base decurrent. Capitula numerous, to 3–5 in a clustered corymbiform synflorescence at end of branches, shortly pedunculate. Involucre narrowly campanulate, 5–7(–10) mm in diam. Phyllaries in 5 or 6 rows, basally yellowish green, apically sometimes purplish, glabrous or arachnoid, apex obtuse; outer phyllaries ovate, 1.5–2 × 1–1.5 mm; middle phyllaries narrowly ovate, 2–6 × 1.5–2 mm; inner phyllaries linear, 7–8(–10) × 0.8–1.5 mm. Receptacle bristles subulate, 4–5 mm. Corolla purple, 8–9(–12) mm, tube 4–5 mm, limb 4–4.5 mm, lobes 2.5–3 mm. Achene cylindrical, 3–4 mm, glabrous. Pappus dirty white; outer bristles 1–3 mm, scabrid; inner bristles 6–9 mm. Fl. and fr. Jul–Sep.

• Montane forests, moist places; 2200–3800 m. ?Guizhou, Hubei, ?Sichuan, NW Yunnan.

Saussurea hemsleyi was mistakenly treated by Handel-Mazzetti as *S. parviflora* var. *atriplicifolia* (Acta Horti Gothob. 12: 317. 1938).

265. *Saussurea parviflora* (Poiret) Candolle, Ann. Mus. Natl. Hist. Nat. 16: 200. 1810.

小花风毛菊 xiao hua feng mao ju

Serratula parviflora Poiret in Lamarck, Encycl. 6: 554. 1805; *Saussurea atriplicifolia* Fischer ex Herder; *S. chowana* F. H. Chen; *S. parviflora* var. *atriplicifolia* (Fischer ex Herder) Handel-Mazzetti; *S. parviflora* var. *cinerascens* Handel-Mazzetti; *S. parviflora* var. *cuspidata* Handel-Mazzetti.

Herbs 30–110 cm tall, perennial. Stem solitary, erect, apically branched, narrowly winged, sparsely pubescent or glabrous. Basal leaves withered at anthesis. Lower stem leaves petiolate to subsessile; petiole 5–10(–20) mm, narrowly winged, base decurrent; leaf blade elliptic or narrowly ovate, 7–18(–30) × 1.5–4.5 cm, abaxially grayish green or glaucous, usually gland-dotted, and glabrous or puberulent, adaxially green and scabrid but glabrescent, base attenuate, margin dentate to den-

tulate, apex acuminate. Middle and upper stem leaves sessile, narrowly ovate-elliptic to narrowly elliptic, 4–15 × 1–3.5 cm, gradually smaller upward on stem. Capitula numerous, in a corymbiform synflorescence, shortly pedunculate. Involucre narrowly campanulate, 5–8 mm in diam. Phyllaries in 4 or 5 rows, yellowish green, apically or entirely dark purple, glabrous or sparsely pubescent, apex subacute to obtuse; outer phyllaries ovate, 2–3 × 1.5–2 mm; middle phyllaries narrowly ovate-elliptic, 3–7 × 2–2.5 mm; inner phyllaries narrowly elliptic, 9–10 × 0.8–1.5 mm. Receptacle bristles subulate, 5–6 mm. Corolla purple, 1.1–1.3 cm, tube 5–7 mm, limb 5–6 mm, lobes 2.5–4 mm. Achene cylindrical, 3–4 mm. Pappus dirty white; outer bristles 2–4 mm, scabrid; inner bristles (6–)8–9 mm. Fl. and fr. Jul–Sep. $2n = 26$.

Forest margins, thickets, montane meadows and grasslands; 1600–3800 m. Gansu, Hebei, ?Nei Mongol, Ningxia, Qinghai, ?Shanxi, Sichuan, Xinjiang, ?Yunnan [Kazakhstan, Mongolia, Russia].

266. *Saussurea candolleana* (Candolle) Wallich ex Schultz Bipontinus, Linnaea 19: 331. 1846.

宽翅风毛菊 kuan chi feng mao ju

Aplotaxis candolleana Candolle, Prodr. 6: 541. 1838; *Saussurea candolleana* var. *glabrata* Lipschitz; *S. candolleana* subsp. *platyptera* Lipschitz; *S. pterocaulon* Decaisne.

Herbs 50–100 cm tall, perennial. Stem solitary, erect, apically branched, narrowly winged. Lower stem leaves sessile, ovate-elliptic, obovate, or narrowly elliptic-oblong, 12–18 × 4–6 cm, abaxially pale green, gland-dotted, and sparsely arachnoid, adaxially dark green, scabrid, and sparsely pubescent to subglabrous, base attenuate, semiamplexicaul, and decurrent, margin denticulate, apex acuminate. Middle and upper stem leaves 6–16 × 0.8–4 cm, gradually smaller upward on stem. Capitula 10–20, in a clustered corymbiform synflorescence. Involucre narrowly campanulate, 5–8 mm in diam. Phyllaries in 5 or 6 rows, yellowish green but dark purple apically; outer phyllaries ovate, 3–6 × 1–2.5 mm, apex acuminate; middle phyllaries narrowly ovate-elliptic, 5–8 × 1.5–2 mm, apex acuminate to subacute; inner phyllaries narrowly elliptic to linear, 8–10 × 1–1.5 mm, apex obtuse. Receptacle bristles light brown, 5–8 mm. Corolla 1–1.2 cm, tube 5–6 mm, limb 5–6 mm, lobes 3.5–4 mm. Achene obconic to cylindrical, ca. 5 mm, glabrous. Pappus light brown; outer bristles 2–4 mm; inner bristles 8–9 mm. Fl. and fr. Aug–Sep. $2n = 26$.

Tall forb communities on scree slopes, *Juniperus* woodlands; 2800–3900 m. S Xizang (Tingri, Yadong) [Bhutan, NE and NW India, Kashmir, Nepal].

The report of *Saussurea parviflora* from S Xizang (S. Y. Liang, Fl. Xizang. 4: 893. 1985) is in fact referable to *S. candolleana*, which has recently also been found in a second locality in S Xizang, in Tingri Xian.

267. *Saussurea latifolia* Ledebour, Icon. Pl. 1: 17. 1829.

宽叶风毛菊 kuan ye feng mao ju

Herbs 35–100 cm tall, perennial. Stem solitary, erect, apically few branched, winged, densely leafy. Basal and lower stem leaves petiolate; leaf blade ovate to elliptic, 6–15 × 4–9

cm, both surfaces green, abaxially pubescent or glabrous, adaxially scabrid, base \pm cordate, margin serrate and ciliate, apex acuminate. Middle and upper stem leaves shortly petiolate or sessile, gradually smaller upward on stem, base decurrent. Uppermost stem leaves narrowly ovate-elliptic to narrowly elliptic. Capitula numerous, in a clustered corymbiform synflorescence. Involucre campanulate, 5–6(–8) mm in diam. Phyllaries in 4 or 5 rows, often dark violet, pubescent; outer phyllaries ovate, apex obtuse to subacute; middle and inner phyllaries oblong to narrowly ovate-elliptic, apex subobtusate to acuminate. Receptacle sparsely bristly. Corolla purplish violet, 1–1.1 cm, tube 5–6 mm, limb 5–6 mm, lobes ca. 3.5 mm. Achene pale brown, cylindrical, ca. 3.5 mm. Pappus dirty white; outer bristles 3–4 mm, scabrid; inner bristles 8–10 mm. Fl. and fr. Jul–Sep. $2n = 24, 26$.

Forests, subalpine and alpine meadows; below 2500 m. N Xinjiang (Altay Shan) [SE Kazakhstan, Mongolia, Russia (Siberia)].

268. *Saussurea dielsiana* Koidzumi, Fl. Symb. Orient.-Asiat. 50. 1930.

狭头风毛菊 xia tou feng mao ju

Saussurea microcephala Diels, Bot. Jahrb. Syst. 29: 624. 1901, not Franchet (1888); *S. stenocephala* Y. Ling.

Herbs 50–80 cm tall, perennial. Stems solitary or several, erect, simple or apically branched, wingless. Lower stem leaves petiolate; petiole 3–6 cm; leaf blade oblong-triangular to ovate, 8–10 \times 4–5(–8) cm, undivided or pinnately lobed, both surfaces green, scabridulous, and subglabrous, base truncate to rarely cordate, margin sinuate-dentate, apex acuminate; lateral lobes 2 or 3 pairs. Upper stem leaves petiolate; petiole 0.5–4 cm; leaf blade narrowly ovate-elliptic to narrowly triangular, gradually smaller upward on stem, usually undivided, base cuneate, truncate, or slightly rounded, apex long acuminate. Capitula numerous, in a corymbiform synflorescence or solitary at leaf axils, pedunculate. Involucre narrowly campanulate to cylindrical, 4–6 mm in diam. Phyllaries in 5 or 6 rows, leathery, apically purple, arachnoid at margin; outer phyllaries ovate, small, apex acute and patent to recurved; inner phyllaries linear, apex acute to slightly obtuse. Corolla purplish red, ca. 1.1 cm. Achene brown, cylindrical, ca. 5 mm. Pappus white; outer bristles ca. 2 mm, scabrid; inner bristles ca. 9 mm. Fl. and fr. Oct. $2n = 26^*$.

• Montane grasslands; 800–1800 m. Nei Mongol, Shaanxi, Shanxi, Sichuan.

269. *Saussurea neoserrata* Nakai, Bot. Mag. (Tokyo) 45: 519. 1931.

齿叶风毛菊 chi ye feng mao ju

Saussurea serrata Candolle var. *amurensis* Herder; *S. parviflora* (Poiret) Candolle var. *amurensis* (Herder) S. Y. Hu.

Herbs 30–100 cm tall, perennial. Stem solitary, erect, apically branched, narrowly winged, glabrescent. Basal leaves withered at anthesis. Lower and middle stem leaves petiolate; petiole 3–10 cm, winged; leaf blade ovate-elliptic to elliptic, 10–21 \times 3–6[–8.5] cm, abaxially glaucous and subglabrous, adaxially green and glabrous, base attenuate, margin dentate to serrate, apex long acuminate. Upper stem leaves narrowly ellip-

tic to linear, gradually smaller upward on stem. Capitula numerous, in a corymbiform synflorescence, shortly pedunculate. Involucre narrowly campanulate-obconic, 3–6 mm in diam. Phyllaries in 4–6 rows, yellowish green but blackish purple apically and near margin, conspicuously 3-veined, subglabrous, apex obtuse; outer phyllaries ovate, 1.5–2.5 \times 1–1.5 mm; middle phyllaries narrowly ovate, 2–8 \times 1.5–1.8 mm; inner phyllaries linear, 8–10 \times 1–1.5 mm. Receptacle bristles subulate, 3–4 mm. Corolla purple, 9–10 mm, tube 5–6 mm, limb 4–5 mm, lobes 3–4 mm. Achene brown, cylindrical, 3–4(–6) mm. Pappus dirty white; outer bristles 1.5–3 mm, scabrid; inner bristles 6–8 mm. Fl. and fr. Jul–Aug. $2n = 26, 52$.

Larix forest margins, forest meadows. Heilongjiang, Jilin, Nei Mongol [Korea, Mongolia, Russia (Far East, E Siberia)].

270. *Saussurea iodoleuca* Handel-Mazzetti, Symb. Sin. 7: 1151. 1936.

浅堇色风毛菊 qian jin se feng mao ju

Herbs 40–65 cm tall, perennial. Stem solitary, erect, simple, unwinged, arachnoid. Basal leaves petiolate; petiole 1–3 cm; leaf blade ovate to elliptic, 3–10 \times 1.5–5 cm, abaxially grayish white or grayish green and densely tomentose, adaxially green and strigose, base rounded to cuneate, margin denticulate, apex obtuse to acute and mucronate. Lower stem leaves petiolate; leaf blade narrowly elliptic to elliptic, base cuneate-attenuate. Middle and upper stem leaves shortly petiolate or sessile, gradually smaller upward on stem; leaf blade narrowly elliptic to linear. Capitula 3–6, clustered in a corymbiform synflorescence, shortly pedunculate. Involucre narrowly campanulate, 5–7 mm in diam. Phyllaries in 4–6 rows, straw-colored or pale green, tomentose, apex subobtusate and mucronate; outer phyllaries ovate, ca. 3 \times 2–3 mm; middle phyllaries narrowly elliptic, ca. 7 \times 3 mm; inner phyllaries linear, ca. 10 \times 1 mm. Corolla white, ca. 1 cm. Pappus pale brown; outer bristles ca. 2 mm, scabrid; inner bristles 8–10 mm. Fl. and fr. Oct.

• Montane forests, thickets; 2000–2300 m. NW Yunnan (Dali, Yongsheng).

271. *Saussurea smithiana* Handel-Mazzetti, Acta Horti Gothob. 12: 310. 1938.

西康风毛菊 xi kang feng mao ju

Herbs 30–40 cm tall, perennial. Stem solitary, erect, simple or apically few branched, narrowly winged. Basal leaves petiolate; petiole 4–6 cm, narrowly winged; leaf blade ovate to elliptic, 6–10 \times 3–5 cm, abaxially white, densely tomentose, and with brown hairs on veins, adaxially green, scabridulous, and densely strigose, base cuneate-attenuate and decurrent, margin shallowly crenate, denticulate, or subentire, apex obtuse and mucronate. Lower stem leaves petiolate; petiole 1–1.5 cm, winged, base widened, semiamplexicaul, and decurrent on stem; leaf blade ovate, 4.5–6 \times 1.8–2.5 cm. Middle and upper stem leaves petiolate or sessile, gradually smaller upward on stem; leaf blade narrowly elliptic to linear. Capitula 2–4, in a racemiform or corymbiform synflorescence or sometimes solitary, long pedunculate. Involucre ovoid, (5–)8–10 mm in diam. Phyllaries in 5 or 6 rows, straw-colored but apically purple, sparsely arachnoid, apex obtuse and mucronate; outer phyllaries

ovate, 3–4 × 1–2 mm; middle phyllaries narrowly ovate-elliptic, 4–10 × 2–2.5 mm; inner phyllaries linear, 12–13 × 1–1.5 mm. Receptacle bristles subulate-filiform, 7–9 mm. Corolla purple, 1.4–1.5 cm, tube 7–8 mm, limb 7–7.5 mm, lobes 3.5–4 mm. Pappus dirty white; outer bristles 1.5–2 mm, scabrid; inner bristles 8–10 mm. Fl. and fr. Aug–Oct.

• Montane thickets, meadows; 3000–3500 m. W Sichuan (Kangding).

272. *Saussurea woodiana* Hemsley, J. Linn. Soc., Bot. 29: 312. 1892.

牛耳风毛菊 niu er feng mao ju

Saussurea nobilis Franchet; *S. woodiana* f. *caulescens* Lipschitz; *S. woodiana* f. *subacaulis* Lipschitz.

Herbs 3–8(–25) cm tall, perennial, stemless or cauliferous. Stem solitary, erect, simple. Rosette leaves sessile or petiolate; petiole winged; leaf blade elliptic to obovate, 5–20 × 1.5–7 cm, abaxially grayish green or brownish and densely tomentose, adaxially green and glandular hairy, base attenuate, margin subentire, apex obtuse to subacute. Stem leaves 1–3, similar to basal leaves. Capitulum solitary, in center of leaf rosette or terminal on stem. Involucre campanulate, 2–2.5(–3) cm in diam. Phyllaries in 5 or 6 rows, straw-colored but purplish apically and near margin, densely yellowish villous, apex long acuminate; outer phyllaries narrowly triangular-ovate, 8–20 × 3–5 mm; middle phyllaries narrowly ovate-elliptic, 1.9–2.3 × 0.4–0.6 cm; inner phyllaries narrowly elliptic, 2.8–3 × 0.2–0.3 cm. Corolla purple, 2.8–3.2 cm, tube (1.4–)1.8–2.2 cm, limb 1–1.2 cm, lobes 6–8 mm. Achene cylindrical, ca. 4 mm, glabrous. Pappus pale brown; outer bristles ca. 3 mm, scabrid; inner bristles ca. 2.2 cm. Fl. and fr. Jul–Sep.

• Montane grasslands; 3000–4200 m. Qinghai, Sichuan.

273. *Saussurea komarnitzkii* Lipschitz, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 59(6): 81. 1954.

腋头风毛菊 ye tou feng mao ju

Herbs 20–35 cm tall, perennial. Stem solitary, erect, simple, ± flexuous, narrowly winged, apically densely leafy, glabrous. Basal and lower stem leaves withered at anthesis. Middle stem leaves shortly petiolate to sessile; petiole winged, base semiamplexicaul and decurrent; leaf blade broadly ovate, suborbicular, or orbicular, 3–6 × 2.5–5 cm, leathery, abaxially white, densely tomentose, and with conspicuous veins, adaxially dark green and subglabrous to sparsely strigose, base semiamplexicaul and decurrent on stem, margin crenate-dentate, apex shortly acuminate. Upper stem leaves sessile, somewhat smaller. Capitula 2–6, in a corymbiform synflorescence or sometimes solitary, shortly pedunculate. Involucre cylindrical to narrowly campanulate, 5–7(–10) mm in diam. Phyllaries in ca. 4 rows, straw-colored, densely arachnoid tomentose; outer phyllaries ovate, 2–3 × 1.5–2.5 mm, apex acuminate and with a purplish mucro; middle phyllaries narrowly ovate-elliptic, 3–6 × 1.5–2.5 mm, apex acuminate to obtuse; inner phyllaries linear, 6–7 × 1–1.5 mm, apex obtuse. Corolla purplish red, 8–9 mm, tube 4–4.5 mm, limb 4–4.5 mm, lobes 3–3.5 mm. Achene brown, ca. 4 mm, glabrous. Pappus dirty white to light brown;

outer bristles 1–4 mm, scabrid; inner bristles 6–7 mm. Fl. and fr. Aug–Oct.

• Montane grasslands, rocky slopes; 2000–2300 m. Guizhou (Fanjing Shan, Jiangkou, Qingshan).

274. *Saussurea rotundifolia* F. H. Chen, Bull. Fan Mem. Inst. Biol., Bot. 6: 98. 1935.

圆叶风毛菊 yuan ye feng mao ju

Saussurea tenella Y. Ling.

Herbs 10–30 cm tall, perennial. Stem solitary, erect, simple, apically very narrowly winged or wingless, sparsely arachnoid. Basal leaves withered at anthesis. Middle stem leaves petiolate; petiole 1–1.5 cm, narrowly winged, base enlarged and amplexicaul; leaf blade broadly ovate to orbicular or triangular, 0.5–5.5 × 0.5–4 cm, abaxially arachnoid tomentose, adaxially green and scabrid or glabrous, base truncate to cuneate and decurrent, margin serrulate, apex acute. Upper stem leaves sessile, slightly smaller. Capitula 1–3, pedunculate. Involucre ovoid-campanulate, ca. 1.3 cm in diam. Phyllaries in ca. 4 rows, pubescent; outer phyllaries narrowly ovate to triangular, apex acuminate; middle phyllaries narrowly ovate-elliptic, apex acute to obtuse; inner phyllaries narrowly elliptic to linear, apex acuminate. Corolla purple, 9–10 mm. Achene cylindrical, ca. 4 mm. Pappus dirty white; outer bristles scabrid. Fl. and fr. Aug–Sep.

• Trailsides on mountain slopes; 3100–3300 m. S Shaanxi (Qin Ling), Sichuan.

275. *Saussurea alaschanica* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 492. 1882.

阿拉善风毛菊 a la shan feng mao ju

Herbs 10–30 cm tall, perennial. Stem solitary, erect, simple, sparsely arachnoid. Basal and lower stem leaves petiolate; petiole 1–5 cm; leaf blade elliptic to ovate-elliptic, 2.5–13 × 1.5–5 cm, abaxially grayish green and densely tomentose, adaxially green and glabrous, base cuneate to rounded, margin denticulate to sinuate-dentate, apex acuminate. Middle stem leaves few, shortly petiolate, gradually smaller upward on stem. Upper stem leaves sessile, narrowly ovate-elliptic to narrowly elliptic. Capitula 2 or 3, in a clustered corymbiform synflorescence or sometimes solitary, shortly pedunculate to sessile. Involucre campanulate, 1–1.2 cm in diam. Phyllaries in 4 or 5 rows, straw-colored but purple apically and near margin, villous, apex acuminate; outer phyllaries triangular-ovate; inner phyllaries linear. Corolla purplish red, 1.2–1.5 cm, tube ca. 6 mm, limb 6–9 mm. Achene blackish brown, cylindrical, ca. 4 mm. Pappus dirty white; outer bristles 2–3 mm, scabrid; inner bristles ca. 1.2 cm. Fl. and fr. Jul–Sep.

Thickets, mountain slopes, rock fissures. Nei Mongol, Ningxia [Mongolia].

276. *Saussurea polygonifolia* F. H. Chen, Bull. Fan Mem. Inst. Biol., Bot. 8: 125. 1938.

蓼叶风毛菊 liao ye feng mao ju

Herbs ca. 70 cm tall, perennial. Stem solitary, erect, api-

cally few branched, narrowly winged, sparsely arachnoid or glabrous. Basal and lower stem leaves withered at anthesis, long petiolate. Middle stem leaves sessile, narrowly ovate-elliptic to narrowly elliptic, $5-8 \times 1-2$ cm, abaxially grayish green or white and densely tomentose, adaxially light green and scabrid, base decurrent, margin subentire to denticulate, apex acuminate. Upper stem leaves sessile, narrowly elliptic to linear, gradually smaller upward on stem. Capitula 4–10, in a lax racemiform synflorescence, long pedunculate. Involucre narrowly campanulate, (5–)7–9 mm in diam. Phyllaries in 4 or 5 rows, straw-colored to reddish brown, glabrous or sparsely villous, apex acuminate; outer phyllaries triangular-ovate, ca. 3×2 mm; middle phyllaries narrowly ovate-elliptic, $3-5 \times 1-2$ mm; inner phyllaries narrowly elliptic, ca. 5×1 mm. Corolla white, ca. 1.2 cm. Achene ca. 2 mm. Pappus straw-colored; outer bristles scabrid. Fl. Sep.

- Forests. NW Yunnan.

277. *Saussurea vestita* Franchet, J. Bot. (Morot) 2: 358. 1888.

绒背风毛菊 rong bei feng mao ju

Herbs 20–60 cm tall, perennial. Stem erect, simple or apically few branched, winged, arachnoid and brown floccose. Basal and lower stem leaves petiolate; petiole 3–6 cm; leaf blade ovate-elliptic to elliptic, (3–)6–12 \times 3–7.5 cm, thick, abaxially grayish white and densely tomentose, adaxially green to yellowish green and sparsely white or pale brown floccose, base attenuate and decurrent, margin dentate, apex obtuse. Middle and upper stem leaves elliptic to narrowly elliptic, gradually smaller upward on stem. Capitula several, in a paniculiform or corymbiform synflorescence. Involucre narrowly campanulate to obconic, 6–10 mm in diam. Phyllaries in 5 or 6 rows, yellowish green but usually purple apically, arachnoid, apex long acuminate; outer phyllaries triangular-ovate, ca. 6×1 mm; middle phyllaries narrowly elliptic, $8-9 \times$ ca. 3 mm; inner phyllaries linear, ca. 10×1.5 mm. Corolla blackish purple, ca. 1.5 cm, tube ca. 5 mm, limb ca. 1 cm. Achene cylindrical, ca. 4 mm, glabrous. Pappus pale brown; outer bristles ca. 3 mm, scabrid; inner bristles ca. 1.1 cm. Fl. and fr. Aug–Oct.

- Montane meadows, trailsides; 3000–3900 m. NW Yunnan (Binchuan, Eryuan, Lijiang).

278. *Saussurea platypoda* Handel-Mazzetti, Symb. Sin. 7: 1152. 1936.

川南风毛菊 chuan nan feng mao ju

Herbs to 1.1 m tall, perennial. Stem solitary, stout, erect, much branched, winged, densely leafy, with articulate hairs. Basal and lower stem leaves withered at anthesis. Middle and upper stem leaves sessile, narrowly oblong to narrowly elliptic, $3-9 \times 1-2$ cm, abaxially grayish green and densely tomentose, adaxially green and scabrid, base attenuate and decurrent, margin crenate, apex acute. Capitula numerous, in a clustered corymbiform synflorescence at end of branches, shortly pedunculate. Involucre campanulate, 8–10 mm in diam. Phyllaries in ca. 5 rows, arachnoid; outer phyllaries ovate, $3-4 \times$ ca. 2 mm, apex acuminate; middle phyllaries narrowly ovate, $5-8 \times 1-2$ mm; inner phyllaries linear, ca. 10×1 mm, apex obtuse. Receptacle bristles subulate, 4–6 mm. Corolla bluish purple, tube ca.

4 mm. Pappus brown; outer bristles 2–4 mm, scabrid; inner bristles ca. 8 mm. Fl. and fr. Sep–Oct.

- Montane thickets; 2900–3300 m. SW Sichuan (Yanyuan).

279. *Saussurea cauloptera* Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 645. 1937.

翅茎风毛菊 chi jing feng mao ju

Saussurea rosthornii Diels var. *sessilifolia* Diels.

Herbs 50–60 cm tall, perennial. Stem solitary, erect, simple, narrowly winged or wingless. Basal and lower stem leaves withered at anthesis. Middle stem leaves petiolate; petiole winged; leaf blade ovate to elliptic, $7-11 \times 3.5-6$ cm, abaxially grayish white and densely tomentose, adaxially green and slightly scabrid, base cuneate-attenuate to truncate, margin denticulate, apex acute. Capitula 4–10, in a clustered corymbiform synflorescence, shortly pedunculate or sessile. Involucre ovoid, ca. 6 mm in diam. Phyllaries in 4 or 5 rows, brownish, pubescent or arachnoid; outer phyllaries ovate, apex with black mucro; middle phyllaries narrowly ovate-elliptic; inner phyllaries linear. Corolla red, 9–10 mm. Achene ca. 3 mm, glabrous. Pappus pale brown; outer bristles scabrid. Fl. and fr. Sep–Oct.

- Open forests; 1700–3000 m. Chongqing (Nanchuan), Henan, S Shaanxi (Qin Ling).

280. *Saussurea amurensis* Turczaninow ex Candolle, Prodr. 6: 534. 1838.

龙江风毛菊 long jiang feng mao ju

Saussurea amurensis subsp. *stenophylla* (Freyn) Kitamura; *S. stenophylla* Freyn.

Herbs 40–100 cm tall, perennial. Stem solitary, erect, apically branched, narrowly winged, arachnoid or glabrous. Basal leaves long petiolate; leaf blade ovate-elliptic to narrowly ovate-elliptic, $10-30 \times 2-5$ cm, abaxially grayish white or grayish green and densely arachnoid tomentose, adaxially green and glabrous, base cuneate-attenuate, margin denticulate, apex acuminate. Lower and middle stem leaves shortly petiolate or sessile; leaf blade narrowly elliptic to linear, base cuneate-attenuate and decurrent, margin denticulate, apex acuminate. Upper stem leaves sessile, linear, gradually smaller upward on stem, margin entire. Capitula numerous, in a corymbiform synflorescence, shortly pedunculate. Involucre narrowly campanulate, 6–8 mm in diam. Phyllaries in 4 or 5 rows, villous; outer phyllaries purple, ovate, ca. 3×2 mm, apex acuminate to acute; middle phyllaries narrowly elliptic, ca. 7×2 mm, apex acute to subobtusate; inner phyllaries lanceolate to oblong-lanceolate, ca. 10×1.5 mm, apex subobtusate. Corolla pale purple, 1–1.2 cm, tube 5–6 mm, limb 5–7 mm. Achene brown, cylindrical, 3–4 mm, glabrous. Pappus dirty white; outer bristles ca. 1 mm, scabrid; inner bristles 8–10 mm. Fl. and fr. Jul–Sep. $2n = 26, 48, 52, 54$.

- Marshy meadows, meadows, forest margins; 900–1300 m. Heilongjiang, Jilin, Liaoning, Nei Mongol [Korea, Russia (Far East, E Siberia)].

281. *Saussurea bullata* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 8: 206. 1914.

泡叶风毛菊 pao ye feng mao ju

Herbs 5–16 cm tall, perennial, stemless or shortly stemmed. Stem solitary, purple, erect, apically few branched, densely covered with brown articulate hairs. Leaves usually in basal rosette. Rosette and lower stem leaves petiolate; petiole 1–3 cm, densely covered with brown articulate hairs; leaf blade broadly ovate or elliptic to suborbicular, 4–7 × 2–5 cm, abaxially white, densely tomentose, and with brown hairs on veins, adaxially green and with hairs on veins, base rounded, truncate, or slightly cordate, margin dentate, apex rounded. Middle stem leaves sessile, smaller. Capitula 2–8, clustered in a corymbiform synflorescence, shortly pedunculate. Involucre narrowly campanulate, (5–)8–10 mm in diam. Phyllaries in 4–7 rows, blackish purple, villous, apex acuminate; outer phyllaries ovate, 3–5 × 2–3 mm; middle phyllaries narrowly ovate-elliptic, ca. 6 × 3 mm; inner phyllaries narrowly elliptic, ca. 9 × 1.5 mm. Corolla purplish red, 1.2–1.5 cm, glabrous, tube 6–9 mm, limb 5–6 mm, lobes 3–4 mm. Achene grayish, cylindric, transversely rugose, ca. 2 mm, apex with a short crown. Pappus basally brown, apically dirty white; outer bristles scabrid, 1–2 mm, inner bristles 9–10 mm. Fl. and fr. Sep.

• Alpine grasslands, consolidated scree slopes; 3600–4300 m. NW Yunnan (Dêqên, Lijiang, Zhongdian).

282. *Saussurea alpina* (Linnaeus) Candolle, Ann. Mus. Natl. Hist. Nat. 16: 198. 1810.

高山风毛菊 gao shan feng mao ju

Serratula alpina Linnaeus, Sp. Pl. 2: 816. 1753.

Herbs 20–70 cm tall, perennial. Stem solitary, straw-colored to purplish red, erect, apically branched, wingless, sparsely pubescent or subglabrous. Lower and middle stem leaves petiolate; petiole 1–4 cm; leaf blade narrowly elliptic to ovate-elliptic, 8–12(–20) × 0.7–3 cm, abaxially grayish white or grayish green and densely arachnoid tomentose, adaxially green and glabrous, base cuneate-attenuate, margin denticulate, apex acuminate. Upper stem leaves sessile, narrowly elliptic to linear, 1–5 × 0.1–0.5 cm, gradually smaller upward on stem, base slightly amplexicaul, margin entire, apex acuminate. Capitula numerous, in a corymbiform synflorescence, shortly pedunculate. Involucre narrowly campanulate, 6–12 mm in diam. Phyllaries in 4 or 5 rows, greenish but purple apically, glabrous to sparsely villous, apex acute to subobtusate; outer phyllaries ovate-elliptic, ca. 3 × 2 mm; middle phyllaries oblong, ca. 6 × 2 mm; inner phyllaries narrowly ovate-elliptic, ca. 9 × 1.5 mm. Corolla purplish red, 1–1.2 cm, tube ca. 5 mm, limb ca. 7 mm. Achene pale brown, cylindric, 2–3 mm. Pappus basally pale brown, apically white; outer bristles 1–3 mm, scabrid; inner bristles 7–9 mm. Fl. and fr. Aug–Sep. *2n* = 26, 52, 54.

Alpine steppes, rocky slopes, scree slopes; ca. 3000 m. N and W Xinjiang (Altay Shan, Tian Shan) [Kazakhstan, Kyrgyzstan, Mongolia, Russia, Tajikistan; C and N Europe].

283. *Saussurea elliptica* C. B. Clarke ex J. D. Hooker, Fl. Brit. India 3: 372. 1881.

藏新风毛菊 zang xin feng mao ju

Saussurea kuschakewiczii C. Winkler.

Herbs 2–8[–20] cm tall, perennial, almost stemless or

shortly stemmed. Caudex 2–4(–6) mm in diam., long creeping, few branched. Stem solitary, simple, erect to ascending, 1.5–3 mm in diam. Lower and middle stem leaves petiolate; petiole 0.8–4.5 cm; leaf blade ovate to elliptic, 1.5–7 × 0.5–3 cm, both surfaces grayish green, gland-dotted, and arachnoid, base cuneate, attenuate, or subtruncate, margin denticulate, apex acute to acuminate. Uppermost stem leaves linear, subtending synflorescence. Capitula 2–10[–20], in a dense to lax clustered corymbiform synflorescence, subsessile to shortly pedunculate. Involucre obconical to narrowly campanulate, 5–13 mm in diam. Phyllaries in 3 or 4 rows, straw-colored and sometimes tinged with purple, arachnoid tomentose to glabrescent, apex acuminate to subacute; outer phyllaries triangular-ovate, ca. 3 mm wide; middle phyllaries narrowly ovate-elliptic; inner phyllaries narrowly elliptic-linear. Receptacle naked or with few subulate bristles. Corolla pale reddish purple, 1.1–1.6 cm, glandular, tube 5–8 mm, limb 5–8 mm, lobes to 5 mm. Achene brown, 3–5 mm, usually gland-dotted. Pappus white to brownish; outer bristles 1–3 mm; inner bristles 1.1–1.4 cm. Fl. and fr. Aug–Sep.

Alpine grasslands and meadows, moraines, rocky slopes, scree slopes, among rocks; 2500–3700[–4600] m. W Xinjiang (Wuqia) [Kashmir, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan].

284. *Saussurea pseudoalpina* N. D. Simpson, J. Linn. Soc., Bot. 41: 427. 1913.

假高山风毛菊 jia gao shan feng mao ju

Saussurea ambigua Krylov ex Sergievskaya.

Herbs (4–)10–20 cm tall, perennial. Stems solitary or few, erect, simple. Basal and lower stem leaves shortly petiolate; leaf blade ovate-elliptic, 5–20 × 1–3 cm, abaxially grayish green, gland-dotted, and arachnoid, adaxially pale green and subglabrous, base attenuate, margin sparsely denticulate, apex acuminate. Middle and upper stem leaves sessile, elliptic to linear, base not decurrent, margin entire. Capitula 4–12, in a clustered corymbiform synflorescence, shortly pedunculate. Involucre campanulate, (3–)5–8 mm in diam. Phyllaries in 3 or 4 rows, pale or violet-blackish; outer phyllaries ovate to ovate-oblong, pubescent, apex acuminate; inner phyllaries oblong, villous, apex subobtusate. Receptacle bristles ca. 4 mm. Corolla purple, 1.1–1.2 cm, tube 5–6 mm, limb 5–6 mm, lobes ca. 3.5 mm. Achene pale brown with dark brown spots, cylindric, 2–4 mm, glabrous. Pappus dirty white; outer bristles 1.5–4 mm; inner bristles 8–9 mm. Fl. and fr. Jul–Sep.

Stony and saline steppes, saline meadows; below 2900 m. N Xinjiang (Altay Shan) [SE Kazakhstan, Mongolia, Russia (Siberia)].

285. *Saussurea undulata* Handel-Mazzetti, Symb. Sin. 7: 1147. 1936.

波缘风毛菊 bo yuan feng mao ju

Herbs to 1.2 m tall, perennial. Stem solitary, erect, apically branched, wingless, arachnoid and with yellowish brown hairs. Lower stem leaves sessile, oblong to narrowly elliptic, 7–12 × 1.5–4 cm, pinnately lobed, lyrate, or undivided, abaxially grayish green and arachnoid tomentose, adaxially dark green and sparsely strigose, base auriculate and amplexicaul, apex acute; lobes 1–4 pairs, margin denticulate. Middle and upper

stem leaves narrowly elliptic, 5–8 × 1–2 cm, gradually smaller upward on stem, undivided, base rounded, margin subentire, apex acute. Capitula numerous, in a paniculiform or lax corymbiform synflorescence, pedunculate. Involucre narrowly ovoid, 8–10 mm in diam. Phyllaries in 4 or 5 rows, straw-colored but blackish brown apically and near margin, sparsely arachnoid; outer phyllaries ovate, ca. 2 × 1 mm, apex dark mucronate; inner phyllaries narrowly elliptic, to 10 × 1 mm, apex acute to obtuse. Corolla bluish purple, ca. 1 cm, tube 4–5 mm, limb ca. 5 mm, lobes ca. 2 mm. Achene glabrous. Pappus brown; outer bristles ca. 3 mm, scabridulous; inner bristles 9–10 mm. Fl. and fr. Oct.

• Montane thickets and grasslands; 2800–3300 m. SW Sichuan (Yanyuan), NW Yunnan (Lijiang).

286. *Saussurea grosseserrata* Franchet, J. Bot. (Morot) 2: 354. 1888.

粗裂风毛菊 cu lie feng mao ju

Herbs 12–35 cm tall, perennial, sometimes laxly caespitose. Stems solitary or several, erect, simple, arachnoid. Basal and lower stem leaves petiolate; petiole 2–10 cm; leaf blade obovate, narrowly obovate, or narrowly elliptic, (1.5–)4.5–11 × 0.9–5 cm, both surfaces pale green and sparsely arachnoid, base cuneate to attenuate, margin coarsely dentate to pinnately lobed, apex rounded, obtuse, or subacute and mucronate. Middle and upper stem leaves few, petiolate; leaf blade narrowly elliptic to linear, gradually smaller upward on stem, margin triangular-dentate to entire. Capitulum solitary, terminal on stem. Involucre campanulate, 1–1.5(–2) cm in diam. Phyllaries in 4–6 rows, blackish purple, arachnoid; outer phyllaries elliptic, ca. 12 × 4–6 mm, apex long acuminate; middle phyllaries narrowly elliptic, ca. 1.8 × 0.4–0.5 cm, apex obtuse; inner phyllaries narrowly elliptic to linear, ca. 1.8 × 0.2 cm, apex caudate-acuminate. Corolla blackish purple to bluish purple, 1.2–1.5 cm, tube 3–6 mm, limb ca. 9 mm. Achene brown, cylindrical, ca. 5 mm, glabrous. Pappus pale brown; outer bristles ca. 1 mm, scabrid; inner bristles ca. 1.2 cm. Fl. and fr. Aug–Oct.

• *Rhododendron* thickets, alpine grasslands, consolidated scree slopes; 2300–4000 m. NW Yunnan (Dali, Lijiang, Zhongdian).

287. *Saussurea pratensis* J. Anthony, Notes Roy. Bot. Gard. Edinburgh 18: 210. 1934.

草原雪莲 cao yuan xue lian

Herbs to 30 cm tall, perennial. Stem solitary, erect, simple, densely yellowish white villous, covered at base with brown residue of petioles. Lower stem leaves petiolate; petiole 3–6 cm; leaf blade oblong, broadly linear, or narrowly elliptic, 15–18 × 1–1.2 cm, sparsely yellowish white villous, base attenuate, margin sinuate and sparsely denticulate, apex obtuse. Middle stem leaves sessile, narrowly ovate-elliptic, to 11 × 0.5 cm, margin entire. Upper stem leaves sessile, narrowly ovate-elliptic to linear, 1.3–6 × ca. 0.2 cm, base amplexicaul, apex acuminate. Capitulum solitary, terminal on stem. Involucre hemispheric, ca. 1.3 cm in diam. Phyllaries in 4 rows, purplish red, densely yellowish white villous, apex acuminate; outer phyllaries narrowly oblong-elliptic, ca. 14 × 4 mm; middle phyllaries narrowly ovate-elliptic, ca. 1.7 × 0.3 cm; inner phyllaries

narrowly triangular-linear, ca. 18 × 1–2 mm. Corolla purplish red, ca. 1.7 cm, tube ca. 1 cm, limb ca. 7 mm. Achene pale brown, oblong, ca. 3.5 mm. Pappus pale brown; outer bristles ca. 3 mm; inner bristles ca. 1 cm. Fl. and fr. Jul–Sep.

• Forest margins, montane meadows; 2000–3100 m. NW Yunnan (Dali, Lijiang).

Saussurea pratensis was erroneously placed in *S.* subg. *Amphilaena* by Lipschitz (Rod *Saussurea*, 64. 1979) and by C. Shih and S. Y. Jin (FRPS 78(2): 30. 1999), but it does not show the colored bracts typical for that subgenus.

288. *Saussurea tunglingensis* F. H. Chen, Bull. Fan Mem. Inst. Biol., Bot. 5: 85. 1934.

卷苞风毛菊 juan bao feng mao ju

Saussurea sclerolepis Nakai & Kitagawa; *S. sclerolepis* f. *pinnatipartita* Nakai & Kitagawa.

Herbs 10–60 cm tall, perennial. Stems solitary or few, erect, simple or few branched, sparsely strigose or glabrous. Basal and lower stem leaves petiolate; petiole 5–14 cm, winged; leaf blade ovate to narrowly ovate-elliptic, 5–15 × 2–5 cm, both surfaces green and glabrous, base cuneate, subtruncate, or cordate, margin sinuate-dentate, apex acuminate. Middle and upper stem leaves sessile or with a narrowly winged short petiole; leaf blade narrowly elliptic, base truncate to cordate-sagittate, apex acuminate. Capitulum solitary, terminal on stem or few in a lax corymbiform synflorescence, pedunculate. Involucre broadly campanulate, (1–)1.5–2(–2.5) cm in diam. Phyllaries in 6 or 7 rows, apically purple, apex acuminate and reflexed; outer phyllaries ovate to ovate-triangular, ca. 4 × 4 mm; middle phyllaries narrowly ovate-elliptic, ca. 1.7 × 0.4 cm; inner phyllaries narrowly elliptic to linear, ca. 1.8 × 0.3 cm, apex obtuse. Corolla purplish red, 1.5–1.8 cm, tube ca. 8 mm, limb ca. 1 cm. Achene pale brown, obconic, 5–5.5 mm, ribbed, glabrous. Pappus dirty white; outer bristles to 6 mm, scabrid; inner bristles ca. 1.5 cm. Fl. and fr. Jul–Sep.

• Montane grasslands, forest margins, ravines; 1700–1900 m. Hebei, Liaoning, Nei Mongol.

Saussurea sclerolepis was published in November 1934, whereas *S. tunglingensis* was published in May of the same year.

289. *Saussurea recurvata* (Maximowicz) Lipschitz, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 21: 374. 1961.

折苞风毛菊 zhe bao feng mao ju

Saussurea elongata Candolle var. *recurvata* Maximowicz, Mém. Acad. Imp. Sci. St.-Petersbourg Divers Savans 9: 167. 1859; *S. parasclerolepis* A. I. Baranov & Skvortsov; *S. recurvata* var. *angustata* H. C. Fu; *S. sclerolepis* Nakai & Kitagawa var. *parasclerolepis* (A. I. Baranov & Skvortsov) C. Y. Li.

Herbs 40–100 cm tall, perennial. Stems solitary or several, erect, simple, glabrous. Basal and lower stem leaves petiolate; petiole 3–7 cm; leaf blade narrowly triangular-ovate to narrowly triangular-hastate, (3–)10–15 × (2–)2.5–6 cm, thick, pinnately lobed, both surfaces green to grayish green, thick, abaxially sparsely pubescent, adaxially sparsely strigose, base hastate to truncate, apex acute to acuminate; lateral lobes unequally

incised, dentate, or denticulate, rarely entire. Middle stem leaves shortly petiolate, smaller; leaf blade pinnately divided or dentate. Upper stem leaves sessile, narrowly elliptic to linear, smaller, undivided. Capitula 3–5, in a clustered corymbiform synflorescence, shortly pedunculate. Involucre campanulate, 1–1.5 cm in diam. Phyllaries in 5–7 rows; outer phyllaries ovate, apex long acuminate and usually reflexed; middle phyllaries narrowly ovate-elliptic, apex acute and mucronate; inner phyl-

laries usually purple, linear, apex acute to obtuse. Corolla purple, 1.2–1.5 cm, tube 6–8 mm, limb 6–7 mm. Achene cylindrical, 4–5 mm, glabrous. Pappus dirty white; outer bristles 2–3 mm, scabrid; inner bristles ca. 1 cm. Fl. and fr. Jul–Sep. $2n = 26$.

Forest margins, thickets, grasslands; 1000–2900 m. Gansu, Heilongjiang, Jilin, ?Liaoning, Nei Mongol, Ningxia, ?Qinghai, Shaanxi [Korea, Mongolia, Russia (Far East)].

2. ARCTIUM group

牛蒡群 niu bang qun

Shi Zhu (石铸 Shih Chu); Werner Greuter

Herbs, biennial or perennial. Capitula homogamous, bisexual. Phyllaries ending in a straight, recurved, or hooked spine. Receptacle densely covered with long bristles. Florets bisexual. Corolla \pm actinomorphic. Stamen filaments distinct, glabrous or papillose. Style branches distinct and divergent. Achene glabrous; apical rim \pm inconspicuous, sometimes denticulate, not forming a crown; apical plate flat. Pappus of scabrid bristles not basally connate into a ring, falling off singly, or sometimes lacking.

About four genera and ca. 700 species: NW Africa, Asia, Europe; three genera and 14 species (two endemic) in China.

- 1a. Outer and middle phyllaries ending in a hooked spine 25. *Arctium*
- 1b. Outer and middle phyllaries ending in a straight or recurved spine.
 - 2a. Capitula glabrous to cobwebby, when in clusters not surrounded by leaflike lanate bracts 23. *Cousinia*
 - 2b. Capitula densely lanate, in clusters surrounded by leaflike lanate bracts 24. *Schmalhausenia*

23. COUSINIA Cassini in F. Cuvier, Dict. Sci. Nat. 47: 503. 1827.

刺头菊属 ci tou ju shu

Shi Zhu (石铸 Shih Chu); Werner Greuter

Herbs, biennial or perennial. Leaves divided or undivided, margin spiny or spinulose. Capitula 1 to many, forming a racemose, paniculate, or corymbose synflorescence, or solitary, glabrous to cobwebby. Involucre spherical to cylindrical. Phyllaries imbricate, leathery, ending in a spine. Stamen filaments glabrous; anther with \pm lacerate basal appendages. Style branches short to long, apex acute. Achene obovoid to obconic, laterally compressed, with (2–)4 or 5 raised ribs, rugose, apex \pm rimmed; rim sometimes denticulate. Pappus rarely absent, when present bristles in ca. 3 rows, outer ones much shorter than inner.

About 600 species: C, S, and SW Asia; 11 species (two endemic) in China.

- 1a. Stems winged.
 - 2a. Corolla yellow.
 - 3a. Involucre 1.2–1.5 cm in diam.; leaves \pm leathery 1. *C. dissecta*
 - 3b. Involucre 0.6–0.9 cm in diam.; leaves thinly papery 2. *C. alata*
 - 2b. Corolla red to purple.
 - 4a. Involucre 1.2–1.5 cm in diam., glabrous; phyllaries green; leaves undivided 3. *C. leioccephala*
 - 4b. Involucre 1.5–2 cm in diam., densely cobwebby; phyllaries grayish white; basal and lower cauline leaves pinnately lobed 4. *C. platylepis*
- 1b. Stems unwinged.
 - 5a. Corolla white or yellow.
 - 6a. Involucre spherical to ovoid, 1.5–2 cm in diam.; corolla white 5. *C. affinis*
 - 6b. Involucre narrowly ellipsoid to cylindrical, 0.6–0.8 cm in diam.; corolla yellow 6. *C. polyccephala*
 - 5b. Corolla purplish red.
 - 7a. Stems unbranched; capitulum solitary.
 - 8a. Involucre 4–4.5 cm in diam.; leaf segments broadly ovate 8. *C. sclerolepis*
 - 8b. Involucre 1.5–2 cm in diam.; leaf segments triangular to triangular-lanceolate 9. *C. caespitosa*
 - 7b. Stems branched; capitula several.
 - 9a. Leaves undivided 7. *C. lasiophylla*
 - 9b. Basal and lower cauline leaves pectinately divided into needle-shaped segments.
 - 10a. Capitula 4 or 5; terminal spine of leaf segments 5–10 mm 10. *C. falconeri*
 - 10b. Capitula numerous; terminal spine of leaf segments ca. 4 mm 11. *C. thomsonii*

1. Cousinia dissecta Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 391. 1842.

深裂刺头菊 shen lie ci tou ju

Arctium dissectum (Karelin & Kirilov) Kuntze.

Herbs 25–35 cm tall, biennial. Stems erect, apically branched, densely cobwebby; wings 2–4(–10) mm wide, with spiny teeth. Leaves ± leathery, abaxially grayish white and densely cobwebby-felted, adaxially grayish green and densely cobwebby. Basal and lower cauline leaves shortly petiolate, bipinnatisect. Middle cauline leaves sessile, bipinnatisect or pinnatisect; uppermost cauline leaves narrowly lanceolate, less divided. Capitula broadly ovoid. Involucre 1.2–1.5 cm in diam. Outer and middle phyllaries falcately recurved in distal half, apex narrowed into a spine to 3 mm; inner phyllaries narrowly lanceolate, margin ciliate, apex long acuminate. Corolla yellow. Achene ca. 5 × 1.5–2 mm, 4-ribbed, ribs apically prolonged into a tooth. Fl. and fr. May–Aug.

Sandy areas adjacent to sand dunes. NW Xinjiang [Kazakhstan].

No material of *Cousinia dissecta* was seen by the present authors. The description here is based on the original publication and the treatments by Tscherneva (Fl. URSS 27: 160. 1962) and G. M. Shen (Fl. Xinjiang. 5: 300. 1999).

2. Cousinia alata Schrenk ex Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 40. 1841.

翼茎刺头菊 yi jing ci tou ju

Herbs 50–90 cm tall, perennial. Stems erect, freely branched, glabrous; wings with spiny teeth. Leaves thinly papery, sparsely cobwebby. Basal and lower cauline leaves sessile, lanceolate to elliptic, ca. 12 × 4 cm, bipinnatifid; ultimate lobes triangular to narrowly ovate, margin entire, apex with a 1–1.5 mm spine. Middle cauline leaves similar or pinnatifid; upper cauline leaves gradually smaller upward, pinnately lobed or toothed. Capitula many, corymbose to paniculate. Involucre ovoid, 6–9 mm in diam., sparsely cobwebby. Phyllaries in ca. 9 rows; outer and middle phyllaries ± narrowly lanceolate, 4–7 × ca. 1 mm, apex narrowed into a patent or ± recurved 1.5–3 mm spine; inner phyllaries lanceolate-elliptic, 8–10 × 1–1.5 mm, apex narrowed into a spine ca. 3 mm. Corolla yellow, ca. 8 mm. Mature achene unknown. Pappus short. Fl. Jul.

Slopes, sandy places; 500–700 m. Xinjiang (Tian Shan part of Junggar Pendi) [Kazakhstan, Uzbekistan].

3. Cousinia leioccephala (Regel) Juzepczuk, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 3: 314. 1937.

光苞刺头菊 guang bao ci tou ju

Cousinia sewertzowii Regel var. *leioccephala* Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 6: 314. 1880.

Herbs 30–60 cm tall, biennial. Stems solitary, grayish white, erect, apically or sometimes basally branched, densely cobwebby; wings 4–6 mm wide, teeth with 0.5–1.5 mm terminal spines. Leaves thinly papery, concolorous, green to grayish green, sparsely cobwebby. Basal leaves sessile, undivided, lan-

ceolate to broadly lanceolate, margin with spiny teeth. Middle and upper cauline leaves sessile, lanceolate, 2.5–3.5 × 0.7–1.5 cm, margin spinulose and toothed, teeth with apical spines. Capitula 9–12. Involucre campanulate, 1.2–1.5 cm in diam., glabrous. Phyllaries in ca. 12 rows, green; outer and middle phyllaries triangular-subulate to linear-subulate, 5–10 × ca. 1 mm, apex narrowed into a recurved spine 0.5–2 cm; inner phyllaries linear, ca. 12 × 1 mm, abaxially strigose, margin with short cilia, apex expanded and scarious. Corolla purplish red, ca. 1.2 cm, tube 4–4.5 mm. Achene pale grayish brown variegated with dark brown, obovoid, ca. 3 mm, multistriate. Fl. and fr. Jun–Aug.

Slopes; 1100–1800 m. Xinjiang (Tian Shan) [Uzbekistan].

4. Cousinia platylepis Fischer, C. A. Meyer & Avé-Lallemant, Index Sem. Hort. Petrop. 9(Suppl.): 10. 1844.

宽苞刺头菊 kuan bao ci tou ju

Arctium platylepis (Fischer, C. A. Meyer & Avé-Lallemant) Kuntze.

Herbs 30–80 cm tall, biennial. Stems erect, grayish white cobwebby-felted; wings 3–4 mm wide, with spiny teeth. Leaves concolorous, grayish white, densely cobwebby-felted. Basal and lower cauline leaves sessile, lanceolate, pinnately lobed. Upper cauline leaves sessile, lanceolate, 2–2.5 × 1–1.5 cm, margin spiny or toothed, teeth spiny laterally and narrowed into a 0.5–3 mm spine; uppermost cauline leaves elliptic to ovate, ca. 10 × 4–5 mm, margin entire. Capitula several. Involucre broadly campanulate, 1.5–2 cm in diam., densely cobwebby. Phyllaries in ca. 7 rows, grayish white; outer and middle phyllaries triangular, triangular-lanceolate, or elliptic, 3–10 × 1–3 mm, apex narrowed into a ca. 2 mm spine; inner phyllaries elliptic, ca. 11 × 3 mm, apex rigid, expanded, scarious, and mucronulate; innermost phyllaries broadly linear, ca. 14 × 2 mm, apex obtuse to rounded. Corolla red, ca. 1.2 cm, tube ca. 5 mm. Achene yellowish, ellipsoid, ca. 1.8 mm, multistriate. Fl. and fr. May–Aug.

Slopes; 1200–2000 m. NW Xinjiang [Kazakhstan, Uzbekistan].

5. Cousinia affinis Schrenk ex Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 41. 1841.

刺头菊 ci tou ju

Arctium affine (Schrenk ex Fischer & C. A. Meyer) Kuntze; *Cousinia wolgensis* (M. Bieberstein ex Willdenow) C. A. Meyer ex Candolle var. *affinis* (Schrenk ex Fischer & C. A. Meyer) Regel.

Herbs 15–40 cm tall, perennial. Rootstock thick, densely cottony and covered with petiole remains. Stems erect, unbranched or apically branched, unwinged, thickly grayish white felted to glabrescent or glabrous. Leaves abaxially grayish white and thickly felted, adaxially green and sparsely cobwebby. Basal leaves with a brown winged petiole; leaf blade elliptic to oblanceolate, 8–12 × 2–4 cm, margin toothed or lobed; teeth or lobes ± broadly ovate to semiorbicular, margin with 0.5–1 mm spinules, apex with 2.5–5 mm spine. Lower and middle cauline leaves sessile, gradually smaller, base auriculate

and semiamplexicaul, otherwise similar to basal leaves or \pm narrowly ovate, smallest uppermost ones ovate. Capitula several. Involucre globose to ovoid, 1.5–2 cm in diam., glabrous or sparsely cobwebby. Phyllaries in ca. 9 rows; outer and middle phyllaries subulate, ovate-elliptic or ovate, 8–12 \times 2–3 mm, margin ciliate, apex abruptly constricted into a recurved 4–5 mm spine; inner phyllaries elliptic to broadly linear, ca. 15 \times 2–2.5 mm, apex narrowed into a short spine; innermost phyllaries oblanceolate, ca. 18 \times 2 mm, abaxially strigose, margin with short cilia, apex with a short spine. Corolla white, ca. 2.3 cm, tube ca. 5 mm. Achene narrowly obovoid, ca. 4 mm, 4-ribbed, ribs apically prolonged into a tooth. Fl. and fr. Jun–Sep.

Deserts, dunes; 400–800 m. Xinjiang (Junggar Pendi) [Kazakhstan, Mongolia].

6. Cousinia polycephala Ruprecht, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 14(4): 54. 1869.

多花刺头菊 duo hua ci tou ju

Arctium polycephalum (Ruprecht) Kuntze.

Herbs to 1 m tall, perennial. Stems erect, branched from middle or apically, unwinged, cobwebby. Leaves leathery, abaxially grayish white and sparsely to thickly felted, adaxially green and sparsely cobwebby. Basal leaves petiolate; leaf blade elliptic-lanceolate, 15–50 \times 5–11 cm, pinnatisect; segments triangular, margin with spiny teeth. Lower cauline leaves similar to basal leaves but sessile and smaller. Capitula many, corymbose. Involucre narrowly ellipsoid to cylindrical, 6–8 mm in diam., cobwebby. Phyllaries in 3 or 4 rows; outer phyllaries 4–5 mm, apex narrowed into a short spine; middle phyllaries narrowly ovate to narrowly lanceolate, ca. 3 \times as long as outer ones, apex narrowed into a long spine; inner phyllaries linear. Corolla yellow. Achene obconic, 4–5 mm, 3- or 4-ribbed, ribs apically prolonged into a tooth. Fl. and fr. Jul–Aug. $2n = 24$.

Rocky slopes in mountains. Xinjiang (W Tian Shan) [Tajikistan].

No material of *Cousinia polycephala* from China was seen by the present authors, and the description here is based on the treatment by Tscherneva (Fl. URSS 27: 206. 1962).

7. Cousinia lasiophylla C. Shih, Bull. Bot. Res., Harbin 4(2): 59. 1984.

丝毛刺头菊 si mao ci tou ju

Herbs to 40 cm tall, biennial. Stems erect, unwinged; branches purplish red, long, striate, sparsely felted to glabrescent. Leaves abaxially grayish green and sparsely cobwebby-felted, adaxially green and sparsely cobwebby. Middle cauline leaves sessile, oblong-elliptic, 9.5–14.5 cm, undivided, margin with 0.5–1.5 mm spines or teeth with curved 2.5–5 mm spines, apex narrowed into a rigid spine. Upper cauline leaves ovate, ovate-lanceolate, or elliptic, 4.5–6 \times 3.5–4 cm, margin spiny or with laterally and apically spiny teeth; uppermost leaves oblanceolate, ca. 4 \times 1 cm, margin entire and unarmed. Capitula several. Involucre broadly campanulate, 4.5–5 cm in diam., fluffily cobwebby. Phyllaries in ca. 7 rows; outer and middle phyllaries triangular-lanceolate, 2.6–3.2 \times 0.5–0.6 cm, leathery, with a medial abaxial ridge, apex with a triquetrous rigid 3–5 mm spine; inner and innermost phyllaries elliptic-lanceolate, linear,

or narrowly linear, 2.5–2.8 \times 0.1–0.3 cm, rigid, apex scarious and acuminate to acute. Corolla purplish red, ca. 2.2 cm, tube ca. 1 cm. Achene variegated with brown, obovoid, ca. 5 mm. Fl. and fr. Jul.

• Grasslands on mountain slopes; 3000–3200 m. W Xinjiang (Wuqia).

8. Cousinia sclerolepis C. Shih, Bull. Bot. Res., Harbin 4(2): 60. 1984.

硬苞刺头菊 ying bao ci tou ju

Herbs to 30 cm tall, biennial. Stems purplish red, tufted, erect, unbranched, unwinged, densely fluffily cobwebby. Leaves papery, \pm concolorous, grayish green, sparsely cobwebby. Basal leaves with petiole ca. 6 cm; leaf blade elliptic, ca. 12 \times 6 cm, pinnatifid or pinnatipartite; segments 5 or 6 pairs, broadly ovate, margin with 3–7 unequal teeth with 3–6 mm lateral spines, apical spine to 1 cm. Cauline leaves similar to basal leaves but sessile; upper cauline leaves lanceolate, smaller. Capitulum 1. Involucre broadly campanulate, 4–4.5 cm in diam., fluffily cobwebby. Phyllaries in 6 or 7 rows; outer and middle phyllaries elliptic-subulate to lanceolate-subulate, 1.8–3.3 \times 0.3–0.4 cm, rigid, leathery, with a medial abaxial ridge, apex narrowed into a rigid triquetrous spine; inner and innermost phyllaries oblanceolate to broadly linear, ca. 2.3 \times 0.2–0.3 cm, rigid, apex scarious, yellowish, and slightly expanded. Corolla purplish red, ca. 2 cm, tube ca. 1.2 cm. Achene pale, obliquely obovoid, ca. 5 mm, darkly striate. Pappus absent. Fl. and fr. Jul.

• Mountain slopes; ca. 3200 m. W Xinjiang (Wuqia).

9. Cousinia caespitosa C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 10: 93. 1887.

丛生刺头菊 cong sheng ci tou ju

Herbs 8–14 cm tall, perennial. Rootstock well developed. Stems many, tufted, unbranched, unwinged, cobwebby. Leaves \pm concolorous, grayish white, sparsely cobwebby. Basal leaves with winged petiole 1–2 cm; leaf blade elliptic, 1–2 \times 0.8–1.3 cm, pinnatisect; segments 4–6 \pm opposite pairs, triangular to triangular-lanceolate, patent at right angle, margin revolute, apical spine 1–2 mm. Cauline leaves few, similar to basal leaves but smaller, sessile. Capitulum 1. Involucre bowl-shaped, 1.5–2 cm in diam., sparsely cobwebby. Phyllaries in ca. 5 rows, abaxially purplish red; outer and middle phyllaries triangular, 5–12 \times 1.5–2 mm, apex narrowed into a 1.5–2 mm spine; inner phyllaries broadly linear, ca. 15 \times 1 mm, apex acuminate. Corolla purplish red, ca. 1.2 cm, tube ca. 9 mm. Achene brown, ca. 5.5 mm, ribs apically prolonged into a tooth. Fl. and fr. Jul–Sep.

Rocky mountain slopes; ca. 3200 m. W Xinjiang (Wuqia) [Kazakhstan].

10. Cousinia falconeri J. D. Hooker, Fl. Brit. India 3: 360. 1881.

穗花刺头菊 sui hua ci tou ju

Herbs 30–100 cm tall, biennial. Stems grayish white, erect, apically branched, unwinged, felted. Leaves leathery, abaxially grayish white and densely felted, adaxially green to yellowish

green and glabrous. Basal leaves with petiole ca. 3 cm; leaf blade ca. 10 × 5 cm, ± pinnatisect; segments needle-shaped, patent at right angle, margin entire and revolute, midvein thick and abaxially raised, apex narrowed into a yellow rigid 5–10 mm spine. Cauline leaves similar to basal leaves but sessile; upper cauline leaves lanceolate, smaller, semiamplexicaul. Capitula spicate by 4 or 5 near apex of stem and branches. Involucre subglobose, 3–5 cm in diam., densely and fluffily cobwebby. Phyllaries in ca. 9 rows, rigid, leathery; outer and middle phyllaries lanceolate, 1.9–2.2 cm × ca. 0.4 mm, apex narrowed into a straight 2–4 mm spine; inner phyllaries narrowly lanceolate, 1.8–2 × ca. 0.3 cm, apex narrowed into a ca. 2.5 mm spine. Corolla purplish red. Mature achene unknown. Fl. Jun.

Slopes, gravelly places in flooded lands; 4100–4400 m. W Xizang [India, Pakistan].

11. Cousinia thomsonii C. B. Clarke, Compos. Ind. 213. 1876.

毛苞刺头菊 mao bao ci tou ju

Herbs 30–80 cm tall, biennial. Rootstock covered with

petiole remains. Stems grayish white, erect, apically branched, unwinged, thickly cobwebby-felted. Leaves leathery, abaxially grayish white and thickly felted, adaxially green and glabrous. Basal and lower cauline leaves with a brown winged petiole; leaf blade elliptic to oblanceolate, 12–13 × 3–3.5 cm, pinnatisect; segments 6–11 pairs, needle-shaped to triangular-subulate, patent at right angle, margin entire and revolute, midvein thick and abaxially raised, apex narrowed into a rigid ca. 4 mm spine. Middle cauline leaves sessile, similar to lower ones or lanceolate to elliptic-lanceolate, semiamplexicaul. Capitula many. Involucre subspherical, 3–4 cm in diam., densely and fluffily cobwebby. Phyllaries in ca. 9 rows, rigid, leathery, abaxially purplish red; outer phyllaries triangular, 1.8–2.3 × 0.4–0.5 cm, apex narrowed into a rigid 3–4 mm spine; middle and inner phyllaries lanceolate, ca. 2.3 × 0.2–0.4 cm, apex narrowed into a 1.5–2.5 mm spine. Corolla purple to pink, ca. 1.4 cm, tube ca. 7 mm. Achene brown, obovoid, ca. 5 mm, 1-ribbed on each side. Fl. and fr. Jul–Sep.

Grasslands, gravelly places in flooded lands; 3700–4300 m. S Xizang [India, Nepal, Pakistan].

24. SCHMALHAUSENIA C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 12: 281. 1892.

虎头蓟属 hu tou ji shu

Shi Zhu (石铸 Shih Chu); Werner Greuter

Herbs, perennial. Leaves bipinnatisect, with spiny lobes. Capitula many, clustered at apex of stem, surrounded by leaflike densely lanate bracts. Involucre campanulate, densely and fluffily lanate. Phyllaries imbricate, apex a long spine. Stamen filaments minutely papillose; anther with short, lacerate basal appendages. Achene obovoid, laterally compressed, with 4–6 ribs each ending in a small tooth, rugose, apex with a denticulate rim. Pappus of ca. 3 rows of bristles, outer ones much shorter than inner.

One species: China, Kazakhstan.

1. Schmalhausenia nidulans (Regel) Petrak, Allg. Bot. Z. Syst. 20: 117. 1914.

虎头蓟 hu tou ji

Cirsium nidulans Regel, Bull. Soc. Imp. Naturalistes Moscou 40(3–4): 160. 1867; *Arctium eriophorum* (Regel & Schmalhausen) Kuntze; *Carduus horridus* (Ruprecht) B. Fedtschenko (1912), not Adams (1805); *Cousinia eriophora* Regel & Schmalhausen; *Jurinea horrida* Ruprecht; *Schmalhausenia eriophora* (Regel & Schmalhausen) C. Winkler.

Herbs to 25 cm tall. Stem solitary, erect, thick, hollow, unbranched, densely and fluffily cobwebby-felted, base covered

with petiole remains. Leaves concolorous, grayish white or grayish green, densely and fluffily villous. Basal leaves petiolate; leaf blade elliptic-oblanceolate, 35–40 × 10–14 cm; ultimate lobes lanceolate, apex narrowed into a long spine. Cauline leaves similar but sessile, smaller, sometimes narrowly elliptic. Capitula 5–10. Involucre 2.2–4 cm in diam. Phyllaries in 3 or 4 rows, narrowly lanceolate, apex narrowed into a long subulate spine; outer and middle phyllaries abaxially brown villous. Corolla purple. Achene ca. 5 mm, wrinkled, ribs prolonged into a small tooth. Pappus bristles brown, to 1.3 cm, unequal. Fl. and fr. Jul–Sep.

Meadows; ca. 3600 m. NW Xinjiang [Kazakhstan].

25. ARCTIUM Linnaeus, Sp. Pl. 2: 816. 1753.

牛蒡属 niu bang shu

Shi Zhu (石铸 Shih Chu); Werner Greuter

Bardana Hill; *Lappa* Scopoli.

Herbs, biennial [or perennial]. Leaves simple, margin sparsely denticulate to subentire. Capitula many, glabrous or cobwebby, forming a corymbose [or racemose] synflorescence. Phyllaries (except sometimes innermost) narrowed into a slender hooked spine. Stamen filaments papillose; anther with subentire to lacerate basal appendages. Style branches linear. Achene obovoid to narrowly ellipsoid, laterally compressed, rugose, striate or ribbed, apex inconspicuously rimmed. Pappus of ca. 3 rows of bristles, outer ones very short.

Eleven species: N Africa, Asia, Europe; two species in China.

- 1a. All phyllaries narrowed into a slender hooked spine; involucre minutely glandular pubescent but not cobwebby 1. *A. lappa*
 1b. Inner phyllaries apically expanded into a dark purple ± truncate appendage; involucre ± densely cobwebby 2. *A. tomentosum*

1. *Arctium lappa* Linnaeus, Sp. Pl. 2: 816. 1753.

牛蒡 niu bang

Arctium leiospermum Juzepczuk & Ye. V. Sergievskaja; *A. majus* Bernhardt, nom. illeg. superfl.; *Lappa major* Gaertner, nom. illeg. superfl.; *L. vulgaris* Hill.

Herbs to 2 m tall, biennial. Stem purplish, erect, stout, apically branched, sparsely cobwebby; branches ascending. Leaves abaxially grayish white or pale green and thinly felted, adaxially green, sparsely strigose, and yellow gland-dotted. Basal leaves with petiole ca. 32 cm; leaf blade broadly heart-shaped, ca. 30 × 21 cm, margin entire and repand to mucronulate denticulate. Cauline leaves similar to basal leaves or ovate; uppermost cauline leaves ovate to shallowly cordate, smaller. Capitula few to many, ± corymbose. Involucre ovoid, 1.5–2 cm in diam., glabrous except for minute glandular hairs. Phyllaries all with a hooked apex; outer phyllaries triangular to lanceolate-subulate, ca. 15 × 1 mm; middle and inner phyllaries lanceolate to linear-subulate, ca. 15 × 1.5–3 mm. Corolla purplish red, ca. 1.4 cm, tube ca. 8 mm. Achene pale brown variegated with dark brown or concolorous, narrowly sometimes obliquely obovoid, 5–7 mm, multistriate. Pappus bristles to 3.5 mm. Fl. and fr. Jun–Sep. $2n = 18, 34, 36$.

Near villages, roadsides, near rivers, wet and waste places, forest margins, thickets, valleys, slopes; 700–3500 m. Throughout China except for Hainan, Taiwan, and Xizang [Afghanistan, Bhutan, India, Japan, Nepal, Pakistan; SW Asia, Europe].

Arctium lappa is cultivated almost throughout China. The achenes and roots are used medicinally.

2. *Arctium tomentosum* Miller, Gard. Dict., ed. 8, *Arctium* no. 3. 1768.

毛头牛蒡 mao tou niu bang

Lappa tomentosa (Miller) Lamarck.

Herbs to 2 m tall, biennial. Stem erect, branched, sparsely cobwebby; branches ascending. Leaves abaxially grayish white and densely felted, adaxially green and glabrous. Basal leaves petiolate; leaf blade heart-shaped, 25–50 × 10–30 cm, margin sparsely denticulate, teeth spinulose or mucronulate, apex acute to obtuse and mucronulate. Cauline leaves similar to basal leaves; uppermost cauline leaves sessile, ovate to ovate-elliptic. Capitula few to many, ± corymbose. Involucre ovoid, 1.5–2 cm in diam., ± densely cobwebby. Outer phyllaries subulate, triangular-subulate, or lanceolate, ca. 6 × 1 mm; middle phyllaries linear-subulate, 10–14 × ca. 2 mm, all with a hooked apex; inner phyllaries lanceolate to linear-lanceolate, apex acuminate. Corolla purplish red, 0.9–1.2 cm, tube 4.5–6 mm. Achene pale brown variegated with dark brown, narrowly obovoid, ca. 5.6 mm, multistriate. Pappus bristles pale brown, ca. 3 mm. Fl. and fr. Jul–Sep.

Grasslands; 1200–2100 m. Xinjiang (Tian Shan) [Kazakhstan, Kyrgyzstan, Russia, Tajikistan, Uzbekistan; Europe].

The above description of Chinese plants does not match typical *Arctium tomentosum*, which, as mentioned in the key, is characterized by inner phyllaries with a dark purple, expanded, truncate apical portion. The identity of the plant in Xinjiang requires confirmation.

3. ONOPORDUM group

大翅蓟群 da chi ji qun

Shi Zhu (石铸 Shih Chu); Werner Greuter

Herbs, biennial or perennial. Capitula homogamous, bisexual. Phyllaries pointed, often ending in a straight or recurved spine. Receptacle densely covered with bristles or naked and alveolate. Florets bisexual. Corolla ± actinomorphic. Stamen filaments distinct, glabrous or papillose. Style branches coherent for most of their length. Achene glabrous; apical rim sometimes inconspicuous but usually forming a low to prominent ± denticulate (rarely entire) crown; apical plate flat or with a conic to rarely cylindrical sclerenchymatous non-oleaginous body. Pappus of scabrid, barbellate, or plumose bristles basally connate into a ring, falling off together, rarely with an inner row of narrow scales.

Nine genera and ca. 90 species: N Africa, Asia, Europe; seven genera (one endemic) and 17 species (five endemic) in China.

- 1a. Receptacle naked and alveolate 31. *Onopordum*
 1b. Receptacle covered with bristles.
 2a. Outer pappus of filiform bristles and inner pappus of narrow scales ending in a barbellate subulate tip 30. *Syreitschikovia*
 2b. Pappus (when present) of bristles only.
 3a. Pappus bristles plumose 32. *Ancathia*
 3b. Pappus bristles scabrid or barbellate.
 4a. Corolla yellow.
 5a. Plants stemless; capitula basal, shortly pedunculate, in center of leaf rosette 29. *Xanthopappus*
 5b. Plants caulescent; capitula terminal on stem and branches 27. *Alfredia*
 4b. Corolla purple, red, blue, or rarely white.
 6a. Basal and lower cauline leaves heart-shaped to triangular-sagittate, undivided 26. *Synurus*
 6b. Basal and lower cauline leaves linear to elliptic, ± deeply pinnately divided 28. *Olgaea*

26. SYNURUS Iljin, Bot. Mater. Gerb. Glavn. Bot. Sada S.S.S.R. 6: 35. 1926.

山牛蒡属 shan niu bang shu

Shi Zhu (石铸 Shih Chu); Werner Greuter

Herbs, perennial. Leaves heart-shaped to triangular-sagittate, undivided or sometimes pinnately divided, margin toothed or merely spinulose denticulate. Capitula large, nodding. Involucre globose. Phyllaries imbricate, lanceolate to linear-lanceolate, rigid, apex long acuminate. Receptacle with long bristles. Corolla purple. Stamen filaments glabrous; anther with long, strongly lacerate basal appendages laterally fused into a tubular sheath enclosing distal part of filament. Style branches short. Achene obovoid, laterally compressed, longitudinally striate but otherwise smooth; apical rim forming a crenulate crown; apical plate with a low central pyramidal non-oleaginous body crowned by a cupular disk. Pappus of 3 or 4 rows of scabrid bristles, outer ones less than 1/2 as long as inner ones.

One species: China, Japan, Korea, Mongolia, Russia.

1. *Synurus deltoides* (Aiton) Nakai in Tozawa & Nakai, Kôryô Sikenrin Ippan, 64. 1932.

山牛蒡 shan niu bang

Onopordum deltoides Aiton, Hort. Kew. 3: 146. 1789; *Carduus atriplicifolius* Fischer ex Hornemann; *Centaurea atriplicifolia* (Fischer ex Hornemann) Matsumura; *Cirsium ficifolium* Fischer; *Rhaponticum atriplicifolium* (Fischer ex Hornemann) Candolle; *Serratula atriplicifolia* (Fischer ex Hornemann) Schultz Bipontinus; *S. atriplicifolia* var. *excelsa* Makino; *S. deltoides* (Aiton) Makino; *S. deltoides* var. *palmatopinnatifida* Makino; *S. pungens* Franchet & Savatier (1878), not Poirlet (1805); *Synurus atriplicifolius* (Fischer ex Hornemann) Iljin; *S. excelsus* (Makino) Kitamura; *S. hondae* Kitagawa; *S. palmatopinnatifidus* (Makino) Kitamura; *S. pungens* Kitamura; *S. pungens* var. *giganteus* Kitamura.

Herbs 0.7–1.5 m tall. Rootstock stout. Stem solitary, stout, erect, ribbed, branched or unbranched, basally densely felted to

glabrescent or glabrous. Leaves abaxially grayish white and densely felted, adaxially green, asperous, and setulose. Basal and lower cauline leaves with narrowly winged petiole to 34 cm; leaf blade cordate, ovate, broadly ovate, ovate-triangular, or hastate, 10–26 × 12–20 cm, base cordate, sagittate, or truncate. Upper cauline leaves gradually smaller upward, sessile or shortly petiolate, ovate, elliptic, or elliptic-lanceolate, margin toothed to spiny. Capitula several. Involucre 3–6 cm in diam., densely and fluffily cobwebby to glabrous. Phyllaries in 13–15 rows; outer and middle phyllaries lanceolate, 7–23 × 3–4 mm, patent to reflexed; inner phyllaries longest, linear-lanceolate, 2.3–2.5 × ca. 0.2 cm, sometimes purple. Corolla ca. 2.5 cm, tube ca. 9 mm. Achene brown, narrowly ellipsoid, ca. 7 mm, apex truncate. Pappus bristles brown, 1.5–2 cm. Fl. and fr. Jun–Oct. $2n = 26$.

Forest margins, forests, meadows; 500–2200 m. Anhui, Chongqing, S Gansu, Hebei, Heilongjiang, Henan, Hubei, N Hunan, Jiangxi, Jilin, Liaoning, Nei Mongol, Shaanxi, E Shandong, S Shanxi, NE Yunnan, Zhejiang [Japan, Korea, Mongolia, Russia].

27. ALFREDIA Cassini in F. Cuvier, Dict. Sci. Nat. 1(Suppl.): 115. 1816.

翅膜菊属 chi mo ju shu

Shi Zhu (石铸 Shih Chu); Werner Greuter

Herbs, perennial, caulescent. Stem solitary, erect, sulcate, unwinged. Leaves subentire to pinnatipartite, with spiny or spinulose teeth or segments. Capitula large, few (sometimes only 1), terminal on stem and branches. Involucre campanulate. Phyllaries numerous, abaxially with appressed tortuous blackish hairs and often white cobwebby, with membranous wings or appendage. Receptacle flat, with dense long bristles. Corolla yellow [or purple]. Stamen filaments glabrous or papillose; anther tails long, subentire to lacerate. Style branches short, apex rounded. Achene narrowly obovoid to narrowly ellipsoid, laterally compressed, often with 12–20 thin inconspicuous ribs, otherwise smooth; apical rim forming a low crown; apical plate with a central pyramidal body of sclerenchyma crowned by a stout disk. Pappus of 3–5 rows of barbellate bristles, outer ones ca. 1/2 as long as inner ones, inner ones gradually wider and flattened.

Six species: C Asia; five species (two endemic) in China.

- 1a. Outer and middle phyllaries distally with a scarious denticulate to lacerate appendage, apically narrowed into a 1–4 mm spine.
 - 2a. Leaves papery, undivided 4. *A. cernua*
 - 2b. Leaves leathery, pinnately divided 5. *A. fetissowii*
- 1b. Outer and middle phyllaries laterally expanded into membranous fimbriate-lacerate wings, apically narrowed into a ca. 10 mm spine.
 - 3a. Leaves leathery, with slender 5–10 mm spines 1. *A. nivea*
 - 3b. Leaves papery, with 1–4 mm spinules.
 - 4a. Basal and lower cauline leaves pinnately divided, terminal lobe cuneate at base; capitula nodding 2. *A. aspera*
 - 4b. Basal and lower cauline leaves with lobed petiole and large undivided blade truncate to cordate at base; capitula erect 3. *A. acantholepis*

1. *Alfredia nivea* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 395. 1842.

厚叶翅膜菊 hou ye chi mo ju

Alfredia suaveolens Ruprecht; *Arctium niveum* (Karelin & Kirilov) Kuntze; *Carduus karelinii* B. Fedtschenko; *Cousinia trautvetteri* Regel.

Herbs 35–60 cm tall. Stem purplish red, unbranched or with 1 branch, stout, many ribbed, sparsely cobwebby-felted. Leaves leathery, abaxially grayish white and densely thickly felted, adaxially green and \pm glabrous, margin with teeth ending in straw-colored needle-shaped 5–10 mm spines. Basal and lower cauline leaves with winged petiole; leaf blade elliptic to elliptic-lanceolate, 15–30 \times 4–7 cm, pinnately lobed or sub-pinnatifid; segments 6–8 pairs, elliptic to semiorbicular, margin toothed, terminal segment triangular. Middle cauline leaves similar but sessile or with a short winged petiole; uppermost cauline leaves lanceolate to linear-lanceolate, to 8 \times 1 cm, margin with sparse spinulose teeth. Capitula 1 or 2, nodding. Involucre 5–6 cm in diam. Outer and middle phyllaries 2.5–3 cm, middle portion laterally expanded into scarious fimbriate-lacerate wings, apex narrowed into a ca. 1 cm spine; innermost phyllaries linear to linear-lanceolate, to 3 cm, rigid, scarious, margin entire, apex acuminate. Corolla yellow, ca. 2.2 cm, tube ca. 7 mm. Achene pale yellowish white variegated with brown, narrowly ellipsoid, ca. 6 mm, inconspicuously multistriate. Pappus bristles to 2 cm, fragile. Fl. and fr. Jul–Sep.

Grasslands in river valleys, trailsides, *Picea* forests; 1400–2400 m. Xinjiang (Borohoro Shan, Tarbagatay Shan, Tian Shan) [Kazakhstan].

2. *Alfredia aspera* C. Shih, Acta Phytotax. Sin. 22: 454. 1984.

糙毛翅膜菊 cao mao chi mo ju

Herbs to 72 cm tall. Stem purplish red, apically once branched, ribbed, sparsely floccose. Leaves papery, abaxially grayish white and densely thickly felted, adaxially green, asperulous, and strigose, margin ciliate with yellowish 1–4 mm spinules. Basal and lower cauline leaves with winged petiole 7–15 cm; leaf blade elliptic, 18–24 \times 8–10 cm, pinnatifid; segments 5 or 6 pairs, elliptic or obliquely triangular to obovate, terminal segment largest, base cuneate. Middle cauline leaves similar but sessile; uppermost cauline leaves undivided, narrowly elliptic to lanceolate, semiamplexicaul. Capitula 2, nodding. Involucre ca. 5 cm in diam. Outer and middle phyllaries ovate-lanceolate to needle-shaped, 1.5–1.8 \times 0.5–0.7 cm, middle portion laterally expanded into scarious fimbriate-lacerate wings, apex narrowed into a ca. 1 cm spine; inner phyllaries lanceolate, ca. 2.5 \times 0.5 cm, rigid, distally with a small scarious lacerate appendage narrowed into a short spine. Corolla yellow, ca. 2.2 cm, tube ca. 7 mm. Mature achene unknown. Pappus bristles brown, to 1.8 cm. Fl. Jul–Sep.

• Open places in forests; 1700–3100 m. Xinjiang (Tian Shan).

3. *Alfredia acantholepis* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 394. 1842.

薄叶翅膜菊 bao ye chi mo ju

Alfredia karelinii Ledebour, nom. illeg. superfl.; *A. tianschanica* Ruprecht; *Carduus tianschanicus* (Ruprecht) B. Fedtschenko.

Herbs 40–120 cm tall. Stem purplish red, stout, unbranched or rarely with 1 branch, with sparse appressed long white hairs. Leaves papery, abaxially grayish white and thickly felted, adaxially green, asperulous, and strigose, margin densely ciliate with 1–2 mm spinules. Basal and lower cauline leaves petiolate; petiole 8–10 cm, winged, distally lobed, lobes in 2 or 3 pairs, elliptic to ovate, and small; leaf blade otherwise undivided, ovate, 11–13 \times 5–8 cm, base cordate to truncate. Middle cauline leaves similar but sessile; upper cauline leaves narrowly ovate, small, semiamplexicaul. Capitula 1 or 2, erect. Involucre broadly campanulate, 4–6 cm in diam. Outer and middle phyllaries lanceolate to needle-shaped, 1.2–2.4 \times 0.3–0.5 cm, middle portion laterally expanded into scarious fimbriate-lacerate wings, apex narrowed into a ca. 1 cm spine; inner phyllaries linear-lanceolate, ca. 3 \times 0.3 cm, rigid, scarious, margin sometimes expanded into small fimbriate-lacerate scarious wings. Corolla yellow, ca. 2.2 cm, tube ca. 8 mm. Achene cream-colored variegated with brown, obliquely narrowly obovoid, ca. 7 mm, compressed, inconspicuously multistriate. Pappus bristles to 2 cm, fragile. Fl. and fr. Jul–Oct.

Meadows, steppes, open forests, moist places; 1600–3300 m. Xinjiang (Tian Shan) [Kazakhstan].

4. *Alfredia cernua* (Linnaeus) Cassini in F. Cuvier, Dict. Sci. Nat. 1(Suppl.): 115. 1816.

翅膜菊 chi mo ju

Cnicus cernuus Linnaeus, Sp. Pl. 2: 826. 1753; *Alfredia stenolepis* Karelin & Kirilov; *Carduus cernuus* (Linnaeus) Steudel; *Silybum cernuum* (Linnaeus) Gaertner; *S. squarrosus* Tausch.

Herbs 1–3 m tall. Stem purplish red, apically long branched, sparsely cobwebby. Leaves papery, abaxially grayish white and densely felted, adaxially green and sparsely strigillose, margin spinulose denticulate. Basal and lower cauline leaves petiolate; petiole long, spinulose, winged, base auriculate and semiamplexicaul; leaf blade undivided, ovate to heart-shaped, 25–50 \times 15–30 cm. Middle cauline leaves similar but shortly petiolate or sessile, cordate amplexicaul; upper cauline leaves sessile, smaller. Capitula several, nodding. Involucre 4–5 cm in diam. Outer and middle phyllaries lanceolate to oblanceolate, 8–20 \times 3–4 mm, distally with a roundish scarious denticulate appendage apically narrowed into a 1–5 mm spine; inner phyllaries oblanceolate, ca. 3 \times 0.3 cm, with a small scarious entire to \pm lacerate usually blunt apical appendage. Corolla yellow, ca. 1.6 cm, tube ca. 6 mm. Achene brown, narrowly ovoid to obovoid, ca. 5.5 mm, multistriate. Pappus bristles to 1.5 cm, fragile. Fl. and fr. Jul–Sep. $2n = 26$.

Sunny slopes in forests, wet grasslands, rocky crevices; 1400–2000 m. Xinjiang (Altay Shan) [Kazakhstan, Russia].

5. *Alfredia fetissowii* Iljin, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 4: 38. 1923.

长叶翅膜菊 chang ye chi mo ju

Herbs to 1 m tall. Stem purplish red, sparsely cobwebby.

Leaves leathery, abaxially grayish white and densely felted, adaxially green and glabrous, margin with acicular spines to 5 mm. Lower cauline leaves with petiole 7–14 cm; leaf blade elliptic, 17–30 × 4–8 cm, pinnately divided; segments 4–6 pairs, elliptic to ovate. Middle and upper leaves similar but sessile, sometimes lanceolate to oblanceolate. Capitula 1 or 2, nodding. Involucre 5–7 cm in diam. Outer and middle phyllaries lanceolate to broadly linear, 0.8–3 × 0.2–0.4 cm, distally

expanded into a scarious lacerate appendage apically narrowed into a 1–1.5 mm spine; inner phyllaries linear, ca. 3 × 0.3 cm, lacking an appendage. Corolla yellow, ca. 2.7 cm, tube ca. 9 mm. Achene brown, narrowly obovoid, ca. 5 mm, multistriate and with numerous ribs. Pappus bristles to 2.8 cm, serrulate. Fl. and fr. Jul–Aug.

• Mountain slopes, ravines; 2100–2800 m. Xinjiang (Tian Shan).

28. OLGAEA Iljin, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 3: 141. 1922.

菊属 wei ju shu

Shi Zhu (石铸 Shih Chu); Werner Greuter

Takeikadzuchia Kitagawa & Kitamura.

Herbs, perennial. Leaves linear to elliptic, pinnately divided, with spiny teeth or segments. Capitula few to many, solitary or glomerate. Involucre campanulate, semiglobose, or ovoid. Phyllaries rigid, leathery, straight or apically recurved. Receptacle flat, with dense long bristles. Corolla purple to blue. Stamen filaments glabrous or subglabrous; anther with long ± entire basal appendages. Style branches slender, apex obtuse to rounded. Achene narrowly ellipsoid to obovoid, laterally compressed, often with 12–15 ribs but otherwise smooth; apical rim forming a crenulate crown; apical plate with central pyramidal body of sclerenchyma crowned by a stout disk. Pappus bristles 3–5 rows, barbellate, outer ones somewhat shorter than inner.

About 16 species: mostly in C Asia; six species (two endemic) in China.

1a. Stem winged.

2a. Basal leaves papery and soft in texture, with elliptic to ovate segments; involucre sparsely cobwebby 1. *O. lomonossowii*

2b. Basal leaves ± leathery, with triangular segments or teeth; involucre glabrous or subglabrous.

3a. Leaves subconcolorous, adaxially ± densely cobwebby; basal leaves ± narrowly elliptic, 3–5 cm wide; leaves and stem wings parchmentlike; phyllaries 2–3 mm wide 2. *O. leucophylla*

3b. Leaves strongly discolorous, adaxially green and glabrous; basal leaves ± broadly linear, ca. 3 cm wide; leaves and stem wings leathery; phyllaries 1–1.5 mm wide 3. *O. tangutica*

1b. Stem unwinged.

4a. Capitula solitary at end of stem and branches; involucre sparsely cobwebby 4. *O. pectinata*

4b. Capitula clustered at end of unbranched stem; involucre densely lanate.

5a. Involucre 2.5–3.5 cm in diam.; outer and middle phyllaries with a 1–1.5 cm pungent apical spine; small capitula usually present in leaf axils below main capitula cluster 5. *O. roborowskyi*

5b. Involucre ca. 4.5 cm in diam.; outer and middle phyllaries apically with a short weak spine; small capitula not present in leaf axils below main capitula cluster 6. *O. laniceps*

1. *Olgaea lomonossowii* (Trautvetter) Iljin, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 3: 144. 1922.

菊属 wei ju

Carduus lomonossowii Trautvetter, Trudy Imp. S.-Peterburgsk. Bot. Sada 1: 183. 1872; *C. hsiaowutaishanensis* F. H. Chen; *C. sinensis* S. Moore; *Olgaea hsiaowutaishanensis* (F. H. Chen) Y. Ling; *O. sinensis* (S. Moore) Iljin; *Serratula diabolica* Kitamura; *Synurus diabolicus* (Kitamura) Kitamura; *Takeikadzuchia lomonossowii* (Trautvetter) Kitagawa & Kitamura.

Herbs 15–60 cm tall. Stem solitary, grayish white, erect, usually branched from near base, rarely unbranched, densely and thickly felted, eventually glabrescent, base covered with petiole remains; wings 1–2 mm wide, margin entire and spinulose. Leaves papery, strongly discolorous, abaxially grayish white and thickly felted, adaxially green and glabrous. Basal leaves with brown petiole; leaf blade elliptic, 8–20 × 4–7 cm, pinnately lobed or pinnatifid; segments 4–7 pairs, elliptic, ± narrowly ovate, or ovate-lanceolate, margin and apex with 0.5–2 mm spines; terminal segment ± narrowly ovate or lanceolate.

Lower cauline leaves similar but sessile; upper cauline leaves gradually smaller upward, ± narrowly elliptic, lanceolate, or narrowly triangular, less divided to entire. Capitula (1 or) few to many. Involucre campanulate to hemispheric, 5–7 cm in diam., sparsely cobwebby. Phyllaries narrowed into long spines; outer and middle phyllaries linear-triangular, 8–24 × 1–2 mm; inner phyllaries similar but longer, ca. 3.5 × 0.2 cm. Corolla purple, ca. 3 cm, tube ca. 1.2 cm. Achene cuneate-obovoid, ca. 6 mm, with a repand apical rim. Pappus bristles brown, to 2 cm, slender. Fl. and fr. Jul–Oct.

Valleys, slopes, sandy areas, riverbeds; 800–2300 m. C Gansu, Hebei, N Jilin, Nei Mongol, N Ningxia, Shaanxi, Shanxi [Mongolia].

2. *Olgaea leucophylla* (Turczaninow) Iljin, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 3: 145. 1922.

火媒草 huo mei cao

Carduus leucophyllus Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 5: 194. 1832; *Olgaea leucophylla* var. *aggregata* Y. Ling; *O. leucophylla* var. *albiflora* Y. B. Chang; *O. leucophylla* var. *jucunda* Iljin.

Herbs 15–80 cm tall. Stems grayish white, erect, branched from base or unbranched, stout, densely cobwebby-felted; wings wide, parchmentlike, spiny, toothed, or lobed. Leaves grayish white, subconcolorous, abaxially cobwebby-felted, adaxially ± densely cobwebby. Basal leaves with thick densely felted petiole; leaf blade ± narrowly elliptic, 12–20 × 3–5 cm, parchmentlike, shallowly pinnately lobed or toothed; segments or teeth 7–10 pairs, triangular to semiorbicular, with lateral spines and a brown to yellowish 5–6(–10) mm apical spine. Middle cauline leaves similar or elliptic to elliptic-lanceolate, sometimes undivided; upper cauline leaves elliptic, lanceolate, or narrowly triangular, smaller. Capitula few to many. Involucre campanulate, 3–4 cm in diam., glabrous or subglabrous. Phyllaries distally narrowed into a spine; outer phyllaries triangular, 10–15 × 2.5–3 mm, recurved; middle phyllaries lanceolate to elliptic-lanceolate, 1.8–2.5 × ca. 0.3 cm; inner phyllaries linear-elliptic to broadly linear, 3.2–3.6 × ca. 0.2 cm. Corolla purple or white, ca. 3.3 cm, tube ca. 8 mm. Achene yellowish variegated with brown, narrowly ellipsoid, ca. 1 cm, 10-ribbed. Pappus bristles pale brown, to 2.5 cm. Fl. and fr. May–Oct.

Grasslands, farmlands, by ditches; 700–1800 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Nei Mongol, Ningxia, N Shaanxi, Shanxi [Mongolia].

3. *Olgaea tangutica* Iljin, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 3: 144. 1922.

刺疙瘩 ci ge da

Olgaea echinantha Y. Ling.

Herbs 20–100 cm tall. Stems solitary or up to 3, erect, usually long branched, sparsely cobwebby, base covered with petiole remains; wings wide, leathery, unequally spiny toothed. Leaves leathery, discolorous, abaxially grayish white and densely thickly felted, adaxially green and glabrous. Basal leaves with a brown fibrous basally thickened petiole; leaf blade ± broadly linear, ca. 33 × 3 cm, pinnately lobed or pinnatifid; segments ca. 10 pairs, triangular, with 2 or 3 unequal teeth each with 2 or 3 lateral spines and a brown to yellowish 3–4 mm apical spine. Cauline leaves similar but sometimes undivided, narrowly triangular, smaller, with spiny teeth. Capitula several, in a lax corymb. Involucre campanulate, 3–4 cm in diam., glabrous. Outer phyllaries triangular, 5–10 × 1–1.5 mm, apex recurved to patent and spiniform; middle phyllaries lanceolate to linear-lanceolate, 10–17 × 1–1.5 mm, apex similar to outer ones; inner phyllaries linear, ca. 2.3 × 0.1 cm, apex narrowed into a long spine. Corolla purple to bluish purple, ca. 2.7 cm, tube ca. 1.7 cm. Achene pale yellowish variegated with brown, long cuneate-ellipsoid, ca. 6 mm. Pappus bristles brown to pale brick colored, to 1.5 cm. Fl. and fr. Jun–Sep.

• Slopes, thickets in valleys, farmlands, flooded lands, wastelands; 1200–2000 m. Gansu, Hebei, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi.

4. *Olgaea pectinata* Iljin, Izv. Glavn. Bot. Sada R.S.F.S.R. 23: 146. 1924.

新疆蜡菊 xin jiang wei ju

Herbs 30–70 cm tall. Stem solitary, grayish white, erect,

apically branched, unwinged, densely lanate. Leaves leathery, discolorous, abaxially grayish white and densely felted, adaxially green and glabrous. Basal and lower cauline leaves with a spinose or unarmed petiole; leaf blade elliptic, 10–15 × 3–3.5 cm, pinnately lobed or pinnatifid; segments numerous pairs, ovate-triangular, 3–5-toothed, each tooth with basal ca. 1.5 mm spines and a 3–3.5 mm apical spine. Middle and upper cauline leaves similar but shortly petiolate or sessile and smaller; uppermost cauline leaves smallest, elliptic to lanceolate, pectinately spiny. Capitula several, solitary at end of stem and branches. Involucre broadly campanulate, ca. 5 cm in diam., sparsely cobwebby. Outer phyllaries elliptic to lanceolate, 2–2.5 × 0.5–1 cm, middle portion of margin spinulose to spiny toothed, apex with a 2–5 mm spine; middle phyllaries lanceolate-subulate to elliptic-subulate, 2–3 × ca. 0.3 cm, apex acuminate-subulate; inner phyllaries linear-lanceolate, 2–3 × ca. 0.2 cm, apex acuminate. Corolla pale purple, ca. 2.6 cm, tube ca. 9 mm. Achene (immature) ca. 6 mm. Pappus bristles yellowish to dirty white, to 2.5 cm. Fl. Jul–Sep.

Rocky mountain slopes; ca. 2900 m. W Xinjiang (Wuqia) [Kazakhstan].

5. *Olgaea roborowskyi* Iljin, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 3: 142. 1922.

假九眼菊 jia jiu yan ju

Herbs 20–25 cm tall. Stem solitary, grayish white, erect, unbranched, unwinged, lanate. Leaves leathery, discolorous, abaxially grayish white and thickly lanate, adaxially green, glabrous, and shiny. Middle cauline leaves sessile, elliptic, 10–20 × 2.5–4 cm, pinnatifid or pinnatifid; segments 7–10 pairs, broadly ovate to broadly triangular, with 3–5 teeth tipped with 3–10 mm spines; upper cauline leaves toothed, with unequal triangular spine-tipped and pectinately spiny teeth. Capitula 3–8, clustered at end of stem; small capitula usually present in leaf axils below main cluster. Involucre ovoid to campanulate, 2.5–3.5 cm in diam., densely lanate. Outer phyllaries lanceolate-subulate, ca. 2 × 0.3 cm, apex narrowed into a pungent ca. 1.1 cm spine; middle phyllaries ± narrowly elliptic to linear-subulate, 2.5–3 × 0.2–0.3 cm, with a 1.2–1.5 cm apical spine; inner phyllaries lanceolate to linear-lanceolate, 2.5–3 × 0.1–0.3 cm, apex acuminate and softly spiny. Corolla purple, ca. 2.2 cm, tube ca. 1.4 cm. Achene gray and dark variegated, long cuneate-ellipsoid, ca. 7 mm. Pappus bristles brownish, to 2 cm. Fl. and fr. Jul.

• Rocky mountain slopes; 2700–2800 m. W Xinjiang (Wuqia).

6. *Olgaea laniceps* (C. Winkler) Iljin, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 3: 143. 1922.

九眼菊 jiu yan ju

Carduus laniceps C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 9: 519. 1886.

Herbs to 40 cm tall. Stem solitary, erect, unbranched, unwinged, densely lanate. Leaves leathery, discolorous, abaxially grayish white and densely cobwebby-felted, adaxially green, glabrous, and shiny. Basal leaves with spiny petiole ca. 5

cm; leaf blade linear-elliptic to lanceolate-elliptic, 10–20 × 3.5–5.5 cm, pinnately lobed or pinnatipartite; segments 9–11 pairs, semiobovate to broadly triangular, with marginal spinules of to 1 mm and 3–5 teeth with a yellowish 4–6 mm apical spine. Middle and upper cauline leaves similar but shortly petiolate or sessile. Capitula 5–9, clustered at end of stem, without small capitula present in leaf axils below main cluster. Involucre broadly campanulate, ca. 4.5 cm in diam., densely lanate; outer

and middle phyllaries lanceolate-subulate, ca. 2 cm × 3.5 mm, apex narrowed into a short weak spine; inner phyllaries ± broadly linear, 2.5–3 × ca. 0.2 cm, apex acuminate. Corolla purplish red, ca. 2.9 cm, tube ca. 1.2 cm. Achene obconic, 6–7 mm. Pappus bristles yellowish, to 2.5 cm. Fl. and fr. Jul–Aug.

River valleys, gravelly places along rivers; 1800–2100 m. Xinjiang (Tian Shan) [Kazakhstan].

29. XANTHOPAPPUS C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 13: 10. 1893.

黄缨菊属 huang ying ju shu

Shi Zhu (石铸 Shih Chu); Werner Greuter

Herbs, perennial, stemless. Leaves all basal, rosulate, pinnatipartite, with spiny lobes. Capitula basal, large, shortly pedunculate, clustered in center of leaf rosette. Phyllaries ending in a straight or ± falcate keeled spine. Receptacle concave, covered with bristles. Corolla yellow. Stamen filaments glabrous; anther with long, subtire basal appendages. Style branches short, apex truncate. Achene (immature) narrowly obovoid, inconspicuously striate but otherwise smooth; apical rim forming an entire conspicuous crown; apical plate with shortly cylindrical cup-shaped disk surmounted by a cylindrical hardened style base. Pappus of ca. 5 rows of scabrid bristles of almost equal length.

• One species: China.

1. Xanthopappus subcaulis C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 13: 11. 1893.

黄缨菊 huang ying ju

Carduus euosmus Forrest; *Xanthopappus multicephalus* Y. Ling.

Rootstock very short, with dense fibrous remains of old petioles. Leaves with a spiny rigid 2–10 cm petiole; leaf blade ± narrowly elliptic, 20–30 × 5–8 cm, abaxially grayish white and thickly cobwebby-felted, adaxially green and glabrous, midvein abaxially raised; segments 8–12 pairs, narrowly elliptic to ovate-

triangular, with triangular teeth or toothed lobes, margin with patent spinules, apex of segments, lobes, and teeth with a rigid yellow spine. Capitula to 20. Involucre broadly campanulate, ca. 6 cm in diam. Phyllaries in 8 or 9 rows, rigid, abaxially scabrid; outer phyllaries lanceolate, 2–2.5 × 0.3–0.4 cm, leathery; middle phyllaries ± narrowly lanceolate, 3–3.5 × 0.4–0.5 cm, leathery; inner phyllaries ± broadly linear, 3.5–4 × 0.3–0.4 cm, scarious. Corolla yellow, ca. 3.5 cm. Achene (immature) ca. 7 mm. Pappus bristles yellowish, 2.5–3.5 cm, brittle. Fl. and fr. Jul–Sep.

• Meadows, steppes, dry slopes; 2400–4000 m. Gansu, W Nei Mongol, Ningxia, Qinghai, Sichuan, NW Yunnan.

30. SYREITSCHIKOVIA Pavlov, Repert. Spec. Nov. Regni Veg. 31: 192. 1933.

疆菊属 jiang ju shu

Shi Zhu (石铸 Shih Chu); Werner Greuter

Herbs, perennial, caespitose. Leaves linear to linear-lanceolate, margin ± spinulose near base. Capitulum small, solitary, upright, pedunculate. Involucre cylindrical to campanulate. Phyllaries imbricate, ending in a patent to reflexed but not hooked spine. Receptacle covered with bristles. Stamen filaments glabrous; anther with setaceous bifid basal appendages. Style branches short. Achene narrowly oblong, laterally compressed, longitudinally striate but otherwise smooth; apical rim forming a membranous toothed crown; apical plate with central cylindrical body crowned by a disk. Pappus elements in 2 dissimilar series, outer of thin scabrid bristles, inner of narrowly lanceolate scales ending in a barbellate subulate tip.

Two species: C Asia; one species in China.

1. Syreitschikovia tenuifolia (Bongard) Pavlov, Repert. Spec. Nov. Regni Veg. 31: 192. 1933.

疆菊 jiang ju

Serratula tenuifolia Bongard, Bull. Sci. Acad. Imp. Sci. Saint-Petersbourg 8: 340. 1841; *Jurinea tenuis* Bunge.

Herbs 15–50 cm tall. Rootstock branched, densely covered with dark scales. Stems erect, unbranched, slender, unwinged, cobwebby to glabrescent. Leaves sessile, linear to linear-lanceolate, 3–20 × 0.4–0.7 cm, soft, abaxially grayish white and

densely thickly felted, adaxially green and glabrous, base narrowed, apex acuminate to acute. Involucre 0.8–1.2 cm in diam., glabrous or subglabrous. Phyllaries in 6 or 7 rows; outer phyllaries broadly triangular to ovate, 3–3.5 × ca. 2 mm, apical spine ca. 0.5 mm; middle and inner phyllaries ovate, elliptic, or broadly linear, 6–11 × 1–1.5 mm, apical spine 1–2 mm. Corolla blue to purplish red, ca. 1.3 cm, tube ca. 6 mm. Achene ellipsoid, 6–7 mm, with toothed apical rim. Pappus scales of inner row 0.8–1.2 cm, longer than outer row. Fl. and fr. Jun–Jul.

Grasslands on rocky mountain slopes; 1200–1700 m. Xinjiang (Tian Shan) [Kazakhstan].

31. ONOPORDUM Linnaeus, Sp. Pl. 2: 827. 1753.

大翅蓟属 da chi ji shu

Shi Zhu (石铸 Shih Chu); Werner Greuter

Acanos Adanson.

Herbs, biennial. Stems erect, with spiny wings. Leaves toothed or pinnately lobed, spiny. Capitula single or few. Phyllaries numerous, imbricate, apex erect to reflexed but not hooked. Receptacle naked, alveolate. Stamen filaments papillose; anther with short entire to lacerate basal appendages. Style branches long. Achene obovoid, laterally compressed, with 3–5 ribs ending in inconspicuous apical rim; apical plate flat, disk not protruding. Pappus of 1 or several rows of scabrid or plumose bristles of unequal length.

About 40 species: C and SW Asia, Europe; two species in China.

- 1a. Pappus bristles scabrid; outer and middle phyllaries with divaricate to reflexed apex 1. *O. acanthium*
 1b. Pappus bristles plumose; phyllaries straight 2. *O. leptolepis*

1. Onopordum acanthium Linnaeus, Sp. Pl. 2: 827. 1753.

大翅蓟 da chi ji

Acanos spina Scopoli, nom. illeg. superfl.

Herbs to 2 m tall. Stem erect, usually branched above, stout, glabrous or cobwebby; wings 2–5 cm wide, with triangular spiny lobes or teeth; spines yellowish brown, to 5 mm. Leaves glabrous or sparsely cobwebby to densely lanate. Basal leaves elliptic to broadly ovate, 10–30 × 4–15 cm, pinnately lobed or with unequal triangular teeth, teeth and lobes ending in yellowish brown spines. Middle and upper cauline leaves sessile, narrowly elliptic to oblanceolate, gradually smaller upward. Capitula solitary. Involucre globose to ovoid, ca. 5 cm in diam., cobwebby, glabrescent. Phyllaries abaxially gland-dotted, margin ciliate; outer and middle phyllaries ovate-subulate to lanceolate-subulate, 1.7–1.8 × 0.4–0.5 cm, leathery, apex narrowed into a pungent divaricate to reflexed spine; inner phyllaries lanceolate to linear, 2–3 × ca. 0.3 cm, straight, apex acuminate-subulate. Corolla purplish red to pink, ca. 2.4 cm, tube ca. 1.2 cm. Achene grayish black to gray, obovoid to narrowly ellipsoid, ca. 6 mm, 3-ribbed, transversely wrinkled, apical rim not prominent. Pappus bristles reddish, to 1.2 cm, scabrid. Fl. and fr. Jun–Sep. $2n = 34$.

Mountain slopes, wastelands, by ditches; 400–1200 m. N Xinjiang

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

2. Onopordum leptolepis Candolle, Prodr. 6: 619. 1838.

羽冠大翅蓟 yu guan da chi ji

Herbs 30–40 cm tall. Stem erect, unbranched or with few branches, densely lanate; wings broad, undulate, densely lanate, with yellow spines. Leaves densely lanate. Lower cauline leaves sessile, ± narrowly elliptic, 30–40 cm, pinnately lobed; lobes ovate, margin undulate, with spiny teeth. Upper cauline leaves gradually smaller upward, lobed or toothed; teeth and lobes apically with yellow spines. Capitula solitary. Involucre globose to subglobose, 4–6 cm in diam., lanate pubescent. Outer and middle phyllaries lanceolate, straight, apex accumbent to involucre and narrowed into a slender spine; innermost phyllaries 3–3.5 × ca. 0.2 cm, narrowed into a scarious 1.2–1.5 cm acumen. Achene brown to grayish brown, tetragonous, ca. 6 mm, 4-ribbed, wrinkled along edges, apical rim scarious. Pappus bristles to 2.5 cm, plumose, a single inner one more robust than others and ca. 3 cm. Fl. and fr. May–Jun. $2n = 34$.

Mountainous regions. Xinjiang [Kazakhstan].

No material of *Onopordum leptolepis* from China was seen by the present authors. The above description is taken from the treatment by Pavlov (Fl. Kazakhst. 9: 348–350. 1966).

32. ANCATHIA Candolle, Arch. Bot. (Paris) 2: 331. 1833.

肋果蓟属 lei guo ji shu

Shi Zhu (石铸 Shih Chu); Werner Greuter

Herbs, perennial. Stems usually unbranched, unwinged. Cauline leaves undivided, linear-lanceolate or linear, margin entire and revolute between spaced, paired, or digitate spines. Capitula 1 or 2, erect. Involucre campanulate. Phyllaries numerous, imbricate, with reflexed to patent but not with an uncinat apical spine. Receptacle with dense long bristles. Stamen filaments glabrous; anther with long lacerate basal appendages. Style branches coherent, short, apex obtuse. Achene narrowly ellipsoid, laterally compressed, with ca. 15 raised contiguous wavy interlocking ribs, glabrous; apical rim forming a high crenulate crown; center of apical plate broadly conic, crowned by a cup-shaped disk. Pappus of 4 or 5 rows of plumose bristles; bristles basally connate into a ring, falling off together, outer not much shorter than inner.

One species: China, Kazakhstan, Mongolia, Russia.

1. Ancathia igniaria (Sprengel) Candolle, Arch. Bot. (Paris) 2: 331. 1833.

肋果蓟 lei guo ji

Cirsium igniarium Sprengel, Syst. Veg., ed. 16, 3: 375. 1826; *Cnicus igniarius* (Sprengel) Benth.

Herbs 15–20 cm tall, rhizomatous. Rootstock stout,

branched. Stems densely felted. Basal leaves absent at anthesis. Cauline leaves numerous, sessile, 10–20 × 0.5–1 cm, leathery, abaxially grayish white and densely felted, adaxially glabrous and shiny, marginal and apical spines 5–6 mm. Involucre 3–5 cm, cobwebby. Outer phyllaries triangular, 7–8 × 1.6–2 mm, apex tipped with a reflexed 2–3 mm spine; middle phyllaries oblanceolate, 1.5–2.5 cm × 3–4 mm, apically abruptly con-

stricted and tipped with a reflexed to patent 5–6 mm spine; inner phyllaries red, lanceolate, oblanceolate, or linear, 3–3.2 × ca. 0.4 cm, scarious, apex long acuminate. Corolla purple to red, ca. 2.8 cm, tube ca. 1.2 cm. Achene dark brown, ca. 6.5 mm. Pappus bristles whitish. Fl. and fr. Jun–Sep.

Mountain slopes, rocky areas; 1100–1500 m. N Xinjiang [Kazakhstan, Mongolia, Russia].

4. Subtribe CARDUINAE

飞廉亚族 fei lian ya zu

Shi Zhu (石铸 Shih Chu); Werner Greuter

Herbs, annual to perennial. Capitula homogamous. Phyllaries pointed, ending in a straight or recurved spine; inner phyllaries sometimes with a scarious appendage. Receptacle with dense long bristles. Florets bisexual, rarely unisexual and then plants dioecious. Corolla ± actinomorphic. Stamen filaments distinct, ± pubescent. Style branches coherent for most of their length. Achene glabrous; apical rim forming a smooth-margined upright crown; apical plate with a prominent oleaginous central umbo (elaiosome). Pappus of scabrid or plumose bristles basally connate into a ring and falling off together.

Eleven genera and ca. 380 species: E and N Africa, Asia, Europe; two genera and 49 species (23 endemic) in China.

Cynara scolymus Linnaeus and *C. cardunculus* Linnaeus, of Mediterranean origin, are cultivated in China for their edible receptacle and phyllaries. Another Mediterranean species, *Silybum marianum* (Linnaeus) Gaertner, is grown as an ornamental and for its achenes, which are used medicinally.

- 1a. Pappus of plumose bristles 33. *Cirsium*
 1b. Pappus of scabrid bristles 34. *Carduus*

33. CIRSIUM Miller, Gard. Dict. Abr., ed. 4, [334]. 1754.

菊属 ji shu

Shi Zhu (石铸 Shih Chu); Werner Greuter

Cirsium sect. *Epitrachys* Candolle ex Duby; *C.* subg. *Lophiolepis* Cassini; *C.* subg. *Orthocentron* Cassini; *Echenais* Cassini; *Epitrachys* (Candolle ex Duby) K. Koch; *Eriolepis* Cassini; *Lophiolepis* (Cassini) Cassini; *Onotrophe* Cassini; *Orthocentron* (Cassini) Cassini.

Herbs, annual to perennial, bisexual or dioecious. Stems (when developed) unwinged or sometimes with spiny wings. Leaves subentire to bipinnately divided, lanceolate or wider, margin spinulose or spiny. Capitula solitary to clustered. Phyllaries numerous, regularly imbricate or of subequal length, abaxially often with a dark glandular resinous medial swelling below apex, apex ending in a straight or gradually recurved spine, spinule, or acumen. Florets normally all bisexual, or if unisexual then plants dioecious. Stamen filaments pubescent; anther with short subentire to lacerate basal appendages. Achene narrowly obovoid, laterally compressed, often with 4 or more slender spaced longitudinal ribs or striae, otherwise smooth; apical rim forming a smooth-margined upright crown; elaiosome crowned by an inconspicuous disk. Pappus of 3 or 4 rows of plumose bristles, outer ones not much shorter than inner.

About 250–300 species: N Africa, Asia, Central and North America, Europe; 46 species (23 endemic) in China.

In addition, the following four species have been reported to occur in Taiwan: *Cirsium ferum* Kitamura (Acta Phytotax. Geobot. 1: 149. 1932), *C. hosokawae* Kitamura (loc. cit.: 57), *C. kawakamii* Hayata (J. Coll. Sci. Imp. Univ. Tokyo 30(1): 159. 1911), and *C. suzukii* Kitamura (loc. cit.: 58). As no material has been seen by the present authors, these taxa have not been included in the following treatment and key.

- 1a. Plants dioecious.
 2a. Stems glabrous or cobwebby-felted; leaves divided or undivided but if undivided then base cuneate 45. *C. arvense*
 2b. Stems hairy; leaves undivided with base auriculate and semiamplexicaul 46. *C. shihianum*
 1b. Florets bisexual.
 3a. Some of phyllaries expanded laterally into membranous wings or distally into a scarious appendage.
 4a. Leaves adaxially rough and spinulose.
 5a. Leaves abaxially densely felted; outer and middle phyllaries unwinged but inner phyllaries expanded into a scarious white or pink appendage 37. *C. leducii*
 5b. Leaves abaxially sparsely cobwebby; outer and middle phyllaries with a margin expanded into yellowish scarious wings 44. *C. chrysolepis*
 4b. Leaves adaxially smooth or covered with hair-tipped papillae and slightly rough but not spinulose.
 6a. Bracts surrounding capitula with pectinately arranged long pungent spines.
 7a. Margin of middle phyllaries not laterally expanded into wings but inner phyllaries apically expanded 41. *C. argyracanthum*

- 7b. Margin of middle phyllaries expanded above base into denticulate to lacerate scarious wings.
- 8a. Outer phyllaries unwinged but usually with pectinately spinulose margin, middle phyllaries with irregularly lacerate scarious wings 42. *C. glabrifolium*
- 8b. Outer and middle phyllaries with regularly denticulate-lacerate wings 43. *C. sieversii*
- 6b. Bracts surrounding capitula (if present) without pectinately arranged long pungent spines.
- 9a. Leaves green, concolorous, and glabrous or with sparse hairs along veins.
- 10a. Stems below capitulum felted 33. *C. tianmushanicum*
- 10b. Stems with crispate hairs, below capitulum also \pm cobwebby 34. *C. chinense*
- 9b. Leaves abaxially grayish white and cobwebby or felted, adaxially green, glabrous, papillose, or with scattered crispate hairs.
- 11a. Leaves undivided or rarely slightly lobed in proximal third 35. *C. lineare*
- 11b. Leaves pinnately lobed to pinnatipartite at least in proximal half 36. *C. shansiense*
- 3b. Phyllaries lacking wings and scarious appendage.
- 12a. Outer and middle phyllaries villous or hirsute with multicellular hairs or bristles.
- 13a. Leaves concolorous, greenish, with sparse to dense bristles 15. *C. fuscotrichum*
- 13b. Leaves discolorous, abaxially grayish white and densely felted, adaxially green and glabrous 16. *C. muliense*
- 12b. Involucre glabrous, sparsely cobwebby, or lanate, phyllaries never hirsute or villous.
- 14a. Involucre densely lanate.
- 15a. Leaves adaxially with scattered spinules or smooth, pinnately divided, segments elliptic, semiorbicular, or ovate 7. *C. eriophoroides*
- 15b. Leaves adaxially rough with sparse to dense spinules, bipinnatipartite, segments triangular to triangular-lanceolate 12. *C. lidjiangense*
- 14b. Involucre glabrous or cobwebby.
- 16a. Leaves adaxially rough and spinulose.
- 17a. Stems winged 14. *C. vulgare*
- 17b. Stems unwinged.
- 18a. Leaf segments elliptic, semiorbicular, or ovate.
- 19a. Leaves discolorous, abaxially grayish white, adaxially green 8. *C. subulariforme*
- 19b. Leaves concolorous, green 9. *C. verutum*
- 18b. Leaf segments lanceolate to narrowly triangular.
- 20a. Leaves concolorous, green to yellowish green 10. *C. chlorolepis*
- 20b. Leaves discolorous, abaxially grayish white, adaxially greenish.
- 21a. Outer and middle phyllaries ending in a subulate spine 8–13 mm, outer phyllaries not much shorter than inner 11. *C. botryodes*
- 21b. Outer phyllaries ending in a spinule or acumen to 2 mm, outer phyllaries much shorter than inner 13. *C. interpositum*
- 16b. Leaves adaxially smooth and not spinulose.
- 22a. Corolla yellow or white.
- 23a. Plants 80–150 cm tall; involucre 4–4.5 cm in diam.; leaves concolorous 6. *C. monocephalum*
- 23b. Plants 45–50 cm tall; involucre ca. 2 cm in diam.; leaves discolorous 40. *C. alberti*
- 22b. Corolla red to purple.
- 24a. Plants stemless with all leaves basal.
- 25a. Petiole unwinged or with discontinuous wing; outer and middle phyllaries narrowly triangular, pectinately fringed with spinules 4. *C. souliei*
- 25b. Petiole with continuous wing; outer and middle phyllaries ovate to lanceolate, margin not spinulose 23. *C. esculentum*
- 24b. Plants with leafy stems at least 20 cm tall.
- 26a. Stems winged 29. *C. alatum*
- 26b. Stems unwinged.
- 27a. Outer phyllaries bractlike, dissimilar from and almost twice as long as middle and inner phyllaries 1. *C. bracteiferum*
- 27b. Outer phyllaries not bractlike, similar to and not longer than middle ones.
- 28a. Outer and middle phyllaries pectinately fringed with spinules.
- 29a. Leaves abaxially cobwebby or glabrous, adaxially glabrous 5. *C. fargesii*
- 29b. Leaves not cobwebby but with crispate multicellular hairs.
- 30a. Involucre ca. 4 cm in diam., sparsely cobwebby 2. *C. leo*
- 30b. Involucre ca. 2 cm in diam., glabrous 3. *C. henryi*
- 28b. Outer and middle phyllaries not fringed with spinules.
- 31a. Bracts surrounding capitula reduced to pectinately arranged long pungent spines.

- 32a. Leaves concolorous, green, glabrous 38. *C. semenowii*
 32b. Leaves discolorous, abaxially grayish green to whitish and cobwebby or felted, adaxially greenish and hairy.
 33a. Outer and middle phyllaries narrowed into a 0.1–0.5 cm spine 24. *C. periacanthaceum*
 33b. Outer and middle phyllaries tipped with a ca. 3 cm spine 39. *C. sairamense*
 31b. Bracts surrounding capitula (if present) not reduced to pectinately arranged long pungent spines.
 34a. Phyllaries in ca. 10 rows; corolla tube more than twice as long as limb 32. *C. pendulum*
 34b. Phyllaries in 5–8 rows; corolla tube shorter or at most slightly longer than limb.
 35a. Leaves undivided, margins entire or toothed with spinules of at most 2 mm.
 36a. Outer and middle phyllaries with an apical spine 3–7 mm 30. *C. vernonioides*
 36b. Phyllaries with an apical spinule of at most 1 mm.
 37a. Leaves discolorous, abaxially grayish to white and felted.
 38a. Lower cauline leaves petiolate, to 3 cm wide, narrowed at base 19. *C. vlassovianum*
 38b. All cauline leaves sessile, at least 4 cm wide, semiamplexicaul 21. *C. helenioides*
 37b. Leaves concolorous, abaxially green and glabrous or with multicellular hairs but not felted.
 39a. Involucre ovoid 18. *C. serratuloides*
 39b. Involucre campanulate.
 40a. Outer and middle phyllaries abaxially with a dark resinous gland 17. *C. viridifolium*
 40b. Phyllaries lacking a resinous gland 20. *C. fanjingshanense*
 35b. Leaves pinnately divided (or at least lobed), margin usually distinctly spiny.
 41a. At least upper cauline leaves discolorous, abaxially gray to white and felted, adaxially ± green.
 42a. Lower cauline leaves petiolate, often concolorous; capitula corymbose 25. *C. maackii*
 42b. All cauline leaves sessile, discolorous; capitula racemose 26. *C. racemiforme*
 41b. Leaves concolorous, abaxially green and glabrous or with sparse to dense multicellular hairs but not felted.
 43a. Involucre 2–3 cm in diam.
 44a. Cauline leaves sessile; basal leaves present at anthesis 22. *C. japonicum*
 44b. Lower and middle cauline leaves petiolate; basal leaves withered at anthesis 28. *C. schantarense*
 43b. Involucre 3–4.5 cm in diam.
 45a. Corolla tube less than 1/2 as long as limb; outer and middle phyllaries abaxially with a dark resinous gland 27. *C. fangii*
 45b. Corolla tube slightly longer than limb; phyllaries lacking a resinous gland 31. *C. handelii*

1. *Cirsium bracteiferum* C. Shih, Acta Phytotax. Sin. 22: 388. 1984.

刺盖草 *ci gai cao*

Herbs to 40 cm tall, perennial. Stems erect, branched above, unwinged, with long multicellular hairs and apically also cobwebby. Leaves concolorous, surface smooth but with sparse multicellular hairs. Upper cauline leaves sessile, elliptic, ca. 13 × 4 cm, pinnatipartite, semiamplexicaul; segments 6 or 7 pairs, obliquely triangular, margin sparsely spinose or with teeth tipped with a 3–6 mm spine. Bracts similar to leaves but smaller. Peduncles stout, with dense multicellular hairs. Capitula several, racemose. Involucre broadly campanulate, 3–4.5 cm in diam., glabrous. Phyllaries in ca. 6 rows, lacking wings and scarious appendage; outer phyllaries bractlike, 3.5–4 × 0.3–0.5 cm, margin minutely toothed and spiny, basal portion elliptic to lanceolate, apical portion subulate and narrowed into a long spine; middle and inner phyllaries markedly different, elliptic to broadly linear, ca. 2.1 × 0.2–0.4 cm, apex acute. Florets bisexual. Corolla purplish red, ca. 2.1 cm, tube ca. 1 cm. Mature achene unknown. Fl. Jul.

- Slopes; ca. 1500 m. Chongqing (Nanchuan).

2. *Cirsium leo* Nakai & Kitagawa, Rep. Exped. Manchoukuo Sect. IV, 1: 60. 1934.

魁薊 *kui ji*

Cirsium chienii C. C. Chang; *C. pinnatibracteatum* Y. Ling.

Herbs 40–100 cm, perennial. Stems simple or tufted, erect, branched above or rarely unbranched, ribbed, unwinged, with long crispate multicellular hairs. Leaves concolorous, green, surface smooth and not cobwebby but with crispate multicellular hairs dense abaxially along veins but scattered elsewhere. Basal and lower cauline leaves with petiole to 5 cm; leaf blade elliptic to oblanceolate-elliptic, 10–25 × 4–7 cm, pinnatipartite; segments 8–12 pairs, semiorbicular, ± narrowly elliptic, or obliquely triangular, with unequal triangular teeth laterally spiny and with an apical (3–)5–6(–12) mm spine. Middle and upper cauline leaves similar but sessile and gradually smaller upward. Capitula corymbose. Involucre campanulate, ca. 4 cm in diam., sparsely cobwebby. Phyllaries in ca. 8 rows, lacking wings and scarious appendage, all of similar length; outer and middle phyllaries 2–3 × 0.2–0.3 cm, pectinately fringed with spinules

to 2.5 mm, basal portion triangular to lanceolate, apical portion subulate tipped with a ca. 3 mm spinule; inner phyllaries lanceolate to linear, ca. $2 \times 0.1\text{--}0.2$ cm, apex long acuminate. Florets bisexual. Corolla purplish red, ca. 2.4 cm, tube ca. 1 cm. Achene dark gray, ca. 5 mm. Pappus bristles dirty white, ca. 2.2 cm. Fl. and fr. May–Sep.

- Mountain valleys, slopes, forest margins, flooded lands, rock crevices, along streams, wet places; 700–3400 m. Gansu, Hebei, Henan, Ningxia, Shaanxi, Shanxi, Sichuan.

3. *Cirsium henryi* (Franchet) Diels, Bot. Jahrb. Syst. 29: 627. 1901.

刺苞蓟 ci bao ji

Cnicus henryi Franchet, J. Bot. (Morot) 11: 21. 1897; *Cirsium forrestii* (Diels) H. Léveillé; *C. melanolepis* Petrak; *C. taliense* (Jeffrey) H. Léveillé; *Cnicus forrestii* Diels; *C. taliensis* Jeffrey.

Herbs 30–50 cm tall, perennial. Stems erect, branched above, rarely unbranched, unwinged, with brown multicellular hairs. Leaves concolorous, surface green to pale green, smooth, and not cobwebby but with \pm dense crispate multicellular hairs. Basal and lower cauline leaves petiolate; leaf blade lanceolate, oblanceolate, or \pm narrowly elliptic, 10–18 \times 4–8 cm, pinnately divided; segments 5–8 pairs, elliptic, lanceolate, or triangular, with unequal triangular teeth laterally spiny and with an apical (2–)6–7 mm spine; terminal segment largest. Middle and upper cauline leaves similar but sessile and gradually smaller upward. Bracts entire, \pm broadly linear, margin spiny. Capitula corymbose or paniculate, \pm nodding. Involucre campanulate, ca. 2 cm in diam., glabrous. Phyllaries in ca. 6 rows, lacking wings and scarious appendage, all of similar length; outer and middle phyllaries narrowly triangular, 11–14 \times 1.5–2 mm, pectinately fringed with geminate 2.5–3 mm spinules, apex narrowed into a spinule; inner phyllaries triangular to lanceolate, 13–14 \times ca. 2 mm, not spinulose. Florets bisexual. Corolla purple, ca. 1.6 cm, tube ca. 1 cm. Achene brownish, ca. 4 mm. Pappus bristles brownish, to 1.5 cm. Fl. and fr. Jun–Oct.

- Meadows; 2700–3500 m. W Hubei, Sichuan, Yunnan.

4. *Cirsium souliei* (Franchet) Mattfeld, J. Arnold Arbor. 14: 42. 1933.

葵花大蓟 kui hua da ji

Cnicus souliei Franchet, J. Bot. (Morot) 11: 21. 1897.

Herbs, stemless, perennial. All leaves basal, rosulate, petiolate, concolorous, green, smooth, with long multicellular hairs particularly along veins; petiole 1.5–4 cm, unwinged or with discontinuous wing; leaf blade \pm narrowly elliptic, elliptic-lanceolate, or oblanceolate, 8–21 \times 2–6 cm, pinnately lobed to pinnatipartite; segments 7–11 pairs, ovate-lanceolate, elliptic, or broadly triangular, toothed; teeth with a 2–5 mm apical spinule or spine; terminal segment largest. Peduncles short. Capitula few to many, clustered in center of rosette. Involucre campanulate, 3–5 cm in diam., glabrous. Phyllaries in 3–5 rows, lacking wings and scarious appendage, all of similar length; outer and middle phyllaries narrowly triangular, 1.8–2.3 \times 0.1–0.2 cm, pectinately fringed with 2–3 mm spinules, tipped with a slender

ca. 5 mm spine; inner phyllaries ca. 2.5×0.2 cm, not spinulose. Florets bisexual. Corolla purplish red, ca. 2.3 cm, tube ca. 1.8 cm. Achene dark, ca. 5 mm. Pappus bristles dirty white to brownish, to 2 cm. Fl. and fr. Jul–Sep.

- Forest margins, roadsides, fallow fields, flooded lands, fields, moist places by water; 1900–4800 m. Gansu, S Ningxia, Qinghai, Sichuan, Xizang [India (Sikkim)].

5. *Cirsium fargesii* (Franchet) Diels, Bot. Jahrb. Syst. 29: 627. 1901.

等苞蓟 deng bao ji

Cnicus fargesii Franchet, J. Bot. (Morot) 11: 22. 1897.

Herbs to 1 m tall, perennial. Stems erect, sparingly branched above, ribbed, unwinged, sparsely cobwebby and with long multicellular hairs. Leaves smooth on both faces, abaxially green or grayish white and glabrous or sparsely cobwebby-felted, adaxially green and glabrous. Lower to middle cauline leaves petiolate; leaf blade broadly lanceolate to lanceolate, 20–30 \times 7–8 cm, pinnatifid; segments ca. 6 pairs, elliptic to \pm broadly triangular, teeth laterally shortly spiny and with an apical spine to 1 cm; terminal segment narrowly lanceolate, margin spiny. Middle and upper cauline leaves similar but sessile, semiamplexicaul. Capitula few, corymbose. Involucre broadly campanulate, ca. 4 cm in diam., \pm cobwebby. Phyllaries in ca. 4 rows, lacking wings and scarious appendage, all of similar length; outer and middle phyllaries 2.1–2.4 \times ca. 0.3 cm, pectinately fringed with ca. 2 mm spinules, basal portion linear to triangular, apical portion subulate, patent to slightly recurved, and tipped with a brown spine; inner phyllaries linear, ca. 2.1 \times 0.2 cm, with an apical spine. Florets bisexual. Corolla purplish, ca. 2.2 cm, tube ca. 1 cm. Mature achene unknown. Pappus bristles to 2 cm. Fl. Jul.

- Slopes; 2400–2500 m. Hubei, Shaanxi, Sichuan.

6. *Cirsium monocephalum* (Vaniot) H. Léveillé, Repert. Spec. Nov. Regni Veg. 12: 189. 1913.

马刺蓟 ma ci ji

Cnicus monocephalus Vaniot, Bull. Acad. Int. Géogr. Bot. 12: 122. 1903; *Cirsium cavaleriei* (H. Léveillé) H. Léveillé; *C. provostii* (Franchet) Petrak var. *monocephalum* (Vaniot) Petrak; *C. provostii* var. *oleracioides* Petrak; *C. provostii* var. *racemosum* Petrak; *C. provostii* var. *spinosum* Petrak; *Cnicus cavaleriei* H. Léveillé.

Herbs 0.8–1.5 m tall, perennial. Stems erect, branched above, ribbed, unwinged, sparsely cobwebby and with long multicellular hairs. Leaves concolorous, green, surface smooth and glabrous or with sparse long multicellular hairs. Middle cauline leaves sessile, \pm narrowly elliptic to lanceolate, 15–25 \times 5–9 cm, pinnatipartite; segments 5–10 pairs, \pm narrowly lanceolate to triangular, margin spiny or with teeth tipped with a 3–10 mm spine. Upper cauline leaves similar but smaller. Capitula few, corymbose to paniculate. Involucre broadly campanulate to hemispheric, 4–4.5 cm in diam., sparsely cobwebby. Phyllaries in ca. 8 rows, 2.2–3.5 \times 0.3–0.4 cm, all of similar length, lacking wings and scarious appendage, basal portion linear, apical portion subulate, patent to reflexed, and narrowed into a

long spine. Florets bisexual. Corolla white or yellowish, ca. 1.4 cm, tube ca. 7 mm. Achene brown, ca. 3.5 mm. Pappus bristles to 1.7 cm. Fl. and fr. Jul–Oct.

• Mountain valleys, forest margins, forests, thickets, wastelands; 700–2000 m. Chongqing, S Gansu, Guizhou, SW Hubei, S Shaanxi (Qin Ling), S Shanxi, Sichuan.

7. *Cirsium eriophoroides* (J. D. Hooker) Petrak, *Biblioth. Bot.* 18(Heft 78): 9. 1912.

贡山薊 gong shan ji

Cnicus eriophoroides J. D. Hooker, *Fl. Brit. India* 3: 363. 1881; *Cirsium bolocephalum* Petrak; *C. bolocephalum* var. *racemosum* Petrak; *C. bolocephalum* subsp. *setschwanicum* Petrak.

Herbs 1–3 m tall, perennial. Stems erect, branched above, unwinged, sparsely cobwebby and with long multicellular hairs. Leaves papery, concolorous, green, abaxially glabrous or sparsely cobwebby and with multicellular hairs, adaxially with sparse 3–8 mm spinules and spines but sometimes almost completely smooth. Lower and middle cauline leaves petiolate; leaf blade elliptic, 20–35 × 8–15 cm, toothed or pinnately divided; segments when present 4–8 pairs, elliptic, semiorbicular, or ovate, with 2–5 spines or teeth laterally shortly spiny and with a 0.5–1.5 cm apical spine. Upper cauline leaves similar but sessile. Capitula few, corymbose, nodding to erect. Involucre globose, ca. 5 cm in diam., densely and fluffily lanate. Phyllaries in ca. 6 rows, all of similar length or inner somewhat longer, lacking wings and scarious appendage; outer and middle phyllaries 2–3 × 0.2–0.4 cm, basal portion lanceolate to triangular, apical portion subulate and 1.5–2 cm; inner phyllaries ca. 3.5 × 0.2–0.3 cm, basal portion linear-lanceolate to linear, apical portion subulate and ca. 1.5 cm. Florets bisexual. Corolla purple, ca. 3.5 cm, tube ca. 2.2 cm. Achene dark brown, ca. 5 mm. Pappus bristles ca. 2.5 cm. Fl. and fr. Jul–Oct.

Slopes, thickets, thicket margins, grasslands, meadows, flooded lands, by water; 2000–4100 m. SW Sichuan, SE Xizang, Yunnan [Bhutan, India (Sikkim)].

8. *Cirsium subulariforme* C. Shih, *Fl. Reipubl. Popularis Sin.* 78(1): 90. 1987.

钻苞薊 zuan bao ji

Cirsium subuliforme C. Shih, *Acta Phytotax. Sin.* 22: 391. 1984, not G. B. Ownbey (1982).

Herbs 1.5–2 m tall, perennial. Stems erect, ribbed, unwinged, sparsely cobwebby, often densely cobwebby below capitula. Leaves papery, discolorous, abaxially grayish white and densely felted, adaxially green to yellowish green, very rough, and covered with dense 1–3 mm spinules and scattered 4–11 mm spines. Lower cauline leaves with winged petiole to 14 cm, wing undulate to dissected into semiorbicular segments and with 1–1.5 cm spines or spine-tipped teeth; leaf blade elliptic, ca. 33 × 18 cm, pinnatifid; segments 7 or 8 pairs, elliptic, with 3–5 unequal triangular teeth fringed with ca. 1 mm spinules and with a ca. 1 cm apical spine. Middle and upper cauline leaves sessile, narrowly elliptic to lanceolate, gradually smaller upward, semiamplexicaul, margin entire or toothed and with 5–

10 mm spines. Bracts reduced to spines. Capitula corymbose to racemose. Involucre campanulate, 3–4 cm in diam., glabrous. Phyllaries in ca. 7 rows, ca. 18 × 1.5–2 mm, all of similar length or somewhat longer inwardly, lacking wings and scarious appendage, basal portion linear, lanceolate, or elliptic, apical portion subulate and 3–10 mm. Florets bisexual. Corolla purple, ca. 3 cm, tube ca. 1.9 cm. Achene ca. 5 mm. Pappus bristles brownish to dirty white, ca. 1.8 cm. Fl. and fr. Jul–Aug.

• Grasslands on mountain slopes, thickets in river valleys, forests; 1500–2500 m. SE Xizang, NW Yunnan.

9. *Cirsium verutum* (D. Don) Sprengel, *Syst. Veg.*, ed. 16, 3: 370. 1826.

苞叶薊 bao ye ji

Cnicus verutus D. Don, *Prodr. Fl. Nepal.* 167. 1825; *Cirsium involucreatum* Candolle, nom. illeg. superfl.

Herbs 1–1.5 m tall, perennial. Stems erect, branched, unwinged, with long multicellular hairs. Leaves concolorous, green, abaxially glabrous or sparsely cobwebby and with long multicellular hairs, adaxially rough and sparsely to densely spinulose. Middle cauline leaves sessile, oblanceolate, 15–20 × 3–9 cm, pinnatifid, semiamplexicaul; segments ca. 10 pairs, ovate to elliptic, with unequal triangular teeth with 1–2 mm lateral spinules and a 3–5 mm apical spine, basal teeth sometimes spiniform. Upper cauline leaves similar but ovate to narrowly elliptic, segments or teeth with a 5–10 mm apical spine. Bracts ovate, margin spiny or with spiny teeth. Capitula corymbose. Involucre campanulate, 3–3.5 cm in diam., glabrous or sparsely cobwebby. Phyllaries imbricate, in ca. 7 rows, lacking wings and scarious appendage; outer and middle phyllaries 1.2–2.5 × 0.2–0.3 cm, basal portion triangular to lanceolate, apical portion subulate, 1–1.2 cm, and patent to reflexed; inner phyllaries linear-lanceolate, ca. 2.5 × 0.2 cm, apex long acuminate. Florets bisexual. Corolla reddish purple, ca. 2.8 cm, tube ca. 1.5 cm. Achene dark, ca. 3.5 mm. Pappus bristles brownish, to 2 cm. Fl. and fr. Jul–Sep.

Slopes, forests, forest margins; 2900–3900 m. Xizang [Afghanistan, Bhutan, India, Nepal, Pakistan, Vietnam].

10. *Cirsium chlorolepis* Petrak, *Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl.* 63: 109. 1926.

两面薊 liang mian ji

Herbs 30–100 cm tall, perennial. Stems erect, branched above, unwinged, with dense long multicellular hairs and sparsely cobwebby, densely cobwebby-felted above. Leaves concolorous, green to yellowish green, abaxially sparsely covered with spinules less than 1 mm, adaxially rough and densely covered with 1–2 mm spinules. Lower and middle leaves sessile, lanceolate, oblanceolate, or elliptic, 16–20 × 6–8 cm, pinnately divided, amplexicaul; segments 5–8 pairs, triangular-lanceolate to ± narrowly triangular, fringed with spinules, with a 5–7 mm apical spine; terminal segment largest. Upper cauline leaves similar but smaller. Capitula racemose or corymbose, ± nodding. Involucre broadly campanulate, 3.5–4 cm in diam., glabrous or sparsely cobwebby. Phyllaries in 7 or 8 rows, 1.3–2.3 × 0.3–0.5 cm, all of similar length, lacking wings and

scarious appendage, basal portion lanceolate, apical portion subulate, 6–10 mm, and patent to recurved. Florets bisexual. Corolla purplish red, ca. 2 cm, tube ca. 1 cm. Achene yellowish, cuneate-oblancheolate, ca. 4 mm. Pappus bristles brownish. Fl. and fr. Jul–Oct.

• Forests, grasslands on mountain slopes; 1300–1800 m. SW Guizhou, Yunnan.

11. *Cirsium botryodes* Petrak, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 63: 109. 1926.

灰薊 hui ji

Cirsium griseum H. Léveillé (1913), not (Rydberg) Cockrell (1911); *C. heleophilum* Petrak; *C. mairei* (H. Léveillé) H. Léveillé (1913), not Halácsy (1908); *C. yunnanense* Petrak; *Cnicus mairei* H. Léveillé.

Herbs 50–100 cm tall, perennial. Stems grayish white, erect, usually branched, unwinged, with dense long multicellular hairs and cobwebby, densely felted below capitula. Leaves rigid, discolorous, abaxially grayish white and densely felted, adaxially greenish, rough, and densely spinulose. Lower to upper cauline leaves sessile, lanceolate to ovate-lanceolate, 12–16 × 6.5–8 cm, pinnately divided, semiamplexicaul; segments ca. 4 pairs, narrowly triangular to lanceolate, basally on one or both sides with a triangular tooth with 1–1.5 mm lateral spinules and a 3–7 mm apical spine, apex narrowed into a 5–7 mm spine. Bracts reduced to spines. Capitula racemose to racemose-corymbose. Involucre broadly campanulate, ca. 3.5 cm in diam., sparsely cobwebby. Phyllaries in ca. 7 rows, lacking wings and scarious appendage; outer phyllaries not much shorter than inner ones; outer and middle phyllaries 10–20 × 3–4 mm, basal portion ovate to elliptic, apical portion subulate and ending in a 0.8–1.3 cm spine; inner phyllaries lanceolate-subulate to linear, ca. 2.5 × 0.1–0.2 cm. Florets bisexual. Corolla white, ca. 2 cm, tube ca. 9 mm. Achene ca. 5 mm. Pappus bristles brownish, to 2 cm. Fl. and fr. May–Sep.

• Mountain valleys, grasslands on mountain slopes; 2800–3000 m. W Guizhou, W Hunan, S Sichuan, Yunnan.

12. *Cirsium lidjiangense* Petrak & Handel-Mazzetti in Handel-Mazzetti, Symb. Sin. 7: 1170. 1936.

丽江薊 li jiang ji

Herbs 70–120 cm tall, perennial. Stems erect, ribbed, branched above, unwinged, cobwebby to hirsute below, densely cobwebby above. Leaves discolorous, abaxially grayish white and densely felted, adaxially green and rough with sparse to dense 0.3–1 mm spinules. Lower cauline leaves sessile, elliptic, 50–60 × 18–24 cm, bipinnatifid, semiamplexicaul; primary segments 10 or 11 pairs; secondary segments 1 or 2 pairs, triangular to triangular-lanceolate, basally with 1 triangular, spine-tipped tooth; terminal lobe narrowly lanceolate, with 1 or 2 marginal spines and a 4–12 mm apical spine. Middle and upper cauline leaves similar but gradually smaller upward, with ± equally forked primary segments; secondary segments lanceolate. Capitula racemose to racemose-paniculate, nodding. Involucre globose, 4–5 cm in diam., densely lanate. Phyllaries in ca. 7 rows, lacking wings and scarious appendage; outer phyllaries

not much shorter than inner ones; outer and middle phyllaries 2.2–2.5 × 0.4–0.5 cm, apical portion triangular, lanceolate, or elliptic, apical portion subulate and with a 1–1.2 cm terminal spine; inner phyllaries linear-subulate, ca. 3.8 × 0.3 cm. Florets bisexual. Corolla reddish purple, ca. 2.2 cm, tube ca. 1.9 cm. Achene brown, ca. 5 mm. Pappus bristles brownish, ca. 2 cm. Fl. and fr. Jun–Aug.

• Meadows; 1800–3200 m. SW Sichuan, NW Yunnan.

13. *Cirsium interpositum* Petrak, Repert. Spec. Nov. Regni Veg. 43: 283. 1938.

披裂薊 pi lie ji

Cnicus griffithii J. D. Hooker (1881), not *Cirsium griffithii* Boissier (1875).

Herbs 2–2.5 m tall, perennial. Stems erect, stout, branched in upper half, ribbed, unwinged, sparsely cobwebby. Leaves discolorous, abaxially grayish white and densely felted, adaxially green, rough, and sparsely to densely spinulose. Middle cauline leaves sessile, ± narrowly elliptic, ca. 60 × 25 cm, pinnately divided, semiamplexicaul with auricles bearing 2–4 cm spines; segments 9–11 pairs, ± narrowly lanceolate, basally on both sides with 1 or 2 spiny teeth, fringed with 1–3 mm spinules, apex narrowed into a 1.5–2.5 cm spine. Upper cauline leaves similar but gradually smaller upward. Bracts lanceolate to linear, smaller than upper leaves, fringed with 2–2.5 cm spines. Capitula corymbose, ± nodding. Involucre broadly campanulate, 4–4.5 cm in diam., sparsely cobwebby, glabrescent. Phyllaries in ca. 10 rows, lacking wings and scarious appendage, outer phyllaries much shorter than inner ones; outer phyllaries triangular to lanceolate, 8–10 × 2.5–3 mm, apex narrowed into a 0.5–2 mm acumen or spinule; middle and inner phyllaries lanceolate to linear, 1.5–3 × 0.2–0.3 cm, apex acuminate and scarious. Florets bisexual. Corolla purple, ca. 3.5 cm, tube ca. 2.5 cm. Achene dark, ca. 5 mm. Pappus bristles brownish, ca. 2.5 cm. Fl. and fr. Sep–Nov.

• Forests, open forests, grasslands on mountain slopes; 2000–2500 m. SE Xizang, W Yunnan.

14. *Cirsium vulgare* (Savi) Tenore, Fl. Napol. 5: 209. 1835–1838.

翼薊 yi ji

Carduus vulgaris Savi, Fl. Pis. 2: 241. 1798; *C. lanceolatus* Linnaeus; *Cirsium lanceolatum* (Linnaeus) Scopoli (1772), not Hill (1769); *Eriolepis lanceolata* (Linnaeus) Cassini.

Herbs 25–150 cm tall, biennial. Stems grayish white, erect, branched above, winged, with sparse long multicellular hairs and cobwebby, densely felted above; wings toothed, teeth ending in a long spine. Leaves herbaceous, discolorous, abaxially grayish white and densely felted, adaxially green to yellowish green, rough and densely covered with ca. 1.5 mm spinules. Middle cauline leaves sessile, linear-lanceolate, lanceolate, or oblanceolate, 10–15 × 4–5 cm, bipinnatifid; primary segments 3 or 4 pairs, equally or unequally forked; secondary segments triangular to lanceolate, fringed with spinules, apex with a 5–10 mm spine; terminal lobe lanceolate, fringed

with spinules and a few spines 5–10 mm. Upper cauline leaves similar but gradually smaller upward. Bracts linear, margin with long spines. Capitula few to many, paniculate-corymbose to racemose, erect. Involucre ovoid, 3–5 cm in diam., glabrous. Phyllaries imbricate, in ca. 10 rows, lacking wings and scarious appendage; outer and middle phyllaries $0.8\text{--}3 \times 0.2\text{--}0.4$ cm, basal portion triangular, lanceolate, or linear, apical portion subulate, 5–9 mm, and narrowed into a spine; inner phyllaries linear, ca. 3.4×0.3 cm, apex acuminate. Florets bisexual. Corolla red, ca. 3 cm, tube filiform, ca. 2 cm. Achene brown, ca. 4 mm. Pappus bristles white, to 3 cm. Fl. and fr. Jul–Aug. $2n = 34, 68$.

Farmlands, wet grasslands; 400–1800 m. N Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Turkmenistan; N Africa, SW Asia, Europe].

Cirsium vulgare is a noxious weed that is naturalized in many parts of the world.

15. *Cirsium fuscotrichum* C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 7: 161. 1936 [*“fusco-trichum”*].

褐毛薊 he mao ji

Herbs ca. 90 cm tall, perennial. Stems ribbed, unwinged, ± densely brownish hirsute. Leaves concolorous, greenish, abaxially with short brown bristles along veins but otherwise glabrous, adaxially sparsely to densely bristly and rough. Lower cauline leaves sessile, oblanceolate, ca. 22×9 cm, pinnatifid; segments ca. 7 pairs, subtriangular, often 1- or 2-lobulate near base, fringed with spinules, apex with a long spine. Middle and upper cauline leaves similar but smaller, base amplexicaul. Capitula few, corymbose. Involucre hemispheric, ca. 6 cm in diam., hirsute. Phyllaries in ca. 6 rows, $3\text{--}4 \times 0.1\text{--}0.2$ cm, lacking wings and scarious appendage, abaxially brownish hirsute with dense long rigid bristles, basal portion lanceolate to linear, apical portion subulate. Corolla not seen. Achene brownish, ca. 4 mm, with 1 stria on each side. Pappus bristles brownish, ca. 1.4 cm. Fl. and fr. Aug.

• Slopes; ca. 2500 m. Sichuan (Pingwu).

16. *Cirsium muliense* C. Shih, Acta Phytotax. Sin. 22: 393. 1984.

木里薊 mu li ji

Herbs 25–100 cm tall, perennial. Stems grayish white, erect, unbranched, ribbed, unwinged, long villous; synflorescence axes densely felted. Leaves discolorous, surface smooth, abaxially grayish white and densely felted, adaxially green and glabrous. Cauline leaves sessile, elliptic, $6\text{--}7 \times 1.5\text{--}2$ cm, pinnatifid, auriculate amplexicaul; segments 3 or 4 pairs, broadly triangular to semiorbicular, fringed with 1–2 mm spinules and with 3–5 unequal triangular teeth ending in a 4–6 mm spine. Upper cauline leaves usually undivided, margin spiny or with spine-tipped teeth, spines to 1.4 cm. Capitula few, racemose, erect. Involucre campanulate, ca. 5 cm in diam., villous. Phyllaries in ca. 6 rows, lacking wings and scarious appendage, abaxially villous with dense long multicellular hairs; outer phyllaries $15\text{--}16 \times 1\text{--}2$ mm, basal portion triangular, apical portion subulate, 0.9–1.1 cm, and spine-tipped; middle phyllaries 1.6--

$1.9 \times 0.2\text{--}0.3$ cm, basal portion lanceolate, apical portion subulate and 4–11 mm; inner phyllaries linear, ca. 17×1 mm, apex acuminate and scarious. Florets bisexual. Corolla red, ca. 1.4 cm, tube ca. 6 mm. Mature achene unknown. Pappus bristles white, ca. 1.2 cm. Fl. Nov.

• Dry mountain slopes; ca. 3200 m. SW Sichuan (Muli).

17. *Cirsium viridifolium* (Handel-Mazzetti) C. Shih, Acta Phytotax. Sin. 22: 394. 1984.

块薊 kuai ji

Cirsium vlassovianum Fischer ex Candolle var. *viridifolium* Handel-Mazzetti, Oesterr. Bot. Z. 85: 223. 1936; *C. salicifolium* (Kitagawa) C. Shih; *C. vlassovianum* var. *salicifolium* Kitagawa.

Herbs 30–40 cm tall, perennial. Stems erect, unbranched or little branched, ribbed, unwinged, with sparse long bristles, also cobwebby above. Leaves undivided, concolorous, green, surface smooth, glabrous or with multicellular hairs. Lower cauline leaves sessile and semiamplexicaul or narrowed into a petiole to 2.5 cm; leaf blade elliptic to lanceolate, $7\text{--}8 \times 1.5\text{--}2$ cm, margin fringed with 1–2 mm spinules, apex acute and spine-tipped. Middle and upper cauline leaves similar but gradually smaller upward. Capitula 1 to few. Involucre campanulate, 1.5–2 cm in diam., glabrous or sparsely cobwebby. Phyllaries imbricate, in ca. 7 rows, lacking marginal spinules, wings, and scarious appendage, all or only inner phyllaries abaxially with a resinous gland; outer and middle phyllaries triangular to lanceolate, $3\text{--}10 \times 1\text{--}2$ mm, apex acute and tipped with an acumen less than 0.5 mm; inner phyllaries elliptic to linear-lanceolate, $12\text{--}15 \times 1.5\text{--}2$ mm, apex acuminate and scarious. Florets bisexual. Corolla purple, ca. 1.9 cm, tube ca. 9 mm. Achene brown, 3.5–4 mm, ribbed. Pappus bristles brownish, ca. 1.5 cm. Fl. and fr. Aug–Sep.

• Moist places, streamsides, roadsides, slopes; 200–2000 m. Hebei, Jilin, Nei Mongol.

18. *Cirsium serratuloides* (Linnaeus) Hill, Hort. Kew. 64. 1768.

麻花头薊 ma hua tou ji

Carduus serratuloides Linnaeus, Sp. Pl. 2: 825. 1753; *Cirsium asiaticum* Schischkin; *Cnicus serratuloides* (Linnaeus) Roth.

Herbs to 1.2 m tall, perennial. Stem solitary, erect, branched above, ribbed, unwinged, with sparse long multicellular hairs; synflorescence branches usually sparsely cobwebby. Leaves undivided, concolorous, green, surface smooth but with long multicellular hairs. Middle cauline leaves sessile, lanceolate, $10\text{--}15 \times 1.5\text{--}3$ cm, auriculate semiamplexicaul, fringed with spinules less than 0.5 mm, apex acute. Upper cauline leaves similar but narrower and gradually smaller upward. Capitula erect, laxly corymbose. Involucre ovoid, 1.5–2 cm in diam., glabrous or sparsely cobwebby. Phyllaries imbricate, in ca. 7 rows, lacking marginal spinules, wings, and scarious appendage, abaxially glabrous; outer phyllaries triangular, ca. 6×1.2 mm, apex acuminate and tipped with a ca. 1 mm spinu-

lose acumen; middle phyllaries ovate-lanceolate to lanceolate, ca. 7×2 – 2.2 mm, tipped with an acumen less than 0.5 mm; inner phyllaries lanceolate to linear-lanceolate, 8 – 15×1.5 – 2 mm, apex acuminate and scarious. Florets bisexual. Corolla purplish red, ca. 2 cm, tube ca. 1 cm. Achene brownish, ca. 4 mm. Pappus bristles white, ca. 1.5 cm. Fl. and fr. Jul–Oct. $2n = 34$.

Forests on mountain slopes, by rivers, by water; 1200–2600 m. Xinjiang (Altay Shan) [Mongolia, Russia].

19. *Cirsium vlassovianum* Fischer ex Candolle, Prodr. 6: 653. 1838.

绒背蓟 rong bei ji

Cirsium vlassovianum var. *bracteatum* Ledebour; *Cnicus vlassovianus* (Fischer ex Candolle) Maximowicz.

Herbs 25–90 cm tall, perennial. Roots tuberous. Stems erect, unbranched or branched above, ribbed, unwinged, with sparse long multicellular hairs apically mixed with sparse felt. Leaves discolorous, surface smooth, abaxially white and densely felted, adaxially green and with sparse multicellular hairs. Lower cauline leaves petiolate; leaf blade lanceolate to elliptic-lanceolate, 6 – 20×2 – 3 cm, undivided, fringed with ca. 1 mm spinules, apex obtuse to acuminate. Middle and upper cauline leaves similar but auriculate semiamplexicaul. Capitula 1 to few, corymbose, erect. Involucre narrowly ovoid, ca. 2 cm in diam., glabrous or sparsely cobwebby. Phyllaries imbricate, in ca. 7 rows, lacking marginal spinules, wings, and scarious appendage, abaxially with a dark resinous gland; outer and middle phyllaries triangular to lanceolate, 5 – $11 \times$ ca. 2 mm, apex acute and tipped with a spinule less than 1 mm; inner phyllaries broadly linear, ca. 2×0.2 cm, apex acuminate and scarious. Florets bisexual. Corolla purple, ca. 1.7 cm, tube ca. 7 mm. Achene brownish striate with brown, ca. 4 mm. Pappus bristles ca. 1.5 cm. Fl. and fr. May–Sep. $2n = 28, 34$.

Forests, forest margins, by rivers, moist places; 300–1500 m. Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Shanxi [Korea, Mongolia, Russia].

20. *Cirsium fanjingshanense* C. Shih, Acta Phytotax. Sin. 22: 394. 1984.

梵净蓟 fan jing ji

Herbs to 1 m tall, ?perennial. Stems erect, sparingly branched above, unwinged, subglabrous. Leaves concolorous, green, surface smooth and glabrous. Upper cauline leaves sessile, ovate-elliptic, broadly elliptic, or obovate, 8 – 16×5 – 9 cm, undivided, auriculate semiamplexicaul, fringed with 0.5 – 2 mm spinules and with simple or double teeth, apex acute to obtuse and spinule-tipped. Bracts sessile, narrowly elliptic to lanceolate, base auriculate semiamplexicaul. Capitula few, terminal on long branches. Involucre broadly campanulate, 2 – 2.5 cm in diam., glabrous or sparsely cobwebby. Phyllaries imbricate, in ca. 6 rows, lacking an abaxial resinous gland, marginal spinules, wings, and scarious appendage; outer and middle phyllaries ovate-lanceolate, elliptic, or lanceolate, 12 – 17×2 – 3.5 mm, apex acuminate and tipped with a short spinule; inner phyllaries broadly linear, ca. 15×1.8 mm, apex acuminate and scarious. Florets bisexual. Corolla purplish, ca. 1.8 cm, tube ca.

8 mm. Mature achene unknown. Pappus bristles dirty white, ca. 1.3 cm. Fl. Jul.

• Grasslands, mountain slopes. Guizhou (Fanjing Shan).

21. *Cirsium helenioides* (Linnaeus) Hill, Hort. Kew. 64. 1768.

堆心蓟 dui xin ji

Carduus helenioides Linnaeus, Sp. Pl. 2: 825. 1753; *Cirsium heterophylloides* Pavlov (1938), not Treuinfels (1875); *Cnicus helenioides* (Linnaeus) Retzius.

Herbs 0.4–2 m tall, perennial. Stems erect, branched above, ribbed, unwinged, sparsely cobwebby. Leaves discolorous, surface smooth, abaxially grayish white and densely felted, adaxially green and with multicellular hairs. Basal leaves present at anthesis, long petiolate. Lower and middle cauline leaves sessile, \pm narrowly elliptic or lanceolate, 10 – 30×4 – 6 cm, undivided, semiamplexicaul, margin with numerous obliquely triangular teeth tipped by a 0.5 – 1 mm spinule and smaller regular spinules in sinuses. Upper cauline leaves similar but gradually smaller upward. Capitula 1 to few, corymbose, erect. Involucre campanulate, ca. 2.5 cm in diam., glabrous or subglabrous. Phyllaries imbricate, in ca. 6 rows, lacking marginal spinules, wings, and scarious appendage; outer and middle phyllaries triangular to lanceolate-elliptic, 6 – 10×1.5 – 2 mm, apex acute and tipped with a spinule less than 0.2 mm; inner phyllaries elliptic to linear-elliptic, 13 – 15×2 – 2.5 mm, apex acuminate and scarious. Florets bisexual. Corolla red, ca. 2 cm, tube ca. 8 mm. Achene yellowish, ca. 4.5 mm. Pappus bristles white or dirty white, ca. 2 cm. Fl. and fr. Sep. $2n = 34$.

Moist grasslands in mountain valleys, forests, forest margins; 1700–2300 m. N Xinjiang (Burqin) [Kazakhstan, Russia].

22. *Cirsium japonicum* Candolle, Prodr. 6: 640. 1838.

蓟 ji

Carduus japonicus (Candolle) Franchet; *Cirsium beling-shanicum* Petrak; *C. bodinieri* (Vaniot) H. Léveillé; *C. cerberus* (Vaniot) H. Léveillé; *C. hainanense* Masamune; *C. japonicum* var. *australe* Kitamura; *C. japonicum* var. *fukienense* Kitamura; *C. japonicum* var. *intermedium* (Maximowicz) Matsuura; *C. japonicum* var. *takaoense* Kitamura; *C. kiusianum* Nakai; *C. lacinulatum* Nakai; *C. maackii* Maximowicz var. *intermedium* (Maximowicz) Nakai; *C. maackii* var. *kiusianum* (Nakai) Nakai; *C. senile* Nakai; *C. smithianum* Petrak; *Cnicus bodinieri* Vaniot; *C. cerberus* Vaniot; *C. japonicus* (Candolle) Maximowicz; *C. japonicus* var. *intermedius* Maximowicz.

Herbs 30–80(–150) cm tall, perennial. Roots tuberous, fusiform. Stems grayish white, erect, unbranched or branched above, ribbed, unwinged, with sparse to dense long multicellular hairs mixed with dense felt under capitula. Leaves concolorous, green, with sparse multicellular hairs along veins or glabrous, surface smooth. Basal leaves present at anthesis, with winged petiole, wing spiny or with spiny teeth; leaf blade ovate, obovate, or \pm narrowly elliptic, 8 – 20×2.5 – 8 cm, pinnately divided; segments 6–12 pairs, ovate-lanceolate, elliptic, \pm narrowly triangular, or triangular-lanceolate, toothed, teeth with marginal and 2–6 mm apical spines; terminal segment largest, lanceolate to narrowly triangular. Lower and middle cauline

leaves similar but sessile, gradually smaller upward, semiamplexicaul. Capitula solitary or few, clustered at end of stem, erect or rarely nodding. Involucre campanulate, ca. 3 cm in diam., glabrous or sparsely cobwebby. Phyllaries imbricate, in ca. 6 rows, lacking marginal spinules, wings, and scarious appendage, abaxially with a dark resinous gland; outer and middle phyllaries triangular to narrowly triangular, 8–13 × 3–3.5 mm, narrowed into a 1–2 mm spine; inner phyllaries lanceolate to linear-lanceolate, 1.5–2 × 0.2–0.3 cm, apex acuminate and softly spiny. Florets bisexual. Corolla red to purple, ca. 2.1 cm, tube ca. 9 mm. Achene ca. 4 mm. Pappus bristles pale brown, ca. 2 cm. Fl. and fr. Apr–Nov.

Forests, forest margins, thickets, grasslands, wastelands, farmlands, roadsides, streamsides; 400–2100 m. Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hebei, Hubei, Hunan, S Jiangsu, Jiangxi, Nei Mongol, NE Qinghai, Shaanxi, Shandong, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Korea, Russia (Far East), Vietnam].

23. *Cirsium esculentum* (Sievers) C. A. Meyer, Beitr. Pflanzentk. Russ. Reiches 5: 43. 1848.

莲座蓟 *lian zuo ji*

Cnicus esculentus Sievers, Neueste Nord. Beytr. Phys. Geogr. Erd- Volkerbeschreib. 3: 362. 1796; *Cirsium acaule* Ledebour var. *gmelinii* (Sprengel) C. A. Meyer; *C. acaule* var. *sibiricum* Ledebour; *C. esculentum* var. *acaule* C. A. Meyer; *C. gmelinii* (Sprengel) Tausch; *Cnicus gmelinii* Sprengel.

Herbs, stemless, perennial. All leaves basal, rosulate, concolorous, green, surface smooth with dense to sparse long multicellular hairs; petiole with entire, continuous wings; leaf blade oblanceolate or ± narrowly elliptic, 6–21 × 2.5–7 cm, pinnately divided; segments 4–7 pairs, basal ones usually reduced to spines, others obliquely ovate, elliptic, or semiobovate, margin with 2–4 mm spinules and teeth tipped with spines to 1 cm; terminal segment largest. Capitula 5–9, in basal cluster. Involucre campanulate, 2.5–3 cm in diam., glabrous. Phyllaries imbricate, in ca. 6 rows, lacking marginal spinules, wings, and scarious appendage; outer and middle phyllaries ovate to lanceolate, 10–20 × 2–4 mm, apex acute and tipped with a spinule to 0.5 mm; inner phyllaries linear-lanceolate to linear, 2.5–3 × 0.2–0.3 cm, apex acuminate and scarious. Florets bisexual. Corolla purple, ca. 2.7 cm, tube ca. 1.5 cm. Achene yellowish, ca. 5 mm. Pappus bristles white or dirty white, ca. 2.7 cm. Fl. and fr. Aug–Sep. $2n = 34$.

Moist places, by water in plains or on hilly areas; 500–3200 m. Hebei, Jilin, Liaoning, Nei Mongol, N and NW Xinjiang [Kazakhstan, Mongolia, Russia, Uzbekistan].

24. *Cirsium periacanthaceum* C. Shih, Acta Phytotax. Sin. 22: 396. 1984.

川蓟 *chuan ji*

Herbs 40–70 cm tall, perennial. Stems erect, branched above, ribbed, unwinged, densely felted with multicellular hairs. Leaves discolorous, surface smooth, abaxially grayish white and densely felted, adaxially greenish and with multicellular hairs. Basal leaves persistent at anthesis. Cauline leaves sessile, elliptic, 12–22 × 5–7 cm, pinnately divided, auriculate semiamplexicaul; segments 4–8 pairs, ± obliquely elliptic, with 3–7

unequal triangular teeth; teeth with 4–14 mm lateral spines and apical spine. Capitula many, corymbose, surrounded by pectinately spiny bracts with pungent 2–3 cm spines. Involucre campanulate, ca. 2 cm in diam., glabrous. Phyllaries imbricate, in ca. 5 rows, lanceolate to elliptic-lanceolate, 8–12 × ca. 3 mm, lacking marginal spinules, wings, and scarious appendage, apex narrowed into a 1–5 mm spine. Florets bisexual. Corolla red, ca. 1.5 cm, tube ca. 6 mm. Achene brown, ca. 4 mm. Pappus bristles brownish, ca. 1.5 cm. Fl. and fr. Jul–Sep.

• River valleys, grasslands on mountain slopes, roadsides; 2400–2600 m. Sichuan.

25. *Cirsium maackii* Maximowicz, Mém. Acad. Imp. Sci. St.-Petersbourg Divers Savans 9: 172. 1859.

野蓟 *ye ji*

Cirsium asperum Nakai; *C. japonicum* Candolle var. *amuraense* Kitamura; *C. japonicum* subsp. *maackii* (Maximowicz) Nakai; *C. japonicum* var. *maackii* (Maximowicz) Matsumura; *C. japonicum* var. *ussuriense* (Regel) Kitamura; *C. littorale* Maximowicz var. *ussuriense* Regel; *C. maackii* var. *koreiense* (Nakai) Nakai; *Cnicus japonicus* Maximowicz var. *maackii* (Maximowicz) Maximowicz; *C. maackii* (Maximowicz) Nakai; *C. maackii* var. *koreiensis* Nakai.

Herbs 40–150 cm tall, perennial. Roots tuberous, fusiform. Stems grayish white, erect, branched or unbranched, unwinged, with multicellular hairs and densely felted above. Leaves with smooth surface, concolorous with crispate hairs along veins or ± discolorous, abaxially grayish green and cobwebby. Basal and lower cauline leaves often concolorous, with winged petiole, wing spiny or with triangular spine-tipped teeth; leaf blade elliptic to lanceolate, 15–30 × 7–9 cm, pinnately divided; segments 4–8 pairs, elliptic, fringed with spinules and with unequal triangular teeth with lateral spinules less than 1 mm and a ca. 5 mm apical spine; terminal segment largest. Middle and upper cauline leaves similar but sessile, smaller, sometimes undivided, discolorous, auriculate semiamplexicaul. Capitula 1 or several, corymbose, erect or nodding. Involucre campanulate, ca. 2 cm in diam., glabrous or sparsely cobwebby. Phyllaries in ca. 5 rows, lacking marginal spinules, wings, and scarious appendage, abaxially with a dark resinous gland; outer and middle phyllaries triangular-lanceolate to lanceolate, 6–13 × 2–2.5 mm, margin ciliate, apex acute and tipped with a spinule less than 0.5 mm; inner phyllaries lanceolate to linear-lanceolate, 1.3–2.3 × 0.2–0.3 cm. Florets bisexual. Corolla purplish red, ca. 2.4 cm, tube ca. 1.2 cm. Achene yellowish, ca. 4 mm. Pappus bristles white, ca. 2 cm. Fl. and fr. Jun–Sep. $2n = 34, 36$.

Grasslands on mountain slopes, forest margins, meadows, near villages; 100–1100 m. S Anhui, Hebei, Heilongjiang, Jiangsu, Jilin, Liaoning, SE Nei Mongol, E Shandong, Sichuan, N Zhejiang [Korea, Russia].

26. *Cirsium racemiforme* Y. Ling & C. Shih, Acta Phytotax. Sin. 22: 445. 1984.

总序蓟 *zong xu ji*

Herbs to 1.5 m tall, perennial. Stems erect, branched above, ribbed, unwinged, with long multicellular hairs and cobwebby; synflorescence branches densely felted. Leaves dis-

colorous, surface smooth, abaxially grayish white and densely felted, adaxially green and with multicellular hairs. Basal leaves withered at anthesis. Cauline leaves sessile, \pm narrowly elliptic, 9–21 \times 4–7 cm, pinnately lobed or pinnatifid, auriculate semiamplexicaul; segments 3–8 pairs, elliptic to broadly triangular, toothed; teeth fringed with ca. 2 mm spinules and with a ca. 4 mm apical spine; terminal segment largest. Bracts similar to leaves or with spiny teeth. Peduncles ca. 2 cm. Capitula 4–8, racemose. Involucre campanulate, 2.5–3 cm in diam., glabrous or sparsely cobwebby. Phyllaries imbricate, in ca. 6 rows, lacking marginal spinules, wings, and scarious appendage; outer and middle phyllaries triangular to triangular-lanceolate, 6–9 \times 1–1.5 mm, abaxially with a dark resinous gland, apex acute and tipped with a 0.8–1.2 mm spinule; inner phyllaries linear-lanceolate to linear, 14–22 \times 0.5–1.5 mm, apex acuminate and scarious. Florets bisexual. Corolla purplish red, ca. 2.3 cm, tube ca. 1.2 cm. Achene yellowish, ca. 5 mm, striate. Pappus bristles dirty brown, ca. 2.2 cm. Fl. and fr. Apr–Jun.

• Mountain valleys, mountain slopes, forests, forest margins; 1000–1300 m. W Fujian, NE Guangxi, SW Guizhou, SW Hunan, NE Jiangxi, SE Yunnan.

27. *Cirsium fangii* Petrak, Repert. Spec. Nov. Regni Veg. 44: 48. 1938.

峨眉薊 e mei ji

Herbs to 1.2 m tall, ?perennial. Stems branched above, ribbed, unwinged, with long sparse multicellular hairs. Leaves concolorous, green, surface smooth, glabrous or abaxially with sparse long multicellular hairs. Basal leaves present at anthesis. Lower cauline leaves petiolate; petiole 2.5–4 cm, with expanded semiamplexicaul base and spiny wings; leaf blade lanceolate to linear-lanceolate, ca. 16 \times 7–10 cm, subpinnatisect; segments 6 or 7 pairs, elliptic, fringed with spinules, ca. 0.5 mm cilia, and a few triangular teeth with a ca. 2 mm apical spinule. Middle and upper cauline leaves similar but sessile, gradually smaller upward, semiamplexicaul. Bracts linear to linear-lanceolate, toothed, teeth with an apical spine to 6 mm. Capitula few, terminal on long branches, nodding. Involucre broadly campanulate, ca. 4.5 cm in diam., glabrous or sparsely cobwebby. Phyllaries in ca. 7 rows, lacking marginal spinules, wings, and scarious appendage; outer and middle phyllaries triangular-lanceolate to lanceolate, 6–15 \times 1.5–3 mm, abaxially with a dark resinous gland, margin sparsely ciliate, apex acute and tipped with a 0.5–1 mm spinule; inner and innermost phyllaries linear to broadly linear, ca. 2.4 \times 0.2–0.3 cm, apex acuminate. Florets bisexual. Corolla red, ca. 2.1 cm, tube ca. 6 mm. Achene ca. 3.5 mm, many ribbed. Pappus bristles brown, ca. 2 cm. Fl. and fr. Jul.

• Grasslands on mountain slopes; 2300–2400 m. Sichuan.

28. *Cirsium schantarens* Trautvetter & C. A. Meyer in Middendorff, Reise Sibir. 1(2): 58. 1856.

林薊 lin ji

Cirsium diamantiacum (Nakai) Nakai; *C. japonicum* Candolle var. *litorale* (Maximowicz) Kitamura; *C. litorale* Maximowicz; *C. litorale* var. *nudum* Regel; *C. maackii* Maximowicz var. *spiniferum* Nakai; *C. pendulum* Fischer ex Candolle var.

oligocephalum Regel & Tiling; *Cnicus diamantiacus* Nakai; *C. japonicus* (Candolle) Maximowicz var. *schantarensis* (Trautvetter & C. A. Meyer) Maximowicz.

Herbs 70–120 cm tall, perennial. Stems erect, diffusely branched above, unwinged, with sparse long multicellular hairs. Leaves concolorous, green, surface smooth, glabrous or with sparse multicellular hairs. Basal leaves withered at anthesis. Lower and middle cauline leaves petiolate; petiole base auriculate semiamplexicaul, margin winged and spiny or with spiny teeth; leaf blade elliptic, \pm narrowly ovate to triangular-lanceolate, 14–27 \times 8–12 cm, pinnately divided; segments 4–8 pairs, obliquely triangular, lanceolate, or broadly linear, fringed with spinules; terminal segment lanceolate. Upper cauline leaves sessile, progressively smaller, pinnately lobed or uppermost ones undivided, amplexicaul. Peduncles long. Capitula few, terminal, nodding. Involucre campanulate, ca. 2 cm in diam., glabrous or sparsely cobwebby. Phyllaries imbricate, in ca. 6 rows, lacking marginal spinules, wings, and scarious appendage, abaxially with or without a resinous gland; outer and middle phyllaries triangular to ovate-triangular, 5–8 \times 1.5–2 mm, apex narrowed into a ca. 1 mm spinule; inner phyllaries lanceolate to linear-lanceolate, 10–12 \times ca. 2 mm, apex narrowed into a soft spinule and scarious. Florets bisexual. Corolla purplish red, ca. 1.6 cm, tube ca. 5 mm. Achene yellowish, ca. 4.5 mm. Pappus bristles brownish, ca. 1.6 cm. Fl. and fr. Jun–Sep. $2n = 34$.

Forests, forest margins, along rivers, meadows; 1500–2000 m. Heilongjiang, Jilin, Liaoning [Russia].

29. *Cirsium alatum* (S. G. Gmelin) Bobrov, Bot. Zhurn. (Moscow & Leningrad) 43: 1547. 1958.

准噶尔薊 zhun ga er ji

Serratula alata S. G. Gmelin, Reise Russland 1: 155. 1770–1774; *Carduus desertorum* (Fischer ex Link) Steudel; *Cirsium desertorum* Fischer ex Link; *C. desertorum* var. *sinuatolobatum* Trautvetter; *C. desertorum* var. *subintegerrimum* Trautvetter; *C. elodes* M. Bieberstein var. *setigerum* (Ledebour) Krylov; *C. elodes* var. *sinuatolobatum* (Trautvetter) O. Fedtschenko & B. Fedtschenko; *C. elodes* var. *subintegerrimum* (Trautvetter) O. Fedtschenko & B. Fedtschenko; *C. setigerum* Ledebour.

Herbs 30–100 cm tall, perennial. Roots tuberous, fusiform. Stem solitary, usually branched above; wings undulate, with ca. 5 mm stout rigid spines. Leaves concolorous, green, surface smooth, glabrous. Basal leaves with winged petiole; leaf blade elliptic, to 30 \times 4 cm, margin with teeth ending in a 4–9 mm spine. Lower and middle cauline leaves similar but sessile, decurrent, gradually smaller upward. Upper cauline leaves lanceolate to elliptic. Capitula 1 to several, terminal, corymbose to corymbose-paniculate. Involucre ovoid, ca. 1.5 cm in diam., glabrous. Phyllaries in ca. 6 rows, lacking marginal spinules, wings, and scarious appendage; outer phyllaries ovate, ca. 3 \times 1.2 mm, apex acute and tipped with a ca. 1.5 mm spinule; middle phyllaries linear-lanceolate, 5–8 \times 1.7–2 mm, apex acute and tipped with a ca. 2 mm spinule; inner phyllaries linear, 8–9 \times ca. 1.5 mm, apex acuminate and scarious. Florets bisexual. Corolla reddish purple, 1.8–1.9 cm, tube 7–8 mm. Achene yellowish, ca. 4 mm, striate. Pappus bristles brownish, ca. 1.6 cm. Fl. and fr. Jun–Sep. $2n = 34$.

lowish, ca. 3 mm. Pappus bristles white, 1.2–1.3 cm. Fl. and fr. Jul–Aug. $2n = 34$.

Flooded lands, grasslands by lakes, farmlands; 400–1500 m. Xinjiang (Junggar Pendi, Tian Shan) [Kazakhstan, Russia, Uzbekistan; E Europe].

30. *Cirsium vernonioides* C. Shih, Acta Phytotax. Sin. 22: 447. 1984.

斑鸠蓟 ban jiu ji

Herbs, perennial. Rhizome tuberous. Stem solitary, erect, ribbed, unwinged, with long multicellular hairs and cobwebby, densely felted below capitula. Leaves discolorous, surface smooth, abaxially grayish white and densely felted, adaxially green and with multicellular hairs. Lower cauline leaves withered at anthesis. Middle and upper cauline leaves with petiole to 1.5 cm; leaf blade elliptic to lanceolate-elliptic, 8–11 × 2.5–4.5 cm, undivided, base cuneate, fringed with ca. 1 mm incurved spinules and sometimes alternating with ca. 2 mm patent spinules, apex acuminate. Capitula several, corymbose, erect. Involucre 2–2.5 cm in diam., glabrous. Phyllaries imbricate, in ca. 8 rows, lacking marginal spinules, wings, and scarious appendage; outer and middle phyllaries 3–10 × 1.5–3 mm, basal portion triangular, lanceolate, or elliptic, apical portion subulate and narrowed into a 3–7 mm spine; inner phyllaries elliptic to linear, 1.5–2 × 0.2–0.3 cm, apex acuminate and scarious. Florets bisexual. Corolla purple, ca. 2.1 cm, tube ca. 1 cm. Achene ca. 6 mm. Pappus bristles dark brown, ca. 1.8 cm. Fl. and fr. Oct.

• Guangxi (Yangshuo).

31. *Cirsium handelii* Petrak, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 63: 110. 1926.

骆骑 luo qi

Herbs to 1.7 m tall, perennial. Stems erect, branched above, ribbed, unwinged, with sparse multicellular hairs and cobwebby. Leaves concolorous, green, surface smooth, glabrous or with sparse multicellular hairs. Basal leaves present at anthesis. Lower and middle cauline leaves with winged petiole, base auriculate and semiamplexicaul, wing spiny or with spiny teeth; leaf blade elliptic, to 27 × 7 cm, pinnately divided; segments ca. 6 pairs, semiobovate, ovate-lanceolate, or broadly triangular, margin spiny or with triangular teeth tipped with a 1–4 cm spine. Upper cauline leaves similar but sessile, lanceolate, gradually smaller upward, auriculate semiamplexicaul, margin with teeth ending in a 1–4 cm spine. Capitula few to many, laxly corymbose to corymbose-paniculate or rarely solitary, ± nodding. Involucre campanulate, 3–4.5 cm in diam., glabrous. Phyllaries imbricate, in ca. 7 rows, lacking an abaxial resinous gland, marginal spinules, wings, and scarious appendage; outer and middle phyllaries 0.7–1.5 cm × 1.5–2 mm, basal portion lanceolate, apical portion subulate, patent to reflexed, and narrowed into a short and soft spinule; inner phyllaries linear-subulate, ca. 18 × 1.5 mm, apex narrowed into a short soft spinule. Florets bisexual. Corolla purple, ca. 2.1 cm, tube ca. 1.2 cm. Achene brown, ca. 3.2 mm. Pappus bristles brownish, ca. 2 cm. Fl. and fr. May–Sep.

• Forests, forest margins, thickets, grasslands, wastelands; 1700–3400 m. Sichuan, NW and SW Yunnan.

32. *Cirsium pendulum* Fischer ex Candolle, Prodr. 6: 650. 1838.

烟管蓟 yan guan ji

Cirsium hilgendorffii (Franchet & Savatier) Makino; *C. provostii* (Franchet) Petrak; *Cnicus hilgendorffii* Franchet & Savatier; *C. pendulus* (Fischer ex Candolle) Maximowicz; *C. provostii* Franchet.

Herbs 1–3 m tall, perennial. Stems erect, branched above, stout, unwinged, sparsely cobwebby and with long multicellular hairs. Leaves concolorous, surface smooth, green, glabrous. Basal and lower cauline leaves sessile or with winged petiole; leaf blade ± narrowly elliptic to oblanceolate, 40–50 × ca. 20 cm, bipinnatifid; primary segments 5–7 pairs; ultimate lobes obliquely triangular, fringed and tipped with ca. 3 mm spines; terminal lobe of segments narrowly lanceolate to broadly linear. Middle and upper cauline leaves sessile, gradually smaller upward, semiamplexicaul. Capitula several, terminal, racemose-paniculate, nodding. Involucre campanulate, 3.5–5 cm in diam., glabrous. Phyllaries imbricate, in ca. 10 rows, lacking an abaxial resinous gland, marginal spinules, wings, and scarious appendage; outer and middle phyllaries 1–4 × 0.1–0.3 cm, basal portion triangular to lanceolate, apical portion subulate and reflexed; inner and innermost phyllaries lanceolate to linear-lanceolate, 1.2–2.5 × ca. 0.2 cm, apex acuminate-subulate. Florets bisexual. Corolla purple to red, ca. 2.2 cm, tube filiform, ca. 1.6 cm. Achene ca. 4 mm. Pappus bristles dirty white, ca. 2.2 cm. Fl. and fr. Jun–Sep. $2n = 34$.

Grasslands in mountain valleys and on mountain slopes, forests, forest margins, streamsides, near villages, rock crevices; 300–2300 m. SE Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Shaanxi, Shanxi, WC Yunnan [Japan, Korea, Mongolia, Russia].

33. *Cirsium tianmushanicum* C. Shih, Bull. Bot. Res., Harbin 4(2): 64. 1984.

杭蓟 hang ji

Herbs to 1 m tall, perennial. Stems erect, branched above, unwinged, felted below capitula. Leaves concolorous, green, surface smooth, with sparse crispate hairs along veins or glabrous. Upper cauline leaves with winged petiole 2–2.5 cm; leaf blade elliptic to rarely ovate, 10–15 × 6–7 cm, undivided, margin serrulate, teeth with lateral spinules less than 1 mm, apex acute and with a 1–1.5 mm spinule. Uppermost leaves and bracts similar but narrower. Capitula few to many, corymbose, erect, not surrounded with pectinately spiny pungent bracts. Involucre ovoid, 2–2.5 cm in diam., glabrous. Phyllaries imbricate, in ca. 8 rows; outer and middle phyllaries triangular-lanceolate, ovate-lanceolate, or linear-elliptic, 5–16 × 2–3 mm, apex tipped with a 0.5–1 mm spinule; inner phyllaries linear to broadly linear, ca. 18 × 1–2 mm, apically expanded into a scarious red appendage. Florets bisexual. Corolla white, ca. 2.3 cm, tube ca. 1.1 cm. Achene ca. 4.5 mm. Pappus bristles white, ca. 2 cm. Fl. and fr. Oct.

• Forests; ca. 1300 m. Zhejiang (Tianmu Shan).

34. *Cirsium chinense* Gardner & Champion, Hooker's J. Bot. Kew Gard. Misc. 1: 323. 1849.

绿蓟 lǜ jì

Cirsium chinense var. *laushanense* (Y. Yabe) Kitamura; *C. laushanense* Y. Yabe; *C. lineare* (Thunberg) Schultz Bipontinus var. *glabrescens* Petrak; *C. lineare* var. *laushanense* (Y. Yabe) Kitamura; *C. lineare* var. *tchefouense* (Debeaux) Y. Ling; *C. manshuricum* Kitagawa; *C. tchefouense* Debeaux; *C. uninerivium* (H. Léveillé & Vaniot) Nakai var. *laushanense* (Y. Yabe) Kitagawa; *Cnicus chinensis* (Gardner & Champion) Benthham ex Maximowicz; *C. tchefouensis* (Debeaux) Franchet.

Herbs 40–100 cm tall, perennial. Stems erect, branched in upper half, rarely unbranched, unwinged, with crispate hairs, below capitula also ± cobwebby. Leaves concolorous, green, surface smooth, glabrous or with long crispate hairs along veins. Basal and lower cauline leaves petiolate; leaf blade elliptic to lanceolate and pinnately divided or narrower to sometimes linear and undivided, 5–7 × 1–4 cm; segments (when present) 3 or 4 pairs, margin with 3 or 4 unequal teeth with 1–2 mm lateral spinules and a to 4 mm apical spine. Middle and upper cauline leaves usually undivided, margin with spines to 3 mm. Capitula (1 or) few, irregularly corymbose, not surrounded with pectinately spiny pungent bracts. Involucre ovoid, ca. 2 cm in diam., glabrous or subglabrous. Phyllaries imbricate, in ca. 7 rows, abaxially often with a dark resinous gland; outer phyllaries triangular, 5–8 × 1.2–2 mm, apex acute to acuminate and tipped with a ca. 0.5 mm spinule; middle and inner phyllaries lanceolate to linear-lanceolate, 1–1.4 cm × 2–3 mm; inner phyllaries apically expanded into a scarious purplish pink denticulate appendage. Florets bisexual. Corolla purplish red, ca. 2.4 cm, tube ca. 1.2 cm. Achene ca. 4 mm. Pappus bristles dirty white, ca. 1.5 cm. Fl. and fr. Jun–Oct.

• Grasslands on mountain slopes; 100–1600 m. Fujian, Guangdong, Guangxi, Hebei, Jiangsu, Jiangxi, Liaoning, Nei Mongol, Shandong, Sichuan, Zhejiang.

35. *Cirsium lineare* (Thunberg) Schultz Bipontinus, Linnaea 19: 335. 1846.

线叶蓟 xian ye jì

Carduus linearis Thunberg in Murray, Syst. Veg., ed. 14, 726. 1784; ?*Cirsium hupehense* Pampanini; *C. lineare* var. *franchetii* Kitamura; *C. lineare* var. *latifolium* H. C. Fu; *C. lineare* f. *oreithales* (Hance) Koyama; *C. lineare* f. *pallidum* Kitamura; *C. lineare* var. *pallidum* (Kitamura) Y. Ling; *C. lineare* var. *salicifolium* Y. Ling; *C. lineare* var. *tsoongianum* (Y. Ling) Y. Ling; *C. oreithales* Hance; *C. tsoongianum* Y. Ling; *Cnicus linearis* (Thunberg) Benthham & J. D. Hooker ex Franchet & Savatier; *Spanioptilon lineare* (Thunberg) Lessing.

Herbs (0.3–)0.6–1.5 m tall, perennial. Stems erect, branched from base or above, ribbed, unwinged, cobwebby and with long crispate hairs to glabrous. Leaves discolorous, abaxially grayish white and cobwebby, adaxially green, glabrous, with some crispate hairs, or ± densely covered with hair-tipped papillae and surface slightly rough but not spinulose. Lower and middle cauline leaves sessile or shortly petiolate; leaf

blade ovate, lanceolate, elliptic, or oblanceolate, 6–18(–23) × 1.5–3(–5) cm, undivided or rarely with a few lobules or teeth in proximal third, base cuneate, margin ± regularly spinulose, apex obtuse to caudate-acuminate. Upper cauline leaves similar but always sessile, often narrower, gradually smaller upward. Capitula terminal, laxly corymbose, not surrounded with pectinately spiny pungent bracts. Involucre ± narrowly ovoid, 1–2.5 cm in diam., glabrous. Phyllaries imbricate, in ca. 6 rows, abaxially with a dark resinous gland; outer and middle phyllaries triangular-lanceolate, 5–8 × ca. 1 mm, tipped with a spinule to 2 mm; inner phyllaries triangular-lanceolate to linear, 10–15 × 1–3.5 mm, apically expanded into a scarious, acuminate, pale or purplish pink, and irregularly denticulate appendage. Florets bisexual. Corolla purplish red to pink, 2–2.2 cm, tube equaling limb. Achene ca. 2.5 mm. Pappus brownish to dirty white, ca. 1.5 cm. Fl. and fr. Aug–Oct.

Mountain slopes, thickets, forest margins, grasslands, roadsides, wastelands, farmlands; 500–2500 m. S Anhui, Chongqing, Fujian, S Gansu, Guangdong, Guizhou, Hebei, Henan, Hubei, Hunan, NE Jiangxi, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, NE Thailand, Vietnam].

Cirsium lineare is variable in leaf shape and papilosity as well as features of the involucre, but any attempt at subdividing it is premature. *Cirsium hupehense* is sometimes regarded as distinct; it was described with phyllaries ending in long, patent to recurved spines, a feature we have not observed in any of our material.

36. *Cirsium shansiense* Petrak, Mitth. Thüring. Bot. Vereins 50: 176. 1943.

牛口蓟 niu kou jì

Cirsium chinense Gardner & Champion var. *australe* Diels; *C. lineare* (Thunberg) Schultz Bipontinus var. *intermedium* (Pampanini) Petrak; *C. lineare* var. *rigidum* Petrak; *C. lineare* var. *spatulatum* Petrak; *C. lineare* var. *tenii* Petrak; *C. lineare* var. *yunnanense* Petrak; *C. wallichii* Candolle var. *intermedium* Pampanini.

Herbs 30–150 cm tall, perennial. Stems erect, branched or unbranched, ribbed, unwinged, with long multicellular hairs and felted. Leaves discolorous, surface smooth, abaxially grayish white and densely felted, adaxially green and glabrous or with long crispate hairs. Middle cauline leaves sessile or petiolate; leaf blade ovate, lanceolate, or ± narrowly elliptic, 5–14 × 1–6 cm, pinnately lobed to pinnatipartite at least in proximal half; segments 3–6 pairs, obliquely triangular to obliquely elliptic, with a 3–6 mm apical spine; terminal segment narrowly triangular to linear. Upper cauline leaves similar but gradually smaller upward. Capitula (1 or) few to many, terminal, paniculate-corymbose, not surrounded with pectinately spiny pungent bracts. Involucre ovoid, 2–2.5 cm in diam., glabrous. Phyllaries imbricate, in ca. 7 rows, abaxially with a dark resinous gland; outer phyllaries triangular-lanceolate to ovate-lanceolate, 8–10 mm, tipped with a ca. 1 mm spinule; middle and inner phyllaries lanceolate to broadly linear, 12–17 × 1.2–3 mm; inner phyllaries apically expanded into a scarious, pale to pink, and often denticulate appendage. Florets bisexual. Corolla pink to purple, ca. 1.8 cm, tube ca. 8 mm. Achene ca. 4 mm. Pappus bristles brownish, ca. 1.5 cm. Fl. and fr. May–Nov.

Forests, thickets, wastelands by rivers, streamsides, roadsides; 1300–3400 m. Anhui, Chongqing, SE Fujian, S Gansu, NE Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, S Hunan, NW Jiangxi, Nei Mongol, E Qinghai, S Shaanxi, Shanxi, Sichuan, NE Xizang, Yunnan [Bhutan, India, Myanmar, Vietnam].

The occurrence of *Cirsium chinense* reported from Vietnam by K. B. Lê (Fl. Vietnam 7: 454. 2007) is actually *C. shansiense*.

37. *Cirsium leducii* (Franchet) H. Léveillé, Cat. Pl. Yun-Nan, 42. 1916.

覆瓦蓟 fu wa ji

Cnicus leducii Franchet, J. Bot. (Morot) 11: 23. 1897.

Herbs 30–150 cm tall, perennial. Stems grayish white, erect, much branched above or rarely unbranched, unwinged, densely felted below capitula. Leaves discolorous, abaxially grayish white and densely felted, adaxially green, rough, and sparsely to densely spinulose. Middle cauline leaves sessile, lanceolate to ± narrowly elliptic, 4–10 × 1–3 cm, undivided or pinnately divided; segments (when present) 3–5 pairs, triangular, margin entire or with 1 spine-tipped tooth, apical spine ca. 3.5 mm; terminal segment narrowly lanceolate to broadly linear. Upper cauline leaves similar, usually undivided. Bracts smaller than leaves, lanceolate to linear-lanceolate, fringed with spinules or spinulose teeth. Capitula (1 or) few to many, corymbose. Involucre campanulate, 2–2.5 cm in diam., glabrous. Phyllaries imbricate, in ca. 6 rows, abaxially with a dark resinous gland; outer and middle phyllaries lanceolate, 5–11 × 1–2 mm, apex narrowed into a ca. 1.5 mm spinule; inner phyllaries elliptic-lanceolate to broadly lanceolate, 12–16 × 1.2–2 mm, apically expanded into a scarious white or pink appendage. Florets bisexual. Corolla purplish red, ca. 1.9 cm, tube ca. 9 mm. Achene dark brown, ca. 3 mm, striate. Pappus bristles brownish, ca. 1.5 cm.

Forests, forest margins, grasslands on mountain slopes; 500–1500 m. Guangdong, Guangxi, Guizhou, Sichuan, Yunnan [Vietnam].

38. *Cirsium semenowii* Regel, Bull. Soc. Imp. Naturalistes Moscou 40(3–4): 161. 1867 [*“Semenowi”*].

新疆蓟 xin jiang ji

Chamaepeuce macrantha Schrank var. *bracteata* Ruprecht; *Cnicus semenowii* (Regel) C. Winkler.

Herbs 50–60(–80) cm tall, perennial. Stems erect, branched above, unwinged, with sparse long multicellular hairs and cobwebby. Leaves concolorous, green, surface smooth, glabrous. Lower and middle cauline leaves with long, winged petiole; wing margin with spinules and spine-tipped teeth; leaf blade lanceolate, linear-lanceolate, or elliptic, to 15 × 3.5 cm, pinnatifid; segments 4–6 pairs, elliptic to ovate, with unequal triangular teeth, teeth with a 0.3–2 cm apical spine. Upper cauline leaves similar but sessile, gradually smaller upward, semi-amplexicaul. Capitula few to many, racemose to glomerate, erect, surrounded by pectinately spiny bracts with long pungent spines. Involucre ovoid, ca. 2(–3) cm in diam., glabrous or very sparsely cobwebby. Phyllaries in ca. 7 rows, lacking an abaxial resinous gland, marginal spinules, wings, and scarious appendage; outer phyllaries 10–14 × 2–2.5 mm, basal portion trian-

gular, apical portion subulate and narrowed into a 6–9 mm spine; middle phyllaries 12–13 × ca. 2.5 mm, basal portion ovate, apical portion subulate and narrowed into a 5–6 mm spine; inner phyllaries linear to linear-lanceolate, 12–15 × 1.5–2 mm, apex acuminate and scarious. Florets bisexual. Corolla red, ca. 1.9 cm, tube ca. 8 mm. Achene brown, ca. 5 mm. Pappus bristles brownish, ca. 1.5 cm. Fl. and fr. Jul–Oct.

Alpine meadows, forests, by water, wastelands; 1700–3000 m. Xinjiang (Tian Shan) [Kazakhstan, Uzbekistan].

39. *Cirsium sairamense* (C. Winkler) O. Fedtschenko & B. Fedtschenko, Consp. Fl. Turkestan. 4: 286. 1911.

赛里木蓟 sai li mu ji

Cnicus sairamensis C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 9: 522. 1886; *Cirsium semenowii* Regel subsp. *sairamense* (C. Winkler) Petrak.

Herbs 20–60 cm tall, perennial. Stems erect, branched from base or middle, unwinged, sparsely cobwebby and with long multicellular hairs. Leaves discolorous, surface smooth, abaxially grayish green and sparsely cobwebby, adaxially green and with long multicellular hairs. Lower and middle cauline leaves sessile, elliptic or ± narrowly lanceolate, 13–20 × 4–6 cm, pinnately divided, semiamplexicaul; segments 4–7 pairs, elliptic to triangular-ovate, with 3–5 unequal, triangular teeth fringed with 2–3 mm spinules and with a 1–2 cm apical spine. Upper cauline leaves similar but gradually smaller upward. Capitula many, terminal, corymbose-paniculate, erect or nodding, surrounded by pectinately spiny bracts with long pungent spines. Involucre campanulate to ovoid, ca. 2.5 cm in diam., glabrous or sparsely cobwebby. Phyllaries imbricate, in 7 or 8 rows, lacking marginal spinules, wings, and scarious appendage; outer and middle phyllaries ca. 4 × 0.2–0.3 cm, basal portion triangular, apical portion subulate, rigid, patent to reflexed, and tipped with a ca. 3 cm spine; inner phyllaries lanceolate, elliptic, or linear, 10–20 × 1–2 mm, apex acuminate and scarious. Florets bisexual. Corolla purple, ca. 2.2 cm, tube ca. 9 mm. Achene brownish, ca. 5 mm. Pappus bristles dirty white, ca. 1.5 cm. Fl. and fr. Jul–Sep.

Mountain slopes, mountain valleys, by water, moist places; 1700–2300 m. Xinjiang (Tian Shan) [Kazakhstan, Uzbekistan].

40. *Cirsium alberti* Regel & Schmalhausen, Trudy Imp. S.-Peterburgsk. Bot. Sada 6: 318. 1880.

天山蓟 tian shan ji

Herbs 45–50 cm tall, perennial. Stems branched from base, ribbed, unwinged, densely cobwebby and with sparse long multicellular hairs. Leaves discolorous, surface smooth, abaxially grayish white and densely felted, adaxially green and with sparse long hairs. Lower cauline leaves with spiny winged petiole; leaf blade elliptic-lanceolate to lanceolate, 22–27 × ca. 7 cm, pinnatifid; segments 4–8 pairs, triangular-ovate to elliptic, fringed with 0.5–2 mm spinules and with 3–5 teeth tipped with a 5–11 mm spine. Middle and upper cauline leaves sessile, lanceolate to narrowly lanceolate, gradually smaller upward, auriculate semiamplexicaul. Capitula several to many, terminal, corymbose to corymbose-paniculate, erect or nodding,

surrounded by pectinately spiny bracts with long pungent spines. Involucre subovoid to campanulate, ca. 2 cm in diam., glabrous. Phyllaries imbricate, in 7 or 8 rows, lacking marginal spinules, wings, and scarious appendage; outer and middle phyllaries 8–16 × 2–3 mm, basal portion triangular, ovate, or lanceolate, apical portion subulate, patent to reflexed, and tipped with a 4–8 mm spine; inner and innermost phyllaries lanceolate to linear, 12–20 × 1–2 mm, apex acuminate and scarious. Florets bisexual. Corolla yellow or white, ca. 1.9 cm, tube ca. 8 mm. Achene brown with darker striae, ca. 4 mm. Pappus bristles white, ca. 1.5 cm. Fl. and fr. Jul–Sep.

Forest margins in mountain valleys, mountain slopes, flooded lands, by streams; 1000–2400 m. Xinjiang (Tian Shan) [Kazakhstan].

41. *Cirsium argyranthum* Candolle, Prodr. 6: 640. 1838.

南蓟 nan ji

Cirsium tibeticum Kitamura; *Cnicus argyranthus* (Candolle) C. B. Clarke.

Herbs 30–100 cm tall, perennial. Stems erect, branched above, unwinged, with sparse long multicellular hairs, also cobwebby above. Leaves concolorous, green, surface smooth, with long multicellular hairs along veins. Middle cauline leaves sessile, elliptic-lanceolate to elliptic, 8–14 × 2–4 cm, pinnately divided, auriculate semiamplexicaul; segments 4–9 pairs, each with 3–5 unequal teeth with 1–2 mm lateral spinules and a 4–7 mm apical spine. Upper cauline leaves with sparse teeth tipped with a 0.7–1.4 cm spine. Capitula few to many, spicate, racemose, or racemose-paniculate, erect, surrounded by pectinately spiny bracts with pungent spines to 1.5 cm. Involucre ovoid, 1.5–2 cm in diam., glabrous. Phyllaries imbricate, in ca. 6 rows; outer phyllaries triangular, 7–8 × 1.5–2 mm, narrowed into a 3–4 mm spine; middle phyllaries lanceolate to ovate-lanceolate, ca. 10 × 2 mm, lacking membranous wings, narrowed into a 2–3 mm apical spinule; inner phyllaries linear-elliptic to broadly linear, ca. 13 × 2–3 mm, apically expanded into a scarious appendage. Florets bisexual. Corolla purple or white, ca. 1.6 cm, tube ca. 8 mm. Achene yellowish, ca. 3 mm. Pappus bristles brownish, ca. 1.4 cm. Fl. and fr. Jun–Oct. $2n = 34$.

Forests, forest margins, grasslands, thickets by rivers, by farmlands; 2100–3700 m. Xizang, NW Yunnan [Bhutan, India, Nepal, Pakistan].

42. *Cirsium glabrifolium* (C. Winkler) Petrak, Oesterr. Bot. Z. 61: 324. 1911.

无毛蓟 wu mao ji

Cnicus glabrifolius C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 9: 523. 1885.

Herbs 70–100 cm tall, perennial. Stems erect, ribbed, unwinged, with sparse multicellular hairs. Leaves concolorous, green, surface smooth, abaxially with scattered multicellular hairs, adaxially glabrous. Middle cauline leaves sessile, elliptic to elliptic-lanceolate, to 20 × 8 cm, pinnately divided, semiamplexicaul; segments 5 or 6 pairs, elliptic, ovate, or triangular-ovate, with 3–5 unequal teeth tipped with a 5–12 mm spine. Upper cauline leaves similar but narrower, gradually smaller upward, undivided but with spiny teeth and apex. Capitula

many, paniculate, surrounded by pectinately spiny bracts with long pungent spines. Involucre ovoid, 1.5–2 cm in diam., glabrous or very sparsely cobwebby. Phyllaries imbricate, in ca. 6 rows; outer phyllaries lanceolate, 6–7 × 1–2 mm, basal portion usually with pectinately spinulose margin, narrowed into a ca. 3 mm apical spinule; middle phyllaries triangular-lanceolate to lanceolate, 12–15 × 2–3 mm, above base with loosely and irregularly lacerate scarious wings, apically spine-tipped; inner phyllaries linear-lanceolate, ca. 15 × 2 mm, apically with a spiny-tipped appendage. Florets bisexual. Corolla purplish red, ca. 1.8 cm, tube ca. 9 mm. Achene yellowish with darker striae, ca. 4 mm. Pappus bristles brownish, ca. 1.5 cm. Fl. and fr. Aug–Sep.

Mountain slopes, thickets; 2500–2700 m. Xinjiang (Tian Shan), S Xizang [India, Kashmir, Kazakhstan, Uzbekistan].

43. *Cirsium sieversii* (Fischer & C. A. Meyer) Petrak, Oesterr. Bot. Z. 61: 324. 1911.

附片蓟 fu pian ji

Echenais sieversii Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 44. 1841.

Herbs 1–2 m tall, perennial. Stems erect, long branched, unwinged, with sparse long multicellular hairs. Leaves concolorous, green, surface smooth, glabrous or ± hairy. Upper cauline leaves sessile, elliptic to lanceolate, 10–18 × 3–6 cm, pinnately lobed or pinnatifid; segments 3–5 pairs, obliquely ovate to semiorbicular, with 3–5 unequal triangular teeth each with few to many lateral spinules and a 4–6 mm apical spine. Capitula 3–6 in terminal cluster or many, terminal, and paniculate, surrounded by pectinately spiny bracts with long pungent spines. Involucre narrowly ovoid, 1.5–2 cm in diam., glabrous. Phyllaries imbricate, in ca. 7 rows; outer and middle phyllaries 3–10 × 1–2 mm, above base with densely and regularly denticulate-lacerate wings, apex narrowed into a 1–3 mm spinule; inner phyllaries 10–12 × ca. 1 mm, apex acuminate and scarious. Florets bisexual. Corolla purplish red, ca. 2 cm, tube as long as limb. Mature achene not seen. Pappus bristles brownish, ca. 1.5 cm. Fl. and fr. Jul–Oct.

Forests on mountain slopes, by water; 1600–2900 m. N Xinjiang [Kazakhstan, Russia, Uzbekistan].

44. *Cirsium chrysolepis* C. Shih, Acta Phytotax. Sin. 22: 451. 1984.

黄苞蓟 huang bao ji

Herbs to 1 m tall, perennial. Stems erect, branched above, unwinged. Leaves discolorous, abaxially grayish white and sparsely cobwebby, adaxially green, rough, and densely covered with ca. 0.5 mm spinules. Lower and middle cauline leaves not seen. Upper leaves of branches sessile, elliptic to lanceolate, 4–8 × ca. 2 cm, pinnately lobed; segments ca. 3 pairs, lanceolate to obliquely triangular-ovate, with 2–4 unequal triangular teeth fringed with spinules less than 0.5 mm and with a 5–10 mm apical spine. Bracts numerous, lanceolate, with spiny teeth and marginal spines to 2 cm. Capitula corymbose, erect. Involucre campanulate, 3–3.5 cm in diam., glabrous. Phyllaries imbricate, in ca. 8 rows, straight, appressed;

outer and middle phyllaries elliptic to lanceolate, 8–25 × 2–3 mm, margin above base expanded into yellowish, scarios lacerate wings, apex narrowed into a spine; inner phyllaries lanceolate to linear, apically expanded into a short and narrow, acuminate, and spine-tipped appendage. Florets bisexual. Corolla purplish red. Mature achene unknown. Pappus bristles yellowish, ca. 1.5 mm. Fl. Aug.

- Mountain slopes; ca. 3500 m. S Xizang (Nyalam).

Cirsium chrysolepis is allied to *C. flavisquamatum* Kitamura from Nepal but differs in having cobwebby leaves.

45. *Cirsium arvense* (Linnaeus) Scopoli, Fl. Carniol., ed. 2, 2: 126. 1772.

丝路蓟 si lu ji

Herbs 30–160 cm tall, perennial, dioecious. Roots far creeping, bearing adventitious shoots. Stems erect, branched above, unwinged. Leaf surface smooth. Capitula often numerous, terminal, corymbose. Involucre ± narrowly ovoid, 1.5–2 cm in diam. Phyllaries imbricate, in 5–7 rows, lacking wings and scarios appendage; outer and middle phyllaries triangular to ovate, 3–8 × 1.2–2.5 mm, apex acute; inner phyllaries elliptic-lanceolate to broadly linear, 9–20 × 1–3 mm, apex acute to acuminate and scarios. Corolla reddish purple or rarely white; female florets 1.6–2.4 cm, tube 1.3–1.8 cm; male florets 1.5–1.8 cm, tube 0.9–1.2 cm. Achene yellowish, 3–4.5 mm. Pappus bristles dirty white, 2.5–3.5 cm.

Moist places, ditches, farmlands, lakesides, grasslands, mountain slopes, roadsides, near villages, by rivers, wet or flooded lands; 100–4300 m. Anhui, Chongqing, Fujian, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Xizang, Zhejiang [Afghanistan, India, Japan, Kazakhstan, Korea, Mongolia, Nepal, Russia; SW Asia, Europe].

Cirsium arvense is one of the world's most noxious weeds of cultivated land. Its strong potential for vegetative multiplication from long trailing roots or root fragments results in morphologically uniform clonal stands, which at times have led to the recognition of some of the variants as distinct species.

- 1a. Lower cauline leaves pinnately divided, segments with 2–5 triangular spiny teeth.
 - 2a. Leaves ± concolorous, green, glabrous or abaxially sparsely cobwebby 45a. var. *arvense*
 - 2b. Leaves discolorous, abaxially grayish white and densely felted, adaxially green and glabrous 45b. var. *alpestre*
- 1b. Lower cauline leaves simple, or if lobed then with entire spinulose lobes.
 - 3a. Leaves ± concolorous, green, glabrous or abaxially sparsely cobwebby 45c. var. *integrifolium*
 - 3b. Leaves discolorous, abaxially grayish white and densely and thickly felted, adaxially green and glabrous or sparsely cobwebby 45d. var. *vestitum*

45a. *Cirsium arvense* var. *arvense*

丝路蓟(原变种) si lu ji (yuan bian zhong)

Serratula arvensis Linnaeus, Sp. Pl. 2: 820. 1753; *Breca arvensis* (Linnaeus) Lessing; *Carduus arvensis* (Linnaeus) Robson; *Cephalonoplos arvensis* (Linnaeus) Fourreau; *Cirsium ochrolepideum* Juzepczuk; *Cnicus arvensis* (Linnaeus) Roth.

Stems glabrous but sparsely cobwebby below capitula. Leaves ± concolorous, green, glabrous or abaxially very sparsely cobwebby. Lower cauline leaves ± shortly petiolate; leaf blade elliptic to elliptic-lanceolate, 7–17 × 1.5–4.5 cm, pinnately lobed or pinnatifid; segments 3–5 pairs, obliquely triangular to obliquely elliptic, with 2 or 3 teeth each with lateral spinules and a ca. 5 mm apical spine. Middle and upper cauline leaves similar but sessile, base semiamplexicaul. Involucre very sparsely cobwebby. Outer and middle phyllaries with a ca. 0.5 mm patent to reflexed apical spinule. Fl. and fr. Jun–Sep. $2n = 34, 34+0-1B, 51, 68$.

Moist places by ditches, farmlands, lakesides; 700–4300 m. Gansu, Xinjiang, Xizang [Afghanistan, India, Kazakhstan, Nepal; SW Asia, Europe].

45b. *Cirsium arvense* var. *alpestre* Nägeli, Neue Denkschr. Allg. Schweiz. Ges. Gesamten Naturwiss. 5(1): 104. 1840.

藏蓟 zang ji

Aplotaxis cirsioides Candolle; *Cephalonoplos arvensis* var. *alpestris* (Nägeli) Kitamura; *Cirsium lanatum* (Willdenow) Sprengel; *Cnicus lanatus* Willdenow.

Stems densely cobwebby-felted or glabrous. Leaves discolorous, abaxially grayish white and densely felted, adaxially green and glabrous. Lower cauline leaves sessile or shortly petiolate; leaf blade elliptic to oblanceolate, 7–12 × 2.5–3 cm, pinnately lobed or pinnatifid or lower ones undivided, base cuneate; segments (0–)3–5 pairs, semiorbicular, broadly ovate, or elliptic, with (2 or)3–5 triangular teeth each with lateral spinules and a 3.5–10 mm apical spine. Upper cauline leaves similar but smaller. Involucre glabrous. Outer and middle phyllaries tipped with a 2.5–4 mm spinule. Fl. and fr. Jun–Sep.

Grasslands on mountain slopes, moist places, roadsides, near villages; 500–4300 m. Gansu, Qinghai, Xinjiang, Xizang [Europe].

45c. *Cirsium arvense* var. *integrifolium* Wimmer & Grabowski, Fl. Siles. 2(2): 92 [“82”]. 1829.

刺儿菜 ci er cai

Breca segetum (Bunge) Kitamura; *Carduus segetum* (Bunge) Franchet; *Cephalonoplos segetum* (Bunge) Kitamura; *Cirsium argunense* Candolle; *C. arvense* f. *albiflorum* Kitagawa; *C. arvense* var. *mite* Wimmer & Grabowski; *C. arvense* var. *setosum* (Willdenow) C. A. Meyer; *C. arvense* var. *subulatum* (Ledebour) Ledebour; *C. laevigatum* Tausch; *C. segetum* Bunge; *C. setosum* (Willdenow) M. Bieberstein; *C. setosum* f. *albiflorum* (Kitagawa) Kitagawa; *C. setosum* var. *subulatum* Ledebour; *Cnicus arvensis* var. *setosus* (Willdenow) Maximowicz; *C. setosus* (Willdenow) Besser; *Serratula setosa* Willdenow.

Stems glabrous or sparsely felted. Leaves \pm concolorous, surface smooth, abaxially green to grayish green and glabrous or sparsely cobwebby, adaxially green and glabrous. Lower and middle cauline leaves usually sessile, \pm narrowly elliptic to elliptic-lanceolate, 7–15 \times 1.5–10 cm, undivided or sometimes pinnately divided into entire lobes, base usually cuneate, margin entire and densely fringed with tender spinules, apex obtuse to rounded. Upper cauline leaves elliptic, lanceolate, or linear-lanceolate, gradually smaller upward. Involucre glabrous. Outer and middle phyllaries with an apical spinule less than 0.5 mm. Fl. and fr. May–Sep.

Mountain slopes, by rivers, wet lands, farmlands; 100–2700 m. Anhui, Chongqing, Fujian, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Zhejiang [Japan, Korea, Mongolia, Russia; SW Asia, Europe].

Cirsium arvense var. *integrifolium* is the most common variant in China. The whole plant is used medicinally.

45d. *Cirsium arvense* var. *vestitum* Wimmer & Grabowski, Fl. Siles. 2(2): 92 [“82”]. 1829.

阿尔泰蓟 a er tai ji

Cirsium argenteum Peyer ex Vest; *C. arvense* var. *argenteum* (Peyer ex Vest) Fiori; *C. arvense* var. *incanum* (S. G. Gmelin) Ledebour; *C. incanum* (S. G. Gmelin) Fischer ex M. Bieberstein; *Serratula incana* S. G. Gmelin.

Stems grayish white, cobwebby-felted in upper half. Leaves discolorous, abaxially grayish white and densely felted, adaxially green and glabrous or sparsely cobwebby. Lower and middle cauline leaves sessile with cuneate base, elliptic to ovate, 7–8 \times ca. 3.4 cm, undivided or sometimes pinnately divided into entire lobes, base cuneate, densely fringed with tender 0.2–0.5 mm spinules. Upper cauline leaves similar but smaller.

Involucre glabrous. Outer and middle phyllaries tipped with a ca. 1 mm spinule. Fl. and fr. Aug–Sep. $2n = 34, 68$.

Grasslands on flooded lands; 500–1700 m. Xinjiang (Altay Shan) [Kazakhstan; SW Asia, Europe].

46. *Cirsium shihianum* Greuter, **nom. nov.**

薄叶蓟 bao ye ji

Replaced synonym: *Cirsium tenuifolium* C. Shih, Acta Phytotax. Sin. 22: 452. 1984, not *Cirsium tenuifolium* (Gaudin) Hagenbach, Verh. Schweiz. Naturf. Ges. 23: 235. 1838.

Herbs to 40 cm tall, ?annual, dioecious. Stems erect, unbranched or rarely with up to 10 branches above, unwinged, with sparse long multicellular hairs. Leaves subconcolorous, abaxially pale green and glabrous or very sparsely cobwebby, adaxially green and with sparse long multicellular hairs. Lower cauline leaves withered at anthesis. Middle cauline leaves sessile, elliptic to elliptic-lanceolate, 6–18 \times 1.3–2 cm, undivided, auriculate semiamplexicaul, fringed with ca. 3 mm spinules alternating with ca. 5 mm spines, apex acute to acuminate. Upper cauline leaves linear-lanceolate to narrowly linear, gradually smaller upward. Capitula 1 to few. Involucre narrowly ovoid to narrowly ellipsoid, 1.5–2 cm, glabrous. Phyllaries imbricate, in ca. 7 rows, lacking wings and scarious appendage; outer phyllaries triangular, ca. 5 \times 1–1.5 mm, tipped with a 1–2 mm recurved to reflexed spinule; middle phyllaries ovate-lanceolate to lanceolate, 7–10 \times 2–3 mm, apex acuminate; inner phyllaries linear to linear-lanceolate, ca. 15 \times 2 mm, apex acuminate. Corolla red, ca. 1.7 cm; tube in male florets ca. 8 mm and in female florets ca. 7.5 mm. Achene yellowish, ca. 4 mm. Pappus bristles white, to 1.5 cm. Fl. and fr. Jul–Aug.

• Forests in mountain valleys, grasslands; 1400–1600 m. Xinjiang (Altay Shan).

34. **CARDUUS** Linnaeus, Sp. Pl. 2: 820. 1753.

飞廉属 fei lian shu

Shi Zhu (石铸 Shih Chu); Werner Greuter

Herbs, biennial or perennial. Stems with spiny wings. Leaves subtire or pinnately divided, spiny. Capitula solitary to clustered. Involucre cylindrical to depressed-globose. Phyllaries imbricate. Florets bisexual. Corolla purple to red or rarely white. Stamen filaments densely pubescent; anther with short, basal appendages entire to somewhat lacerate. Style branches short. Achene narrowly obovoid, laterally compressed, often with 10–15 slender longitudinal striae but otherwise smooth; elaiosome crowned by an inconspicuous disk. Pappus 4 or 5 rows of scabrid bristles, outer ones shorter than inner.

About 95 species: tropical Africa, Asia, Europe; three species in China.

- 1a. Capitula solitary, \pm nodding; involucre 4–7 cm in diam.; outer and middle phyllaries 4–5 mm wide, distal portion narrowed at base 1. *C. nutans*
 1b. Capitula clustered by 3–5 or sometimes solitary, erect; involucre 1.5–2(–2.5) cm in diam.; phyllaries to 2 mm wide, distal portion not narrowed at base.
 2a. Plants dark green; leaves abaxially sometimes gray and thinly cobwebby; leaf and wing spines weak, to 3 mm 2. *C. crispus*
 2b. Plants light green or bluish green; leaves concolorous and hardly cobwebby; major leaf and wing spines pungent, 3–6 mm 3. *C. acanthoides*

1. *Carduus nutans* Linnaeus, Sp. Pl. 2: 821. 1753.

飞廉 fei lian

Carduus armenus Boissier; *C. coloratus* Tamamschjan; *C.*

leiophyllus Petrovič; *C. nutans* subsp. *leiophyllus* (Petrovič) Stojanov & Stefanov; *C. schischkini* Tamamschjan; *C. songoricus* Tamamschjan; *C. thoermeri* Weinmann.

Herbs 30–100 cm tall, biennial or perennial. Stems grayish

white, usually branched, sparsely cobwebby and hirsute below, densely cobwebby-felted above; wings continuous, unequally toothed; teeth triangular, margin and apex with spines. Leaves green, concolorous, hirsute along veins or sparsely cobwebby. Lower and middle cauline leaves sessile, ovate to lanceolate, (5–)10–40 × (1.5–)3–10 cm, pinnatifid or pinnatipartite; segments 5–7 pairs, obliquely triangular to triangular-ovate, margin spinulose, apex with a 4–6 mm spine. Upper cauline leaves similar but gradually smaller upward, pinnately lobed or entire. Capitula 4–6, solitary at end of stem and branches, ± nodding. Involucre ± broadly campanulate, 4–7 cm in diam. Phyllaries slightly constricted at or beyond middle then expanded into a lanceolate, spiny-tipped, and patent to recurved distal portion; outer phyllaries 14–15 × 4–5 mm; middle and inner phyllaries 1.5–2 × ca. 0.5 cm; innermost phyllaries broadly linear to linear-lanceolate, 2–2.2 × 0.2–0.3 cm, not constricted. Corolla purplish red, ca. 2.5 cm, tube ca. 1.3 cm. Achene grayish yellow with pale brown striae, ca. 3.5 mm. Pappus bristles white, unequal, to 2 cm. Fl. and fr. Jun–Sep. $2n = 16, 40$.

By croplands, grasslands, valleys; 500–2300 m. N Xinjiang [Kazakhstan, Mongolia, Russia; N Africa, SW Asia, Europe].

Carduus nutans is a variable species. At least fifteen subspecies have been recognized in the western, European part of its range. *Carduus nutans* subsp. *nutans* does not extend to Asia. The Chinese plants probably belong to *C. nutans* subsp. *leiophyllus*, as the synonymy indicates, but more research is needed.

2. *Carduus crispus* Linnaeus, Sp. Pl. 2: 821. 1753.

丝毛飞廉 si mao fei lian

Herbs 40–150 cm tall, biennial or perennial. Stems erect, apically usually branched, sparsely hirsute, usually cobwebby above; wings toothed, teeth with slender spines 1–3 mm at margin and apex. Leaves dark green, abaxially sometimes gray and thinly cobwebby, sparsely hirsute along veins. Lower cauline leaves sessile, ± narrowly elliptic or oblanceolate, 5–18 × 1–7 cm, pinnatifid or lowermost undivided; segments 7–12 pairs, elliptic, triangular, or ovate-triangular, margin spinulose and unequally toothed, teeth triangular, laterally with short spinules, and apically with a spine to ca. 3 mm. Middle cauline leaves similar but smaller. Uppermost cauline leaves oblanceolate to broadly linear. Capitula mostly 3–5 clustered at end of stem or branches, rarely solitary. Involucre subglobose, 1.5–2(–2.5) cm in diam., glabrous or sparsely cobwebby. Outer phyllaries triangular, ca. 3 × 0.7 mm, apex mucronulate to spiniform; middle phyllaries 4–13 × 0.9–2 mm, narrowed into a triangular-subulate erect-patent or spreading spiny-tipped distal portion; inner

phyllaries linear, straight, distally membranous and acuminate. Corolla purplish red or rarely white, ca. 1.5 cm, tube ca. 7 mm. Achene ca. 4 mm. Pappus bristles white, to 1.3 cm. Fl. and fr. Feb–Oct. $2n = 16, 16+2B, 18$.

Grasslands on mountain slopes, farmlands, wastelands, by rivers, forests; 400–3600 m. Widely distributed in China (but see discussion for *Carduus acanthoides*) [Kazakhstan, Korea, Mongolia, Russia; SW Asia, Europe].

Carduus crispus is weedy but a good nectariferous plant. It is widely naturalized in North America.

3. *Carduus acanthoides* Linnaeus, Sp. Pl. 2: 821. 1753.

节毛飞廉 jie mao fei lian

Herbs (10–)20–100 cm tall, biennial or perennial. Stem solitary, long branched, ± hirsute; wings toothed, teeth with major spines pungent, 3–5 mm. Leaves concolorous, light or bluish green, not or scarcely cobwebby, sparsely hirsute along veins. Basal and lower cauline leaves sessile, elliptic to oblanceolate, 6–29 × 2–7 cm, pinnately lobed to pinnatipartite; segments 6–12 pairs, elliptic to triangular, margin toothed, teeth laterally and apically with 3–5 mm spines. Middle and upper cauline leaves similar but gradually smaller upward; uppermost cauline leaves ± broadly linear, sometimes undivided. Capitula mostly solitary or clustered at end of stem and branches. Involucre subglobose, 1.5–2(–2.5) cm in diam., glabrous or sparsely cobwebby. Outer phyllaries linear to triangular-subulate, ca. 7 × 1 mm, apical spinule 1–2 mm; middle phyllaries 8–14 × 1.5–1.6 mm, narrowed into a triangular-subulate erect-patent or spreading distal portion with apical 1–2 mm spinule; inner phyllaries linear, straight, ca. 16 × 1 mm, apex thin and acuminate. Corolla purplish red or rarely white, ca. 1.7 cm, tube ca. 8 mm. Achene brownish, ca. 4 mm. Pappus bristles white, ca. 1.5 cm. Fl. and fr. May–Oct. $2n = 16, 22$.

Mountain slopes, mountain valleys, ravines, grasslands, forest margins, thickets, farmlands, by water; 200–3500 m. Gansu, Guizhou, Hebei, Henan, SW Hunan, W Jiangsu, N Jiangxi, S Nei Mongol, Ningxia, E and S Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, N Xinjiang, E Xizang, Yunnan [Russia; SW Asia, Europe].

The distinction between *Carduus crispus* and *C. acanthoides* breaks down in Chinese material, which for the most part shows intermediate features. Perhaps only a single species (best assigned to *C. acanthoides*) exists in China.

Carduus acanthoides is naturalized in North and South America and the Pacific islands (New Zealand).

5. Subtribe CENTAUREINAE

矢车菊亚族 shi che ju ya zu

Shi Zhu (石铸 Shih Chu); Ludwig Martins

Herbs or subshrubs, annual, biennial, or perennial. Stems and leaves usually unarmed. Capitula homogamous or heterogamous; if capitula heterogamous then outer florets in 1 row, tubular, often enlarged and radiant, sterile or rarely female; inner florets in many rows, bisexual. Receptacle with dense whitish linear smooth setae. Corolla tube slender. Achene with or without an apical rim, glabrous or rarely hairy; attachment scar usually lateral. Pappus usually double (i.e., differentiated into 2 types of pappus elements); outer pappus elements bristlelike, usually in many rows and increasing in length from outermost to inner; inner pappus elements scalelike or bristlelike but wider than outer ones; or pappus simple and all pappus elements bristlelike or scalelike, rarely absent.

About 29 genera and ca. 750 species: mainly in N Africa, C and SW Asia, and Europe, with a few in tropical Africa, tropical and E Asia, Australia, and North and South America; 16 genera (one endemic, two introduced) and 37 species (two endemic, four introduced) in China.

- 1a. Capitula homogamous; all florets bisexual.
- 2a. Middle phyllaries apically rounded, with a narrow hyaline margin or with a scarious appendage.
- 3a. Involucre 3–6 cm in diam., or if involucre smaller than pappus elements pinnate at apex and persistent 35. *Rhaponticum*
- 3b. Involucre 1–2.5 cm in diam. and pappus elements serrulate and easily falling off 41. *Plagiobasis*
- 2b. Middle phyllaries apically acute or acuminate, without an appendage or with a simple spine, spinule, or subulate tip.
- 4a. Outer phyllaries leaflike or with a leaflike appendage 48. *Carthamus*
- 4b. All phyllaries ± leathery and without a leaflike appendage but often apicalmost leaves approximate to capitulum.
- 5a. Annuals; pappus elements of two types (i.e., innermost bristle or bristles wider and longer than others).
- 6a. Middle phyllaries with an apical spinule; stems mostly branched from base and branches procumbent or ascending 36. *Oligochaeta*
- 6b. Middle phyllaries without apical spinule; stems erect and branched only in apical part 42. *Russowia*
- 5b. Perennials; pappus elements all ± of one type.
- 7a. Middle phyllaries 0.5–1 mm wide, subulate or narrowly ovate, apex attenuate into long subulate tip 39. *Tricholepis*
- 7b. Middle phyllaries 1–6 mm wide, narrowly triangular or narrowly ovate, apex with or without a short apical spinule.
- 8a. Stem virgately branched, terminal branches densely foliate up to capitulum 38. *Archiserratula*
- 8b. Stem simple or branched, terminal branches sparsely foliate or leafless 37. *Klasea*
- 1b. Capitula heterogamous; outer florets female or sterile, inner florets bisexual.
- 9a. Outer and middle phyllaries with a fimbriate, spiny, scarious, or hyaline appendage.
- 10a. Appendage of middle phyllaries fimbriate, long decurrent almost to base; bisexual florets violet-blue 49. *Cyanus*
- 10b. Appendage of middle phyllaries fimbriate, lacerate, or entire, not or only shortly decurrent; bisexual florets purple, pink, white, or yellow.
- 11a. Leaves densely tomentose especially on abaxial side 46. *Psephellus*
- 11b. Leaves glabrous or with various pubescence types but not densely tomentose.
- 12a. Leaf blade margin argutely toothed; longitudinal striae of middle phyllaries conspicuous 45. *Rhaponticoides*
- 12b. Leaf blade margin entire, coarsely dentate, or spinose; longitudinal striae of middle phyllaries inconspicuous or lacking 50. *Centaurea*
- 9b. Outer and middle phyllaries without an appendage but sometimes with a spinule and/or hyaline margin.
- 13a. Apex of middle phyllaries broadly rounded.
- 14a. Pappus elements scalelike; plants annual or biennial 40. *Amberboa*
- 14b. Pappus elements bristlelike; plants perennial.
- 15a. Corolla pink to purplish; leaf blade undivided but margin serrate 41. *Plagiobasis*
- 15b. Corolla yellow to yellowish; leaf blade pinnatisect, pinnate, or bipinnatisect 45. *Rhaponticoides*
- 13b. Apex of middle phyllaries acute or acuminate.
- 16a. Perennials; phyllaries lanate or velvety 44. *Serratula*
- 16b. Annuals; phyllaries glabrous or subglabrous.
- 17a. Leaf blade margin spiny; dwarf plants less than 20 cm tall 43. *Schischkinia*
- 17b. Leaf blade margin serrate-dentate, not spiny; erect plants 20–60 cm tall 47. *Crupina*

35. RHAPONTICUM Vaillant, Königl. Akad. Wiss. Paris 5: 177. 1754.

漏芦属 lou lu shu

Shi Zhu (石铸 Shih Chu); Ludwig Martins

Acroptilon Cassini; *Klaseopsis* L. Martins; *Leuzea* Candolle; *Stemmacantha* Cassini.

Herbs, perennial. Stems erect, simple or branched. Capitulum homogamous, solitary, at end of stem or branches. Phyllaries imbricate, with narrow membranous margin or apical scarious or membranous appendage. Florets bisexual. Corolla pink to purple. Achene tetragonal or inconspicuously striate. Pappus elements in several rows, brittle, scabrid to shortly plumose; pappus elements of innermost row basally wider than and as long as or slightly longer than others.

About 26 species: Africa, Asia, Australia, Europe; four species (one endemic) in China.

- 1a. Stem simple; capitulum 1; middle phyllaries with a conspicuous scarious appendage; involucre 3.5–6 cm in diam.
 2a. Pappus elements scabrid; appendage of phyllaries glabrous or puberulent 1. *R. uniflorum*
 2b. Pappus elements plumose; appendage of phyllaries villous 2. *R. carthamoides*
- 1b. Stem branched; capitula few to many, or if rarely 1 then middle phyllaries with a very narrow membranous margin but without an appendage; involucre 0.5–3 cm in diam.
 3a. Involucre 0.5–1.3 cm in diam.; phyllaries with membranous appendage; corolla ca. 1.4 cm; achene 3.5–4 mm ... 3. *R. repens*
 3b. Involucre 1.5–3 cm in diam.; phyllaries with very narrow membranous margin; corolla 1.8–3 cm; achene 5–8 mm 4. *R. chinense*

1. *Rhaponticum uniflorum* (Linnaeus) Candolle, Ann. Mus. Natl. Hist. Nat. 16: 189. 1810.

漏芦 lou lu

Cnicus uniflorus Linnaeus, Mant. Pl. 2: 572. 1771; *Centaurea monantha* Georgi; *Leuzea uniflora* (Linnaeus) Holub; *Rhaponticum monanthum* (Georgi) Voroschilov; *R. satzyperovii* Soskov; *R. uniflorum* subsp. *satzyperovii* (Soskov) Voroschilov; *Serratula uniflora* (Linnaeus) Poiret; *Stemmacantha uniflora* (Linnaeus) Dittrich.

Herbs (10–)20–100 cm tall. Stems single or few, grayish white, ca. 5 mm in diam., lanate, basally clothed with remains of petioles. Leaves grayish white, soft, arachnoid lanate. Basal and lower stem leaves petiolate; petiole 6–20(–40) cm; leaf blade elliptic, narrowly elliptic, or oblanceolate, 10–25 × 3–9 cm, pinnatifid or subpinnatifid; lateral lobes or segments 5–12 pairs, elliptic to oblanceolate, margin toothed, coarsely toothed, or entire. Middle and upper stem leaves sessile or shortly petiolate, similar in form and same in division to basal and lower stem leaves. Peduncle stout, leafless or with a few diminished leaves. Capitulum 1. Involucre 3.5–6 cm in diam. Phyllaries in (4 or)5–8 rows, appendaged; appendages brown, broadly ovate to suborbicular, 0.9–1.5 × 0.8–1.5 cm, margin lacerate; outer phyllaries ovate, ca. 5 × 3 mm excluding apical appendage; middle phyllaries elliptic to lanceolate, ca. 10 × 4 mm excluding apical appendage; inner and innermost phyllaries lanceolate, ca. 2 × 0.3 cm excluding apical appendage. Corolla 2.5–3.5 cm. Achene cuneate, ca. 4 mm, with denticulate rim at apex. Pappus elements in many rows, longest ca. 2 cm, scabrid. Fl. Apr–Jul, fr. May–Aug. $2n = 26^*$.

Hills, forests, rocky slopes; 100–2700 m. Gansu, Hebei, SW Heilongjiang, Henan, Hubei, E Jilin, Liaoning, Nei Mongol, Ningxia, E Qinghai, Shaanxi, Shandong, Shanxi, Sichuan [Korea, Mongolia, Russia].

The occurrence of *Rhaponticum satzyperovii* in NE China was indicated by Soskov (Fl. URSS 28: 317. 1963). It is said to differ from *R. uniflorum* by its more robust habit and its stem leaves with 4–6 pairs of ovate lobes (not 8–12 pairs of lanceolate lobes). This taxon should probably be treated as *R. uniflorum* subsp. *satzyperovii*, but the material seen is too scarce to make a decision about its taxonomic status.

2. *Rhaponticum carthamoides* (Willdenow) Iljin, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 1: 204. 1933.

漏草 lou cao

Cnicus carthamoides Willdenow, Sp. Pl. 3: 1686. 1803; *Leuzea carthamoides* (Willdenow) Candolle; *Serratula cartha-*

moides (Willdenow) Poiret; *Stemmacantha carthamoides* (Willdenow) Dittrich.

Herbs 60–90 cm tall. Stems simple, ca. 1 cm in diam., sparsely arachnoid. Leaves green, sparsely arachnoid along veins and margin. Lower and middle stem leaves shortly petiolate to subsessile; leaf blade elliptic, oblanceolate, or lanceolate, 13–25 × ca. 7 cm, pinnatifid or subpinnatifid; lateral lobes or segments 5–8 pairs, lanceolate to narrowly lanceolate, margin serrate, apex attenuate-apiculate. Upper stem leaves sessile, lanceolate, decreasing in size upward, basally pinnatifid or pinnatifid with 3 or 4 pairs of lateral segments or undivided, margin toothed. Capitulum 1. Involucre 4.5–6 cm in diam. Phyllaries in 10–12 rows; outer and middle phyllaries ovate to narrowly ovate, 5–10 × 4–5 cm excluding apical appendage, apically purplish red; appendage of middle phyllaries brown, ovate, broadly triangular, or subrhombic, to 7 × 7 mm, spreading to reflexed, villous; inner and innermost phyllaries lanceolate to linear-lanceolate, 15–18 × 2–3 mm excluding apical appendage; appendage of inner phyllaries brown, ovate, 6–8 × 2–5 mm, villous. Corolla ca. 2.5 cm. Achene brown, narrowly ellipsoid, ca. 7 mm, with denticulate rim at apex. Pappus elements yellowish to pale brown, longest ca. 1.8 cm, shortly plumose. Fl. and fr. Jul. $2n = 24$.

Grasslands, meadows; 2000–2700 m. NW Xinjiang [Kazakhstan, Mongolia, Russia].

The rhizomes are used medicinally.

3. *Rhaponticum repens* (Linnaeus) Hidalgo, Ann. Bot. (Oxford) 97: 714. 2006.

顶羽菊 ding yu ju

Centaurea repens Linnaeus, Sp. Pl., ed. 2, 2: 1293. 1763; *Acroptilon australe* Iljin; *A. picris* (Pallas ex Willdenow) C. A. Meyer; *A. repens* (Linnaeus) Candolle; *C. picris* Pallas ex Willdenow; *Serratula picris* (Pallas ex Willdenow) M. Bieberstein.

Herbs 25–70 cm tall. Stems 1 or few, erect, branched from base, densely foliate, arachnoid. Leaves sessile, elliptic, spatulate, or linear, 2–7 × 0.4–1.3 cm, pinnatifid, slightly rigid, grayish green, sparsely arachnoid to glabrescent, margin dentate or entire. Upper leaves often smaller. Capitula many, corymbose to corymbose-paniculate. Involucre ovoid to ellipsoid-ovoid, 5–13 mm in diam. Phyllaries in ca. 6 rows; outer and middle phyllaries ovate to broadly ovate, 3–11 × 2–6 mm, appendaged, basal part green and to a large extent concealed by appendages; appendage of outer phyllaries white, membranous, glabrous, apically ciliate or villous, apex obtuse to acuminate; inner phyllaries lanceolate to linear-lanceolate, ca. 13 × 2–3 mm; appendage of inner phyllaries small, apically densely vil-

lous. Corolla ca. 1.4 cm. Achene yellowish to pale brown, narrowly obovoid, 3.5–4 mm, apex rounded. Pappus elements 8–10 mm, shortly plumose at apex, easily falling off at maturity. Fl. and fr. May–Sep. $2n = 26^*$.

Mountain slopes, hills, waste places, farmlands, plains; 600–2600 m. Gansu, Hebei, Nei Mongol, Ningxia, Qinghai, N Shaanxi, N Shanxi, Xinjiang [Afghanistan, Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia, Europe].

4. *Rhaponticum chinense* (S. Moore) L. Martins & Hidalgo, Bot. J. Linn. Soc. 152: 461. 2006.

华漏芦 hua lou lu

Herbs 60–120 cm tall. Stems erect, branched or rarely unbranched, sparsely arachnoid, glabrescent, or glabrous. Leaf blade of middle stem leaves ovate, lanceolate, or narrowly lanceolate, 6–15 × 0.9–7.5 cm, scabrid, setiferous and minutely brownish yellow gland-dotted, margin dentate, denticulate, or serrate, apex acute to attenuate-acuminate. Middle stem leaves petiolate; petiole 0.5–2.5(–4.5) cm. Upper leaves sessile or subsessile, similar to middle stem leaves, decreasing in size upward. Peduncle inflated below capitula. Involucre bowl-shaped, 1.5–3 cm in diam. Phyllaries in 6 or 7 rows, tinged purple, margin narrow and scarious, apex rounded to obtuse; outer phyllaries ovate to elliptic, 5–13 × 3–5 mm; inner and innermost phyllaries elliptic to linear-elliptic, 2–2.6 × 0.2–0.5 cm. Corolla 1.8–3 cm. Achene dark brown, narrowly ellipsoid, 5–8 mm, without an apical rim. Pappus elements brown, longest 1–1.6 cm, scabrid. Fl. and fr. Jul–Oct.

• Grasslands on slopes, forest margins, forests, thickets, thicket margins; 300–1400 m. W Anhui, Fujian, SE Gansu, N and NE Guangdong, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, S Shaanxi, Sichuan, Yunnan, S Zhejiang.

- 1a. Leaf blade of middle stem leaves ovate to lanceolate, 1.5–3 × as long as wide 4a. var. *chinense*
1b. Leaf blade of middle stem leaves narrowly lanceolate, 3.5–8 × as long as wide 4b. var. *missionis*

4a. *Rhaponticum chinense* var. *chinense*

华漏芦(原变种) hua lou lu (yuan bian zhong)

Serratula chinensis S. Moore, J. Bot. 13: 228. 1875;
Klaeopsis chinensis (S. Moore) L. Martins; *Klasea chinensis* (S. Moore) Kitagawa.

Leaf blade of middle stem leaves ovate to narrowly elliptic, 6–15 × 2.5–7.5 cm, margin dentate to denticulate, apex acute; teeth cartilaginous, directed slightly toward apex to almost rectangularly outward. Anther appendages obtuse, rounded, or slightly emarginate. $2n = 26^*$.

• Grasslands on slopes, forest margins, forests, thickets, thicket margins; 300–1400 m. W Anhui, Fujian, SE Gansu, N and NE Guangdong, Henan, Hubei, Hunan, Jiangsu, Jiangxi, S Shaanxi (Qin Ling), Sichuan, S Zhejiang.

4b. *Rhaponticum chinense* var. *missionis* (H. Léveillé) L. Martins, **comb. et stat. nov.**

滇黔漏芦 dian qian lou lu

Basionym: *Centaurea missionis* H. Léveillé, Repert. Spec. Nov. Regni Veg. 8: 451. 1910.

Leaf blade of middle stem leaves narrowly lanceolate, 6–11 × 0.9–2.5 cm, margin serrate, apex attenuate-acuminate; teeth herbaceous, directed toward apex at an acute angle. Anther appendages narrowly triangular, acuminate.

• Guizhou, Yunnan.

36. OLIGOCHAETA (Candolle) K. Koch, *Linnaea* 17: 42. 1843.

寡毛菊属 gua mao ju shu

Shi Zhu (石铸 Shih Chu); Ludwig Martins

Serratula sect. *Oligochaeta* Candolle, Prodr. 6: 671. 1838.

Herbs, annual. Stem usually branched from base. Leaves undivided or lyrate pinnatifid. Capitula homogamous, sessile, axillary or terminal at end of stem and branches, solitary or in clusters of 2 or 3. Phyllaries imbricate, attenuate into a short spinule or acuminate. Florets bisexual. Corolla pink. Stigmatic branches patent. Achene with an entire or minutely denticulate apical rim. Pappus elements of two types; outer pappus of scabrid bristles; inner pappus of 1–5 bristles, slightly longer and distinctly wider than outer ones.

Four species: Asia; one species in China.

1. *Oligochaeta minima* (Boissier) Briquet, Arch. Sci. Phys. Nat., sér. 5, 12: 113. 1930.

寡毛菊 gua mao ju

Microlonchus minimus Boissier, Fl. Orient. 3: 701. 1875;
Centaurea minima (Boissier) B. Fedtschenko; *C. vvedenskyi* M. Popov; *Jurinea korolkowii* Regel & Schmalhausen.

Primary stem very short. Branches 5–15(–25) cm, pro-cumbent or ascending, rarely absent in weak individuals, pubescent. Leaves petiolate; leaf blade elliptic to elliptic-obovate, 1–2 × 0.4–0.7 cm, arachnoid or abaxially scabrid and setiferous and

adaxially glabrous, base cuneate, margin serrate and sometimes lobed near base, apex acute. Capitula few. Involucre ellipsoid to ellipsoid-ovoid, 10–13 × 4–7 mm. Phyllaries in ca. 5 rows; outer and middle phyllaries ovate to elliptic, 4–10 × 1.5–2 mm, abaxially white pubescent, apex attenuate into a 2–3 mm spinule; inner phyllaries linear, ca. 12 × 1 mm, apex acuminate and spiniform. Corolla ca. 7.5 mm. Achene yellowish, oblanceolate, ca. 2.5 mm, apex truncate. Pappus elements white, scabrid; outer pappus elements ca. 4 mm; inner pappus elements 1(or 2), ca. 6 mm. Fl. and fr. Jul.

Mountain slopes. N Xinjiang [Afghanistan, Pakistan, Turkmenistan, Uzbekistan; SW Asia].

37. KLASEA Cassini in F. Cuvier, Dict. Sci. Nat. 35: 173. 1825.

麻花头属 ma hua tou shu

Shi Zhu (石铸 Shih Chu); Ludwig Martins

Nikitinia Iljin; *Schumeria* Iljin.

Herbs, perennial. Leaves pinnatilobed, pinnatipartite, or pinnatisect, rarely undivided, rigid or soft, margin entire or toothed. Capitula homogamous, 1 or to many in a panicle, rarely compactly corymbose, solitary at end of stem and branches. Involucre globose, ovoid, hemispheric, or bowl-shaped. Phyllaries imbricate, rigid; middle phyllaries with apex acute to acuminate and often with apical spinule; inner phyllaries longest, papillose-puberulent at apex. Florets bisexual. Corolla purple to pink, rarely almost white; tube 1/3–1/2 as long as corolla. Stigmatic branches to 1(–3) mm. Achene glabrous, with a subentire apical rim. Pappus elements of one type, in several rows, whitish to yellowish brown, all ± same length or outer ones shorter, scabrid or finely barbellate.

About 45 species: N Africa, Asia, Europe; eight species in China.

All Chinese species belong to *Klasea* sect. *Klasea*.

- 1a. Leaf blade adaxially scabrous with multicellular hairs but sometimes sparsely so.
 - 2a. Stems always simple, to 10 cm; margin of phyllaries black 6. *K. lyratifolia*
 - 2b. Stems simple or branched, (10–)15–150 cm; margin of phyllaries purplish or pale-colored.
 - 3a. Middle phyllaries acuminate, with apical spinule 2.5–5 mm; leaf blade glandular with minute sessile glands 3. *K. dissecta*
 - 3b. Middle phyllaries acute, with apical spinule 0.2–2 mm or without spinule; leaf blade not glandular 8. *K. centauroides*
- 1b. Leaf blade adaxially glabrous but margin sometimes pubescent.
 - 4a. Leaf blade glaucous, margin entire.
 - 5a. Involucre 1.5–3 cm in diam.; middle phyllaries with conspicuous black to dark brown area at apex 1. *K. marginata*
 - 5b. Involucre 0.8–1.5 cm in diam.; middle phyllaries with inconspicuous brownish spot at apex 2. *K. cardunculus*
 - 4b. Leaf blade green, margin dentate.
 - 6a. Stem to 15 cm, usually decumbent; involucre 1.8–2.5 cm in diam. 5. *K. procumbens*
 - 6b. Stem 15–80 cm, erect; involucre 1.1–1.7 cm in diam.
 - 7a. Spinule of middle phyllaries to 1 mm; leaf blade leathery with paler venation and margin white cartilaginous 4. *K. suffruticulosa*
 - 7b. Spinule of middle phyllaries (1–)3–5 mm; leaf blade herbaceous, concolorous 7. *K. sogdiana*

1. *Klasea marginata* (Tausch) Kitagawa, J. Jap. Bot. 40: 137. 1965.

薄叶麻花头 bao ye ma hua tou

Serratula marginata Tausch, Flora 11: 484. 1828; *Klasea algida* (Iljin) Hidalgo; *S. algida* Iljin; *S. dshungarica* Iljin; *S. glauca* Ledebour (1812), not Linnaeus (1753); *S. nitida* Fischer ex Sprengel var. *glauca* Trautvetter.

Herbs 15–80 cm tall. Rhizomes ascending to procumbent. Stem solitary, erect, simple or rarely with 1 branch, base clothed with fibrous remains of petioles. Leaves glabrous or with sparse hairs, glaucous, margin often minutely ciliate. Basal leaves petiolate; leaf blade elliptic, narrowly elliptic, or ovate, tapering into petiole, 3–15 × 1.5–4 cm, margin entire, repand-crenate, or rarely pinnatilobed. Stem leaves few, sessile, lanceolate to linear, pinnatilobed or undivided, margin entire or toothed. Capitulum 1(or 2). Involucre campanulate to bowl-shaped, 1.5–2.5(–3) cm in diam. Phyllaries in 5–7 rows, apically dark brown to black; outer and middle phyllaries ovate-triangular, elliptic, or ovate-elliptic, 5–14 × 2–3 mm, apex acuminate and with a 1–3 mm spinule; inner and innermost phyllaries lanceolate to linear-lanceolate 10–20 × 1.5–3 mm. Corolla purple, (1.3–)1.6–2.3 cm. Achene brown, oblong, 4–6 mm. Pappus whitish, ca. 1.2 cm. Fl. and fr. Jun–Aug. *2n* = 30.

Mountain steppes, hilly areas; 1500–2300 m. Gansu, Heilongjiang, Nei Mongol, N Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Uzbekistan].

2. *Klasea cardunculus* (Pallas) Holub, Folia Geobot. Phytotax. 12: 305. 1977.

分枝麻花头 fen zhi ma hua tou

Centaurea cardunculus Pallas, Reise Russ. Reich. 1: 500. 1771; *Serratula cardunculus* (Pallas) Schischkin; *S. nitida* Fischer ex Sprengel.

Herbs 20–70 cm tall. Rhizomes short. Stems erect, unbranched or apically branched, glabrous or subglabrous, base clothed with remains of petioles. Leaves glabrous or with sparse hairs, glaucous. Basal leaves shortly to long petiolate; leaf blade oblong-elliptic, elliptic, or lanceolate, 5–10 × 0.8–2 cm, base cuneate-attenuate, margin entire or toothed, apex obtuse to acute. Stem leaves several, sessile, lanceolate to narrowly elliptic, smaller than basal ones, margin entire, toothed, or pinnatilobed. Upper stem leaves linear, smaller than others, margin entire. Capitula (1 or)2–7(–9). Involucre campanulate, 0.8–1.5 cm in diam., glabrous. Phyllaries imbricate, in 5 or 6 rows; outer and middle phyllaries ovate to ovate-lanceolate, 1.7–2.5 mm wide. Corolla purple or rarely white, 1.5–1.7 cm. Achene dark brown to black, oblong, 3.5–5 mm. Pappus whitish, 7–9 mm. Fl. and fr. Jun–Jul.

Meadows; 500–1500 m. Nei Mongol (Xilin Gol Meng), Xinjiang [Kazakhstan, Mongolia, Russia; Europe].

3. *Klasea dissecta* (Ledebour) L. Martins, Bot. J. Linn. Soc. 152: 455. 2006.

羽裂麻花头 yu lie ma hua tou

Serratula dissecta Ledebour, Fl. Altaic. 4: 40. 1833; *S. angulata* Karelin & Kirilov; *S. dissecta* var. *angulata* (Karelin & Kirilov) Trautvetter.

Herbs 20–40 cm tall. Rhizomes short and thick. Stems solitary or few, erect, branched in upper part, sparsely setiferous, with fibrous remains of petioles at base. Leaves pubescent with multicellular hairs and minute sessile yellow glands. Basal and lower stem leaves long petiolate; petiole fibrous; leaf blade elliptic, 10–15 × 1.5–3.5 cm, pinnatipartite; lateral lobes 5–8 pairs, lanceolate, narrowly elliptic, or broadly linear, margin toothed. Middle stem leaves sessile, similar in form and same in division to basal and lower stem leaves. Upper stem leaves lanceolate, margin toothed. Capitula few to many, corymbose-paniculate. Involucre ovoid-cylindric to narrowly obconic, 5–12 mm in diam., sparsely tomentose. Phyllaries in 6 or 7 rows; outer phyllaries ovate, 3.5–6 × 1.5–2 mm, apex with a 0.5–2 mm straight to patent spinule; middle phyllaries lanceolate, ca. 10 × 2 mm, apex attenuate into a straight or spreading 2.5–5 mm spinule; inner and innermost phyllaries elliptic to broadly linear, ca. 17 × 1.5–2 mm, apex acuminate. Corolla purple to pink, ca. 1.3 cm. Achene pale to dark brown, narrowly ellipsoid, 4–6 mm, many striate. Pappus whitish to straw-colored, ca. 8 mm. Fl. and fr. Jun–Jul.

Deserts; 1000–1500 m. NW Xinjiang [Kazakhstan].

4. *Klasea suffruticulosa* (Schrenk) L. Martins, Taxon 54: 636. 2005.

木根麻花头 mu gen ma hua tou

Serratula suffruticulosa Schrenk, Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Petersbourg 3: 110. 1845; *S. ajdarovae* Sultanova.

Herbs (10–)15–50 cm tall. Rhizomes brown, robust, woody. Stems erect, woody at base, apically with few branches or rarely simple. Leaves rigid, leathery, glabrous or subglabrous, venation paler than rest of blade, margin toothed and white cartilaginous. Basal leaves petiolate; petiole 2.5–5 cm; leaf blade elliptic to spatulate, 4.5–9 × 1.5–5 cm, base cuneate, apex obtuse to acute. Middle cauline leaves similar to basal ones or lanceolate to oblanceolate and smaller. Upper cauline leaves smallest, linear. Capitula few or rarely 1. Involucre green to yellowish green, cylindric to ovoid-cylindric, 1.1–1.5 cm in diam., glabrous. Phyllaries imbricate, in 6–8 rows; outer phyllaries triangular-ovate to ovate, 2.5–5 × 2–3 mm; middle phyllaries elliptic, narrowly elliptic, or elliptic-lanceolate, 7–15 × 2.5–4 mm, apex acute and with a less than 1 mm spinule; inner and innermost phyllaries broadly linear to linear, 14–20 × 1.3–2 mm, apex acute and mucronate. Corolla purple, 1.5–1.9 cm. Achene brown, cuneate-ellipsoid, ca. 6 mm, striate. Pappus 6–11 mm. Fl. and fr. Jul–Aug.

Mountain slopes; ca. 1500 m. Xinjiang (Tian Shan) [Kazakhstan, Kyrgyzstan].

5. *Klasea procumbens* (Regel) Holub, Folia Geobot. Phytotax. 12: 427. 1977.

歪斜麻花头 wai xie ma hua tou

Serratula procumbens Regel, Bull. Soc. Imp. Naturalistes Moscou 40(3–4): 165. 1867.

Herbs 7–15 cm tall. Rhizomes long, procumbent. Stems single or few, decumbent or ascending, simple or sparingly branched, glabrous. Leaves narrowly elliptic, lanceolate-elliptic, or lanceolate, leathery, inconspicuously puberulent especially on margin or glabrous. Basal and lower stem leaves shortly petiolate; leaf blade 3–7 × 0.7–2 cm, base attenuate, margin toothed; teeth with cartilaginous tip. Middle stem leaves sessile, base semiamplexicaul, margin toothed below middle. Uppermost stem leaves broadly linear, margin entire. Capitula 1–3. Involucre ovoid-cylindric, 1.8–2.5 cm in diam., glabrous or subglabrous. Phyllaries in 7–9 rows; outer phyllaries triangular to ovate-lanceolate, 5–7 × ca. 3 mm, apex acute and with a straight or patent 1–2 mm spinule; middle phyllaries elliptic-lanceolate to elliptic, 9–12 × ca. 3 mm, with an apical straight or patent 1.5–2 mm spinule; inner phyllaries lanceolate, linear-lanceolate, or broadly linear, 1.6–2.2 × ca. 0.2 cm. Corolla purple to pink, ca. 2.5 cm. Achene brown, ellipsoid, ca. 6 mm. Pappus pale, ca. 1.3 cm. Fl. and fr. Jul–Sep.

Mountain slopes, ruderal areas; 2600–3600 m. SW Xinjiang [Afghanistan, Kashmir, Pakistan, Tajikistan].

6. *Klasea lyratifolia* (Schrenk ex Fischer & C. A. Meyer) L. Martins, Taxon 54: 636. 2005.

无茎麻花头 wu jing ma hua tou

Serratula lyratifolia Schrenk ex Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 45. 1841; *Klasea rugosa* (Iljin) Kitagawa; *S. modestii* Borissova; *S. rugosa* Iljin; *S. tianschanica* Saposhnikow & Nikitina.

Herbs, stemless or stem to 10 cm tall. Rhizome stout, oblique. Leaves petiolate; petiole 1–5 cm; leaf blade 2.5–10 × 1.5–4 cm, lyrate or pinnatipartite, subleathery, with scattered rather large multicellular hairs on adaxial surface, margin denticulate; lateral lobes 1–3(–5) pairs, broadly triangular, elliptic, or narrowly elliptic; terminal lobe ovate to orbicular, larger than others. Capitulum 1. Involucre bowl-shaped, 1.5–3 cm in diam., glabrous or subglabrous. Phyllaries in 6–8 rows, green with narrow black margin; outer phyllaries triangular, 5–10 × 2–6 mm, apex acute; middle phyllaries ovate to ovate-elliptic, 6–15 × 4–6 mm, apex acute and with a less than 2 mm spinule; inner phyllaries lanceolate, elliptic-lanceolate, or broadly linear, 1.4–2.2 × 0.2–0.5 cm, apex with a scarious appendage. Corolla purple, 2–2.6 cm. Achene grayish brown or dark brown, narrowly cuneate-ellipsoid, 5–6 mm. Pappus 1.5–2.2 cm. Fl. and fr. Jul–Sep. $2n = 30$.

Mountain slopes; 2000–3400 m. NW Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

The taxonomic status of *Klasea rugosa* needs clarification. It should possibly be assigned subspecific rank. It differs from typical *K. lyratifolia* by the terminal leaf segment not enlarged and by long (ca. 3 mm) stigmatic branches.

7. *Klasea sogdiana* (Bunge) L. Martins, Bot. J. Linn. Soc. 152: 455. 2006.

阿拉套麻花头 a la tao ma hua tou

Serratula sogdiana Bunge, Beitr. Fl. Russl. 191. 1852; *S. alata* C. A. Meyer; *S. dissecta* Ledebour var. *asperula* Regel & Herder; *S. trautvetterana* Regel & Schmalhausen.

Herbs 30–80 cm tall. Rhizomes long, woody. Stems erect, apically long virgately branched, glabrous or basally with scattered hairs. Leaves glabrous except at margin, adaxially shiny. Basal leaves petiolate; leaf blade elliptic, undivided, margin toothed. Lower and middle stem leaves lyrate pinnatifid; lobes toothed, lateral lobes sublinear to linear, terminal lobe ovate to narrowly elliptic. Upper stem leaves pinnatifid or undivided. Capitula several, solitary at end of a branch. Involucre campanulate, 1.2–1.7 cm in diam. Phyllaries tightly imbricate, in 8 or 9 rows; outer phyllaries triangular, ovate, or ovate-elliptic, 4–7.5 × 1.5–2.5 mm, apex acute and with a (1–)3–5 mm apical spinule; middle phyllaries elliptic-lanceolate or narrowly lanceolate, 11–13 × 1.8–2.5 mm, apex acute and with a (1–)3–5 mm spinule; inner and innermost phyllaries oblanceolate, 20–23 × 1.5–2 mm, apex acuminate. Corolla purple, 1.6–2 cm. Achene brown, ovoid-ellipsoid, ca. 5 mm. Pappus ca. 1 cm. Fl. and fr. Jul–Sep. $2n = 30, 60$.

Mountain slopes; ca. 1400 m. NW Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

8. *Klasea centauroides* (Linnaeus) Cassini ex Kitagawa, J. Jap. Bot. 21: 138. 1947.

麻花头 ma hua tou

Herbs (10–)25–150 cm tall. Stem erect, simple or branched, sparsely to densely crispate-pubescent near base, subglabrous in upper part, base with lacerate remains of old petioles. Leaves subglabrous to scabrid; pubescence often sparse, somewhat denser toward margin and along veins, composed of small appressed (ca. 0.2 × 0.03 mm) and larger patent (ca. 1 × 0.1 mm) multicellular hairs. Basal and lower stem leaves petiolate. Upper leaves sessile. Capitula 1 to many. Involucre 0.6–3 cm in diam. Phyllaries imbricate, in 4–10 rows; outer and middle phyllaries 2–11 × 1.5–5(–6) mm, without an apical spine or with a 0.2–2 mm spinule. Corolla purple to pink, rarely almost white, 2–3 cm. Achene brown to pale brown, cuneate-ellipsoid to obliquely cuneate, 4.5–6 mm, faintly ribbed. Pappus 7–11 mm. Fl. and fr. May–Oct.

Mountain slopes, steppes, meadows, sandy hills, open forests, forests, grasslands, wastelands, roadsides, riversides, watersides, farmlands; 200–3500 m. Anhui, Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, N Sichuan [Korea, Mongolia, Russia].

Klasea centauroides is a very polymorphic species with respect to number of capitula, leaf shape, shape of involucre, and coloration of phyllaries. Several distinctive forms have been described as species, but all of them are connected by intermediate forms. Delimitation of subspecies is problematic especially in regions where their ranges overlap. Herbarium specimens are often misidentified; therefore, distribution data from literature have to be taken with care and may be incomplete for some subspecies treated here.

- 1a. Stem much branched; capitula (3–)10–60; involucre 0.6–1.2 cm in diam. 8b. subsp. *polycephala*
- 1b. Stem simple or sparingly branched; capitula 1–6(–12); involucre 1.1–3 cm in diam.
 - 2a. All leaves undivided 8e. subsp. *cupuliformis*
 - 2b. At least middle stem leaves pinnatisect or pinnatifid.
 - 3a. Involucre obconic to bowl-shaped; inner phyllaries straight, without clear distinction between basal part and scarious appendage; middle phyllaries yellowish green with pale margin 8f. subsp. *chanetii*
 - 3b. Involucre semiglobose, ovoid, or campanulate; inner phyllaries mostly geniculate between basal part and appendage; middle phyllaries with dark tip and/or purple scarious margins.
 - 4a. Involucre base shortly attenuate; middle phyllaries 1.8–3 mm wide; lateral segments of middle stem leaves usually antrorse at an acute angle 8c. subsp. *komarovii*
 - 4b. Involucre base rounded or slightly umbilicate; middle phyllaries 2.5–6 mm wide; lateral segments of middle stem leaves usually at right angle or nearly so.
 - 5a. Stem ± foliate throughout; peduncles 1–12(–18) cm; involucre not or slightly constricted, 1.1–2.2 cm in diam. 8a. subsp. *centauroides*
 - 5b. Stem ± leafless in upper part; peduncles (10–)15–40 cm; involucre conspicuously constricted, (1.5–)2–3 cm in diam. 8d. subsp. *strangulata*

8a. *Klasea centauroides* subsp. *centauroides*

麻花头(原亚种) ma hua tou (yuan ya zhong)

Serratula centauroides Linnaeus, Sp. Pl. 2: 820. 1753; *Klasea centauroides* var. *albiflora* Y. B. Chang; *K. centauroides* var. *yamatsutana* (Kitagawa) Kitagawa; *K. mongolicola* (Kitagawa) Kitagawa; *K. ortholepis* (Kitagawa) Kitagawa; *S. mongolicola* Kitagawa; *S. ortholepis* Kitagawa; *S. polycephala* Iljin var. *ortholepis* (Kitagawa) Y. Ling ex H. C. Fu; *S. yamatsutana* Kitagawa; *S. yamatsutana* var. *mongolicola* (Kitagawa) Kitagawa.

Herbs (10–)25–80 cm tall. Rhizomes prostrate. Stem unbranched or sparingly branched in upper part. Petiole of basal

and lower stem leaves 2–10 cm; leaf blade elliptic to narrowly elliptic in outline, 5–12(–16) × 2–5(–8) cm, pinnatifid; lateral lobes 5–8 pairs, narrowly elliptic to broadly linear, margin entire or few toothed, apex acute. Middle stem leaves sessile or very shortly petiolate, similar in form and same in division to basal and lower stem leaves; lateral segments usually at right angle or nearly so. Upper stem leaves smaller than others. Peduncles 1–12(–18) cm. Capitula 1–4(–12). Involucre ovoid to narrowly ovoid, 1.1–2.2 cm in diam., base rounded or slightly umbilicate, apically ± constricted. Phyllaries loosely imbricate, in 6–8 rows; outer and middle phyllaries triangular, triangular-ovate, or ovate-lanceolate, 4–15 × 2.5–4 mm, leathery, greenish, darker toward apex and purple at margin, apex acute and with a 0.5–2 mm spinule; inner and innermost phyllaries narrowly elliptic or linear, 10–20 × 1–2 mm, transitioning into appendage; appendage straw-colored or purple-tinged, linear to linear-lanceolate, slightly bent outward or almost straight, margin slightly revolute or plane. Fl. and fr. Jun–Sep. $2n = 30, 60$.

Mountain slopes, steppes, meadows, sandy hills; 800–1700 m. Hebei, Heilongjiang, Liaoning, Nei Mongol, Shandong [Mongolia, Russia].

8b. *Klasea centauroides* subsp. *polycephala* (Iljin) L. Martins, Bot. J. Linn. Soc. 152: 457. 2006.

多花麻花头 duo hua ma hua tou

Serratula polycephala Iljin, Izv. Glavn. Bot. Sada S.S.S.R. 27: 90. 1928; *Klasea polycephala* (Iljin) Kitagawa.

Herbs 30–80 cm tall. Rhizomes stout. Stem branched in upper part. Petiole of basal and lower stem leaves 1.5–4 cm; leaf blade oblanceolate, elliptic-lanceolate, or elliptic in outline, 5–15 × 2.5–5 cm, pinnatifid or pinnatilobate; lateral lobes 5–9 pairs, broadly elliptic, triangular, or narrowly elliptic, margin entire or toothed, apex acute to acuminate. Middle and upper stem leaves sessile, pinnatifid; lateral lobes usually at right angle or nearly so, narrowly elliptic to broadly linear, margin entire or few toothed, apex acute. Uppermost leaves linear to subulate or with 1–3 pairs of lateral segments. Capitula (3–)10–60, corymbose. Involucre narrowly ovoid, 6–12 mm in diam. Phyllaries imbricate, in 6–8 rows; outer and middle phyllaries greenish with darker tip, ovate, ovate-triangular, or elliptic-lanceolate, 3–11 × 2–3 mm, acute and with 0.2–0.8 mm apical spinule; inner phyllaries linear, ca. 16 × 1–2 mm, transitioning into appendage; appendage straw-colored or purple-tinged, slightly bent outward or almost straight, linear to linear-lanceolate, with slightly revolute or plane margins. Fl. and fr. Jul–Sep.

• Mountain slopes, roadsides, farmlands; 600–2000 m. Hebei, Liaoning, Nei Mongol, Shanxi.

8c. *Klasea centauroides* subsp. *komarovii* (Iljin) L. Martins, Bot. J. Linn. Soc. 152: 457. 2006.

北麻花头 bei ma hua tou

Serratula komarovii Iljin, Izv. Glavn. Bot. Sada S.S.S.R. 27: 89. 1928; *Klasea hayatae* (Nakai) Kitagawa; *K. nishimurana* (Kitagawa) Kitagawa; *S. charbinensis* A. I. Baranov

& Skvortsov; *S. hayatae* Nakai; *S. hsinganensis* Kitagawa; *S. nishimurana* Kitagawa.

Herbs 0.5–1.5 m tall. Rhizomes prostrate. Stems unbranched or sparingly branched in upper part. Petiole of basal and lower stem leaves 3–9 cm; leaf blade elliptic in outline, 8–20 × 3–10 cm, pinnatifid or rarely undivided; lateral lobes 4–8 pairs, narrowly elliptic to broadly linear, margin entire or few toothed, apex acute. Middle stem leaves sessile or very shortly petiolate, similar in form and same in division to basal and lower stem leaves; lateral segments usually falcate or antrorse at an acute angle. Upper stem leaves smaller than others, linear or with 1–3 pairs of lateral segments. Peduncles (8–)12–30 cm, leafless or with 1 or few linear diminished leaves. Capitula 1–6(–9). Involucre campanulate or ovoid-campanulate, 1.1–1.5(–1.7) cm in diam., constricted, base shortly attenuate. Phyllaries tightly imbricate, in 7–10 rows; outer and middle phyllaries triangular, triangular-ovate, or ovate-lanceolate, 3–10 × 1.8–3 mm, leathery, greenish, often darker toward apex and purple at margin, apex acute and with a 0.5–1.5 mm apical spinule; inner and innermost phyllaries narrowly elliptic to linear, 10–20 × 1–2.5 mm, transitioning into appendage; appendage straw-colored or purple-tinged, linear to linear-lanceolate, bent outward, margin slightly revolute. Fl. and fr. Jul–Oct.

Mountain slopes, steppes, meadows; 200–1800 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shaanxi, Shanxi [Korea, Russia].

8d. *Klasea centauroides* subsp. *strangulata* (Iljin) L. Martins, Bot. J. Linn. Soc. 152: 457. 2006.

缢苞麻花头 yi bao ma hua tou

Serratula strangulata Iljin, Izv. Glavn. Bot. Sada S.S.S.R. 27: 89. 1928; *Klasea strangulata* (Iljin) Kitagawa.

Herbs 40–100 cm tall. Rhizomes procumbent. Stem unbranched or sparingly branched from middle and branches erect. Petiole of basal and lower stem leaves 4–10 cm; leaf blade elliptic, oblanceolate-elliptic, or oblanceolate in outline, 10–20 × 3–7 cm, lyrate pinnatifid or pinnatifid, rarely undivided; lateral lobes 3–7 pairs, elliptic to triangular, margin toothed, few toothed, or entire. Middle stem leaves sessile, similar in form and same in division as basal and lower stem leaves; lateral segments usually at right angle or nearly so, narrowly triangular, linear-triangular, or lanceolate, 0.5–1.5 cm wide, margin entire or distantly toothed. Upper stem leaves linear, margin entire. Peduncles (10–)15–40 cm. Capitula 1 or few. Involucre hemispheric, (1.5–)2–3 cm in diam., conspicuously constricted, base rounded. Phyllaries imbricate, in 7 or 8 rows; outer and middle phyllaries yellowish, blackish green striate toward apex, dark purple at margin, ovate, ovate-lanceolate, or elliptic, 6–13 × 3–5(–6) mm, leathery, apex acute and with a ca. 1 mm apical spinule; inner and innermost phyllaries elliptic to linear, 14–22 × 2–5 mm, transitioning into appendage; appendage straw-colored, linear to linear-lanceolate, bent outward, margin slightly revolute. Fl. and fr. Jun–Sep.

• Mountain slopes, grasslands, riversides, farmlands; 1300–3500 m. S Gansu, W Henan, Nei Mongol, Ningxia, Qinghai, S Shaanxi, Shanxi, N Sichuan.

8e. *Klasea centauroides* subsp. *cupuliformis* (Nakai & Kitagawa) L. Martins, Bot. J. Linn. Soc. 152: 457. 2006.

钟苞麻花头 zhong bao ma hua tou

Serratula cupuliformis Nakai & Kitagawa, Rep. Exped. Manchoukuo Sect. IV, 1: 66. 1934; *Klasea cupuliformis* (Nakai & Kitagawa) Kitagawa.

Herbs 40–100 cm tall. Rhizome robust. Stem unbranched or sparingly branched in upper part. Petiole of basal and lower stem leaves 1–6 cm; leaf blade narrowly elliptic, oblanceolate, or elliptic, 8–20 × 2–7 cm, base attenuate, margin coarsely toothed to biserrate, apex acuminate. Middle stem leaves lyrate-pinnatifid or undivided. Upper stem leaves similar to lower and middle stem leaves, oblanceolate, or linear, smaller than other leaves. Peduncles 2–24 cm. Capitula usually 1, rarely to 4 in robust individuals. Involucre hemispheric to ovoid, (1.3–)1.8–2.5 cm in diam., constricted. Phyllaries in 7 or 8 rows; outer and middle phyllaries yellowish, blackish green striate toward apex, dark purple at margin, ovate to lanceolate, 2.5–9 × 2–3.5 mm, leathery, apex acute and with a 0.3–1 mm apical spinule; inner phyllaries lanceolate, linear-lanceolate, or narrowly linear, 9–11 × 1.5–3 mm, transitioning into appendage; appendage straw-colored, linear to linear-lanceolate, bent outward, margin slightly revolute. Fl. and fr. Jul–Oct.

• Grasslands on mountain slopes, open forests; 900–2400 m. Hebei, Henan, Liaoning, Shanxi.

8f. *Klasea centauroides* subsp. *chanetii* (H. Léveillé) L. Martins, Bot. J. Linn. Soc. 152: 457. 2006.

碗苞麻花头 wan bao ma hua tou

Serratula chanetii H. Léveillé, Repert. Spec. Nov. Regni Veg. 10: 351. 1912; *Klasea potaninii* (Iljin) Kitagawa; *S. potaninii* Iljin.

Herbs (15–)30–90 cm tall. Rhizome short. Stems solitary or few, branched in upper part, rarely unbranched. Petiole of basal and lower stem leaves 2–9 cm; leaf blade elliptic, oblanceolate, or oblanceolate-elliptic in outline, pinnatifid, pinnatifid-partite, lyrate-pinnatifid, or lyrate-pinnatifid-partite, 6–20 × 3–7 cm; lateral lobes 6–10 pairs, margin few toothed or entire. Middle leaves sessile, similar in form and same in division as basal and lower stem leaves. Upper stem leaves broadly linear to linear or with 3–5 pairs of lateral segments, margin entire. Peduncles 1–22 cm. Capitula (1–)3–6(–12), inconspicuously corymbose. Involucre obconic to bowl-shaped, 1.8–2.5 cm in diam. Phyllaries loosely imbricate, in 4–6 rows; outer and middle phyllaries yellowish green, paler at margin, triangular, narrowly triangular, linear-lanceolate, or elliptic-lanceolate, 2–10 × 1.5–3.5 mm, apex acute and without an apical spinule or with a ca. 0.5 mm spinule; inner phyllaries linear-lanceolate to linear, 10–18 × 1–2.5 mm, straight, plane, without distinction between basal part and appendage. Fl. and fr. May–Sep.

• Grasslands on mountain slopes, forests, wastelands, farmlands, watersides; 200–2100 m. Anhui, Hebei, Henan, Shandong, Shanxi.

38. ARCHISERRATULA L. Martins, Taxon 55: 973. 2006.

滇麻花头属 dian ma hua tou shu

Shi Zhu (石铸 Shih Chu); Ludwig Martins

Serratula sect. *Suffruticosae* Iljin, Izv. Glavn. Bot. Sada S.S.S.R. 27: 92. 1928.

Subshrubs or perennial herbs. Stems virgately branched, foliate throughout. Leaves undivided, with reticulate resin ducts. Capitula solitary at end of branches, homogamous. Phyllaries imbricate, apex acute or apiculate. Receptacle cylindrical to obconic. Florets bisexual. Stigmatic branches divergent, canaliculate. Achene ellipsoid-cylindric, smooth, glabrous, apex with a denticulate rim. Pappus elements in many rows, bristlelike, not connate into a ring, pinnate at least in their distal part.

• One species: China.

1. *Archiserratula forrestii* (Iljin) L. Martins, Taxon 55: 973. 2006.

滇麻花头 dian ma hua tou

Serratula forrestii Iljin, Izv. Glavn. Bot. Sada S.S.S.R. 27: 91. 1928.

Herbs or subshrubs, 0.7–1.5 m tall. Stems sometimes purplish red, erect, long virgately branched, woody at base, leafy, glabrous or subglabrous. Leaves subsessile, lanceolate to linear-lanceolate, glabrous, with resin ducts along veins visible on abaxial side, base cuneate, margin denticulate, apex acute. Lower and middle stem leaves 2.5–10 × 0.3–2 cm. Upper stem

leaves similar to lower and middle stem leaves, decreasing in size upward. Capitula several to many. Involucre cylindrical to narrowly obconic, 6–10 mm in diam. Phyllaries imbricate, in 7 or 8 rows, green to yellowish green, sometimes slightly purple tinged; outer and middle phyllaries triangular, ovate-triangular, ovate, or lanceolate, 2–14 × 1–3 mm, apex acute or acuminate; inner phyllaries linear-lanceolate, ca. 18 × 1.5–2 mm, densely puberulent near apex. Corolla pale purple, 1.9–2.2 cm. Achene ellipsoid-cylindric, 7–9.5 mm. Pappus elements light brown, ca. 1.2 cm, finely serrulate, pinnate toward apex. Fl. and fr. Aug–Nov.

• Grasslands on mountain slopes, rock crevices; 1300–2000 m. NW Yunnan.

39. TRICHOLEPIS Candolle, Arch. Bot. (Paris) 2: 515. 1833.

镇苞菊属 zhen bao ju shu

Shi Zhu (石铸 Shih Chu); Ludwig Martins

Stictophyllum Edgeworth.

Herbs or subshrubs, annual or perennial. Stem erect, branched from base or middle. Lower stem leaves pinnately divided or entire. Capitula homogamous, several, solitary at end of stem and branches. Involucre campanulate to hemispheric. Phyllaries subulate to subulate-lanceolate, very narrow, unappendaged or with an awnlike appendage. Florets bisexual. Corolla purple, pink, yellow, or whitish. Stigmatic branches divergent. Achene with a denticulate rim at apex. Pappus elements in many rows or absent; outer pappus elements shortly plumose, scabrid, or serrulate, distinct or basally connate into a ring; inner pappus elements scarcely longer and basally wider, flattened.

About 17 species: Asia; three species in China.

There is one specimen of *Tricholepis roylei* J. D. Hooker from "Tibet." However, this is probably erroneous or is from a locality outside of China but referred to as "Tibet" in a historical sense. This species is only known from Himachal Pradesh, India, and it is very unlikely to occur in China.

1a. Involucre 0.9–1.5 cm in diam.; middle and upper leaves linear or nearly so, to 0.2 cm wide 3. *T. tibetica*

1b. Involucre 1.5–6 cm in diam.; middle and upper leaves lanceolate or narrowly lanceolate, 0.3–3 cm wide.

2a. Capitula not subtended by leaves; peduncles slender, ca. 1 mm in diam.; phyllaries flexuous or bent outward 1. *T. furcata*

2b. Capitula subtended by uppermost leaf or leaves; peduncles stout, ca. 2 mm in diam.; phyllaries straight 2. *T. karenium*

1. Tricholepis furcata Candolle, Prodr. 6: 563. 1838.

镇苞菊 zhen bao ju

Herbs 0.6–1.4 m tall, perennial. Stem branched from base or middle; stem and branches purplish red, glabrous or sparsely pubescent. Lower stem leaves shortly petiolate; leaf blade elliptic to lanceolate, 5–12 × 3–5 cm, scabrid, yellowish gland-dotted, base cuneate, margin serrate, apex acute to acuminate. Upper stem leaves sessile, similar to lower stem leaves, 2–4 × 0.3–1.3 cm. Peduncles slender, ca. 1 mm in diam. Capitula nodding. Involucre hemispheric, 1.5–4 cm in diam. Phyllaries in many rows; appendage usually blackish, awnlike, 4–24 × 0.5–0.7 mm, somewhat recurved; outer phyllaries sparsely ciliate toward apex; inner phyllaries densely ciliate to plumose toward apex. Corolla yellow, ca. 2 cm; lobes glabrous. Achene cuneate-ellipsoid, 4–5 mm, glabrous. Pappus elements scabrid to serrulate, deciduous, decreasing in length outward, basally connate into a ring; innermost pappus elements ca. 15 × 0.1 mm, flattened. Fl. and fr. Oct.

Forest margins in mountain valleys; ca. 2600 m. SE Xizang [Bhutan, India (Sikkim), Nepal].

Tricholepis furcata has been indicated to also occur in NW India, Kashmir, and Pakistan (Nasir & Ali, Fl. W. Pakistan, 797. 1972; Hajra, Fl. India 12: 222. 1995). Those specimens, however, are distinct from typical *T. furcata* by their erect capitula and wider (ca. 1 mm wide), apically glabrous phyllaries and should instead be referred to *T. elongata* Candolle.

2. Tricholepis karenium Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 41: 318. 1872.

云南镇苞菊 yun nan zhen bao ju

Herbs or subshrubs, 0.5–1 m tall, perennial. Stem erect, basally woody, branched, puberulent. Leaves sessile or shortly petiolate, linear-lanceolate to linear-oblong, 3.5–18 × 0.5–2 cm, undivided, both surfaces puberulent, abaxially with minute dark dots, base narrowly cuneate, apex acute to acuminate. Lower

leaves distantly denticulate. Upper leaves entire. Peduncles stout, ca. 2 mm in diam. Capitula erect, subtended by 1 or few leaves. Involucre ovoid to broadly obconic, 4–6 cm in diam., base truncate. Phyllaries in many rows, subulate and slightly broader at base, 10–50 × 0.5–1 mm, straight, sparsely ciliate or glabrous near base, densely ciliate at apex. Corolla white or nearly so, ca. 2.1 cm; lobes appressed puberulent toward apex. Achene oblong, base oblique, apex slightly curved. Pappus elements multiseriate, filiform, 1–1.5 cm, shortly ciliate. Fl. Jun–Oct.

Rocky slopes, open dry places; ca. 1400 m. Yunnan [India, Kashmir, Myanmar, N Thailand].

3. Tricholepis tibetica J. D. Hooker & Thomson ex C. B. Clarke, Compos. Ind. 241. 1876.

红花镇苞菊 hong hua zhen bao ju

Herbs or subshrubs, 25–60 cm tall, perennial. Stems virgately branched, sparsely pubescent or glabrous, floccose lanate at base; branches slender. Leaves glabrous, glabrescent, or sparsely tomentose, somewhat fleshy. Lower leaves oblong, 2–6 × 0.2–0.5 cm, margin dentate to pinnatifid; lobes few, distant. Upper leaves oblong to linear, 5–15 × ca. 1 mm, margin entire. Peduncles ca. 1 mm in diam. Capitula erect or almost so. Involucre ovoid, 0.9–1.5 cm in diam., base truncate to obtuse. Phyllaries imbricately appressed, in many rows, lanceolate-subulate, 2–12 × 0.5–1 mm, apex acuminate with tip somewhat deflexed; outer and middle phyllaries glabrous or slightly tomentose; inner phyllaries appressed pubescent toward apex. Corolla pink, 1.3–1.6 cm, glabrous; lobes glabrous. Achene brown, oblong, smooth. Pappus elements white, decreasing in length outward, scabrid; innermost pappus elements 12–13 × 0.2–0.3 mm, flattened.

Dry rocky slopes. Xizang [Afghanistan, Kashmir, Pakistan].

No material from China was seen by the present authors, and the description here is based on the original publication and specimens from Kashmir.

40. AMBERBOA Vaillant, Königl. Akad. Wiss. Paris 5: 182. 1754 [*“Amberboi”*], nom. cons.

珀菊属 po ju shu

Shi Zhu (石铸 Shih Chu); Ludwig Martins

Herbs, annual or biennial. Stem erect, branched or unbranched. Leaves undivided, lyrate, or pinnatifid, margin entire or toothed. Capitula heterogamous, solitary at end of stem and branches, sometimes additionally 1 or few subbasal. Involucre glabrous or sparsely arachnoid. Phyllaries imbricate, rigid to subrigid; middle phyllaries broadly rounded; inner phyllaries with scarious apical appendage. Outer florets in 1 row, sterile, with corollas 5–20-cleft; inner florets many, bisexual, in many rows. Corolla yellow or purple. Stigmatic branches long. Achene sericeous-villous, apex with denticulate rim; attachment scar surrounded by conspicuously thickened rim. Pappus elements of one type, scalelike, wider toward apex, scabridulous, rarely absent.

Seven species: C and SW Asia; two species (one introduced) in China.

- 1a. Corolla yellow; corolla of radiant florets 5–10-cleft; usually at least 1 subbasal capitulum present 1. *A. turanica*
 1b. Corolla purplish red or white; corolla of radiant florets 10–20-cleft; all capitula terminal on long peduncles 2. *A. moschata*

1. Amberboa turanica Iljin, Izv. Glavn. Bot. Sada S.S.S.R. 30: 110. 1932.

黄花珀菊 huang hua po ju

Herbs 15–35 cm tall, annual. Main stem very short, usually surmounted by side branches; stem and branches floccose. Leaves glabrous. Basal and lower stem leaves petiolate; petiole to 4.5 cm; leaf blade elliptic to lanceolate, undivided, margin denticulate to almost entire, 4–6 × 1.2–2.5 cm. Middle and upper stem leaves sessile or shortly petiolate, pinnatifid or pinnatifid; lateral lobes 3 or 4 pairs, lanceolate, margin sparsely toothed or entire. Involucre ovoid, bowl-shaped, or hemispheric, 1–1.7 cm in diam. Phyllaries in ca. 4 rows, lanate-pubescent, glabrescent; outer phyllaries broadly ovate to ovate-elliptic, 4–7 × 4–6 mm, apex obtuse-rounded; middle phyllaries elliptic, 8–12 × ca. 6 mm; inner phyllaries spatulate-elliptic to broadly linear, ca. 12 × 2–4 mm, with triangular to lanceolate apical appendage. Corolla yellow to yellowish; corolla of marginal florets scarcely longer than disk florets, 5–10-cleft, white pubescent at middle. Achene dark brown, cylindrical, ca. 5 mm, densely white villous. Pappus ca. 4 mm. Fl. and fr. May–Sep. $2n = 64$.

Sandy areas, wastelands, farmlands; ca. 400 m. Xinjiang (Junggar Pendi) [Afghanistan, Kazakhstan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

2. Amberboa moschata (Linnaeus) Candolle, Prodr. 6: 560. 1838.

珀菊 po ju

Centaurea moschata Linnaeus, Sp. Pl. 2: 909. 1753.

Herbs 30–50 cm tall, annual or biennial. Stem solitary, branched or unbranched; stem and branches sparsely cobwebby floccose. Leaves glabrous or sparsely floccose. Lower stem leaves petiolate; leaf blade spatulate to elliptic, 6–7 × 1.5–2 cm, base attenuate, margin serrulate, apex obtuse to acute. Middle and upper stem leaves shortly petiolate; leaf blade elliptic to narrowly elliptic, lyrate pinnatifid. Uppermost leaves sessile or subsessile, margin serrulate. Involucre ovoid, 1.2–2 cm in diam. Phyllaries in 3 or 4 rows, sparsely villous; outer phyllaries ovate, ca. 4 × 1.8 mm; middle phyllaries ovate to broadly ovate, 5–10 × 3–7 mm; inner phyllaries spatulate-elliptic to broadly linear, ca. 10 × 3–4 mm, with ovate to orbicular apical appendage. Corolla purple, 10–20-cleft, white villous; corolla of marginal florets much longer than inner ones. Achene brown, cylindrical, ca. 5 mm, densely white villous. Pappus ca. 5 mm, rarely absent. $2n = 32$.

Naturalized in Gansu [native to SW Asia].

Amberboa moschata is also grown as a garden ornamental.

41. PLAGIOBASIS Schrenk, Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Petersbourg 3: 108. 1845.

斜果菊属 xie guo ju shu

Shi Zhu (石铸 Shih Chu); Ludwig Martins

Herbs, perennial. Stem branched. Capitula heterogamous, rarely homogamous. Phyllaries imbricate, broadly rounded. Outer florets female or sterile; inner florets bisexual; rarely all florets bisexual. Corolla pink to purple. Stigmatic branches long, divergent. Achene ellipsoid-cylindrical, without a rim; attachment scar without a thickened margin. Pappus elements in many rows, bristlelike, not connate into a ring.

One species: China, Kazakhstan, Kyrgyzstan.

1. Plagiobasis centauroides Schrenk, Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Petersbourg 3: 109. 1845.

斜果菊 xie guo ju

Plagiobasis dshungarica Iljin.

Herbs 20–60(–80) cm tall. Stem erect, sparsely branched above middle, striate, glabrous. Leaves thick, glabrous, margin sharply toothed. Basal leaves petiolate; petiole 2–5 cm; leaf blade elliptic to obovate, 4–6 × 1.5–2 cm, base attenuate, apex obtuse to acute. Stem leaves sessile, oblong to lanceolate, base

cuneate to rounded and sometimes semiamplexicaul, apex acute. Capitula few, corymbose to laxly paniculate. Involucre globose to ovate, 1–2.5 cm in diam. Phyllaries in 4 or 5 rows, green to yellow-green, leathery, apex sometimes with purple tinge or with dark triangular or semilunar spot; outer and middle phyllaries suborbicular, ovate, or oblong, 5–15 × 4–7 mm, with a narrow faintly delimited membranous margin, apex rounded; inner and innermost phyllaries elliptic to linear-lanceolate, 15–

19 × 1.5–5 mm, apically hyaline to scarious, apex obtuse. Corolla 1.6–2 cm. Achene brown, narrowly ellipsoid-cylindric, 5–6 × 1–1.5 mm, sparsely pubescent and early glabrescent, not ribbed, apex rounded. Pappus elements white, 5–7 mm, serrulate, easily falling off. Fl. and fr. Jul–Oct.

Arid areas, gravel areas; ca. 800 m. Xinjiang (Junggar Pendi, Tian Shan) [Kazakhstan, Kyrgyzstan].

42. RUSSOWIA C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 11: 281. 1890.

纹苞菊属 wen bao ju shu

Shi Zhu (石铸 Shih Chu); Ludwig Martins

Herbs, annual. Stem richly branched, glabrous. Leaves pinnatisect. Capitula homogamous, at end of stem and branches, laxly paniculate to corymbose-paniculate. Phyllaries imbricate, in ca. 4 rows, without appendage. Florets bisexual. Corolla pale pink to purple. Achene sericeous; attachment scar surrounded by a thickened whitish rim; apex with a denticulate corona. Pappus elements white, in many rows, of one type, serrulate.

One species: Afghanistan, China, Kazakhstan, Tajikistan, Turkmenistan, Uzbekistan.

1. *Russowia sogdiana* (Bunge) B. Fedtschenko, Consp. Fl. Turkestan. 4: 267. 1911.

纹苞菊 wen bao ju

Plagiobasis sogdiana Bunge, Beitr. Fl. Russl. 361. 1852; *Russowia crupinoides* C. Winkler.

Herbs 20–60 cm tall. Stem erect, branched from base or above middle; branches slender. Leaves thin. Basal leaves spatulate; leaf blade lanceolate, base attenuate into a long petiole, margin entire or denticulate. Lower stem leaves lyrate or pinnatisect; lateral segments 2–5 pairs, oblong to linear; terminal segment longest. Middle and upper stem leaves diminished,

sessile, pinnatisect; segments often thickened at apex; lateral segments 1–3 pairs, linear, 3–30 × 0.3–1 mm. Capitula few to many. Involucre cylindric to ovoid-cylindric, 3–8 mm in diam. Phyllaries green with purple tinge, 3- or 5-striate, apex obtuse; outer and middle phyllaries ovate to elliptic, 2–3.5 × ca. 2 mm, margin narrow and membranous; inner and innermost phyllaries elliptic-lanceolate to elliptic-oblong, 6–10 × 2–2.5 mm. Florets few. Corolla ca. 1 cm, sparsely villous above middle. Achene yellowish brown, narrowly ellipsoid, 3.5–4 mm, sparsely white sericeous. Pappus elements white, 5–7 mm, serrulate. Fl. and fr. Jun–Oct.

Deserts; 800–1000 m. Xinjiang (Junggar Pendi, Tian Shan) [Afghanistan, Kazakhstan, Tajikistan, Turkmenistan, Uzbekistan].

43. SCHISCHKINIA Iljin, Repert. Spec. Nov. Regni Veg. 38: 73. 1935.

白刺菊属 bai ci ju shu

Shi Zhu (石铸 Shih Chu); Ludwig Martins

Herbs, dwarf, annual. Stem branched from base. Leaves undivided, margin with rigid white spines. Uppermost leaves concealing capitula. Capitula heterogamous, clustered. Phyllaries imbricate, herbaceous. Receptacle with setae few, rather short. Florets few; outer florets sterile; inner florets bisexual. Corolla yellow or pink, of even thickness, not divided into tube and limb. Style branches short. Achene with a denticulate rim at apex. Pappus elements of two types; outer pappus of scabrid bristles; inner pappus of an annulus bearing 1 rigid basally widened bristle.

One species: Afghanistan, China, Kazakhstan, Pakistan, Tajikistan, Uzbekistan; SW Asia.

1. *Schischkinia albispina* (Bunge) Iljin, Repert. Spec. Nov. Regni Veg. 38: 73. 1935.

白刺菊 bai ci ju

Microlonchus albispinus Bunge, Del. Sem. Hort. Dorpat. 8. 1843; *Centaurea albispina* (Bunge) B. Fedtschenko; *Oligochaeta leucosmerinx* K. H. Rechinger & Köie.

Herbs, annual. Stem very short; stem and branches white, puberulent. Leaves shortly petiolate; leaf blade elliptic, oblanceolate, linear-oblong, or spatulate, 2–6 × 0.3–0.7(–1.5) cm, glabrous or abaxially sparsely shortly strigose, base cuneate-attenuate, apex acute; marginal spines simple or 2–6-digitate, white, 1–5 mm. Capitula few to many congested at end of

a branch. Involucre narrowly ovoid-ellipsoid, 12–14 × 4–5 mm. Phyllaries in ca. 5 rows, glabrous, apex acuminate and tipped with a short spine; outer phyllaries ovate, 5–6 × 2–3 mm; middle phyllaries elliptic to elliptic-lanceolate, 8–10 × 2–3 mm; inner phyllaries elliptic to linear, ca. 12 × 1.5 mm, scarious, apex often purple tinged. Corolla yellow or pink, 5–6 mm. Achene pale, ellipsoid-obovoid, compressed, ca. 4 × 2 mm, glabrous, shiny; lateral attachment scar almost 1/2 as long as achene; apical rim regularly denticulate. Pappus absent in sterile florets; pappus elements of fertile florets white but inner ones darker at base; outer pappus bristlelike, to 7 mm; inner pappus a single bristle, 8–9 mm, ca. 0.5 mm wide at base. Fl. and fr. Jun.

Sandy areas; ca. 600 m. Xinjiang (Junggar Pendi) [Afghanistan, Kazakhstan, Pakistan, Tajikistan, Uzbekistan; SW Asia].

44. SERRATULA Linnaeus, Sp. Pl. 2: 816. 1753.

伪泥胡菜属 *wei ni hu cai shu*

Shi Zhu (石铸 Shih Chu); Ludwig Martins

Mastrucium Cassini.

Herbs, perennial. Stems erect, usually branched in upper half. Leaves pinnatisect or pinnate, rarely undivided, margin dentate or serrate. Capitula heterogamous [or homogamous and plants gynodioecious], few to many, paniculate or corymbose. Involucre ovoid, hemispheric, or bowl-shaped. Phyllaries usually darker toward apex, imbricate, apex acute; inner phyllaries longest. Marginal florets female, scarcely longer than bisexual ones, with staminodes. Corolla purple to pink. Stigmatic branches slender. Achene glabrous, apex rounded. Pappus elements of one type, in several rows, finely serrulate or scabrid.

Two species: Asia, Europe; one species in China.

1. *Serratula coronata* Linnaeus, Sp. Pl., ed. 2, 2: 1144. 1763.

伪泥胡菜 *wei ni hu cai*

Mastrucium pinnatifidum Cassini ex Candolle; *Serratula coronata* var. *manshurica* (Kitagawa) Kitagawa; *S. manshurica* Kitagawa.

Herbs 0.6–1.5 m tall. Rhizomes stout, procumbent. Stems erect, apically branched, rarely unbranched, glabrous. Basal and lower stem leaves petiolate, strigose to glabrescent; petiole 5–16 cm; leaf blade oblong to elliptic in outline, to 40 × 12 cm, pinnatisect or pinnate; segments narrowly elliptic, margin dentate or serrate; lateral segments 3–8 pairs, asymmetrical, decurrent on rachis. Middle and upper stem leaves sessile, similar in form and same in division as basal and lower stem leaves but smaller. Capitula heterogamous, few or rarely 1. Involucre

bowl-shaped to campanulate, 1.2–2.5 cm in diam., with brownish lanate to velvety pubescence, rarely glabrescent. Phyllaries imbricate, in 6 or 7 rows, abaxially purplish red; outer phyllaries triangular to ovate, 3–7 × 1.5–4 mm, apex acute and with a spinule; middle and inner phyllaries elliptic, narrowly elliptic, or lanceolate, 10–18 × 3–4 mm, apex acuminate to acute; innermost phyllaries linear, ca. 20 × 1 mm. Corolla purple, 2–2.8 cm in female florets, ca. 2 cm in bisexual florets. Achene oblanceolate-ellipsoid, ca. 7 mm, many striate. Pappus elements yellowish brown, to ca. 1.2 cm, scabrid. Fl. and fr. Jul–Oct. $2n = 22$.

Forests, forest margins on mountain slopes, steppes, meadows, riverbanks; 100–1600 m. Anhui, SE Gansu, Guizhou, Hebei, Heilongjiang, W Henan, NW Hubei, NW Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, S Shaanxi, E Shandong, Shanxi, N Xinjiang [Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Russia; Europe].

45. RHAPONTICOIDES Vaillant, Königl. Akad. Wiss. Paris 5: 165. 1754.

欧亚矢车菊属 *ou ya shi che ju shu*

Shi Zhu (石铸 Shih Chu); Ludwig Martins

Bielzia Schur.

Herbs, perennial. Rhizome woody. Stem usually solitary, glabrous, covered with ± lanate remains of old leaves at base. Leaves pinnate, pinnatisect, or bipinnatisect, glabrous, margin argutely toothed; teeth white cartilaginous at apex; leaf segments usually strongly asymmetric at base, decurrent on rachis. Capitula heterogamous, solitary at end of stem and branches. Phyllaries broadly ovate, glabrous, base rounded. Corolla yellow or sulfureous; corolla of marginal florets not or scarcely radiant, sterile, with staminodes. Achene brown, yellowish near base, blackish near apex. Pappus elements of two types; outer pappus elements in many rows, bristlelike, scabrid; inner pappus elements in 1 row, scalelike, much shorter than to almost as long as outer ones, sometimes excurrent into a longer bristle.

About 30 species: N Africa, C and SW Asia, Europe; three species in China.

- 1a. Middle phyllaries with very narrow (ca. 0.2 mm wide) inconspicuous hyaline margin, without apical appendage 1. *R. ruthenica*
 1b. Middle phyllaries appendaged or with more than 1 mm wide hyaline margin.
 2a. Primary segments of lower leaves undivided, oblong to narrowly elliptic 2. *R. kasakorum*
 2b. Primary segments of lower leaves irregularly pinnatipartite to pinnatisect 3. *R. dschungarica*

1. *Rhaponticoides ruthenica* (Lamarck) M. V. Agababjan & Greuter, Willdenowia 33: 61. 2003.

欧亚矢车菊 *ou ya shi che ju*

Centaurea ruthenica Lamarck, Encycl. 1: 663. 1785; *C. modestii* Fedorov; *Centaureum ruthenicum* (Lamarck) Cassini.

Herbs 40–110 cm tall. Stem usually solitary, erect, apically

few branched. Leaves green. Basal and lower stem leaves petiolate; petiole 4–9 cm, lanate; leaf blade oblanceolate in outline, pinnatisect to pinnate, ca. 18 × 8 cm; lateral segments 8–14 pairs. Middle and upper stem leaves sessile, similar in shape and same in division to basal and lower stem leaves, decreasing in size upward; lateral segments 4–10 pairs, elliptic to linear; basal lateral segments much diminished. Capitula few to several, rarely 1. Involucre ovoid, 1.8–2.5 cm in diam. Phyllaries in

4–6 rows, apex obtuse to rounded; middle phyllaries elliptic to ovate-elliptic, 9–10 × ca. 5 mm, unappendaged, margin ca. 0.2 mm wide and hyaline; inner phyllaries elliptic-lanceolate to lanceolate, 14–18 × 3–5 mm, apical appendage brownish and scarious. Achene narrowly ellipsoid, ca. 7 mm, apically rugulose. Outer pappus elements ca. 4 mm; inner pappus elements 0.8–3.5 mm. Fl. and fr. Jul–Sep. $2n = 30$.

Mountain slopes, meadows; 1200–1900 m. N Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Uzbekistan; SW Asia, Europe].

2. *Rhaponticoides kasakorum* (Iljin) M. V. Agababjan & Greuter, Willdenowia 33: 60. 2003.

天山矢车菊 tian shan shi che ju

Centaurea kasakorum Iljin, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 7: 66. 1937.

Herbs ca. 30 cm tall. Stem usually solitary, erect, apically few branched or unbranched. Leaves green or grayish green. Basal leaves petiolate; petiole to 13 cm; leaf blade elliptic to oblanceolate, 14–22 × 5–8 cm, pinnatisect to pinnate; lateral segments 6–12 pairs, oblong to narrowly elliptic, sometimes with 1 or 2 accessory segments near base; terminal segment elliptic, equal to lateral segments or smaller. Stem leaves several, sessile or shortly petiolate, similar to basal leaves but smaller. Capitula few to several, rarely 1. Involucre ovoid to campanulate, ca. 1.5 cm in diam. Phyllaries in 5 or 6 rows, apex obtuse to rounded; middle phyllaries elliptic to ovate-elliptic, 7–12 × ca. 5 mm, unappendaged, margin ca. 1 mm wide, hyaline, and often lacerate; inner phyllaries elliptic-lanceolate to lanceolate, ca. 15 × 3 mm, apical appendage white, hyaline, and

scarious. Achene 6–8 mm. Outer pappus elements to 7 mm; inner pappus elements short. Fl. and fr. May–Aug.

Mountain slopes; ca. 2300 m. Xinjiang (Xinyuan) [Kazakhstan, Russia].

3. *Rhaponticoides dschungarica* (C. Shih) L. Martins, **comb. nov.**

准噶尔矢车菊 zhun ga er shi che ju

Basionym: *Centaurea dschungarica* C. Shih, Bull. Bot. Res., Harbin 4(2): 65. 1984.

Herbs 40–80 cm tall. Stem usually solitary, erect, apically few branched or unbranched. Leaves green. Basal leaves petiolate; petiole 2.5–6 cm, lanate at base; leaf blade oblanceolate, elliptic, or obovate in outline, 10–15 × 6–7 cm, bipinnatisect or pinnate and lateral segments irregularly pinnatifid to pinnatisect; primary segments ca. 10 pairs, lanceolate to obliquely lanceolate, decreasing in size toward apex; ultimate segment narrowly elliptic. Stem leaves sessile or shortly petiolate, similar in shape and same in division as basal leaves. Capitula few to several, rarely 1. Involucre ovoid to bowl-shaped, 1.2–2.5 cm in diam. Phyllaries in 5 or 6 rows; middle phyllaries elliptic to ovate-elliptic, 7–12 × ca. 6 mm, apical appendage white hyaline to scarious, 2–5 mm, and narrowly decurrent on phyllary; inner phyllaries elliptic-lanceolate to linear-lanceolate, 15–16 × 3–6 mm, gradually transitioning into a scarious white or pale brown appendage. Achene 6–7 mm. Outer pappus elements to 6 mm; inner pappus elements very short. Fl. and fr. Jul–Aug.

Mountain slopes; 1600–2000 m. Xinjiang (Tian Shan) [Kyrgyzstan].

Centaurea ruthenica Lamarck var. *bipinnatifida* Trautvetter, described from Kazakhstan, is possibly a synonym of *Rhaponticoides dschungarica*.

46. PSEPELLUS Cassini in F. Cuvier, Dict. Sci. Nat. 43: 488. 1826.

矮小矢车菊属 ai xiao shi che ju shu

Shi Zhu (石铸 Shih Chu); Ludwig Martins

Herbs, perennial. Leaves tomentose, not decurrent. Capitula heterogamous, solitary at end of stem and branches. Phyllaries with apical appendage; appendage not or shortly decurrent, scarious, not spiny. Marginal florets sterile, radiant, with minute staminodes enclosed in corolla tube. Style branches of bisexual florets connate, divergent only in uppermost part. Achene narrowly ovoid, sparsely pilose. Pappus elements indistinctly of two types, shorter than achene; outer pappus elements in several rows, scabrid; inner pappus elements similar to outer ones, but somewhat wider and shorter than innermost row of outer pappus elements.

About 75 species: C and SW Asia, Europe, Russia; one species in China.

1. *Psephellus sibiricus* (Linnaeus) Wagenitz, Willdenowia 30: 38. 2000.

矮小矢车菊 ai xiao shi che ju

Centaurea sibirica Linnaeus, Sp. Pl. 2: 913. 1753; *Heterolophus sibiricus* (Linnaeus) Cassini.

Herbs 5–15(–30) cm tall. Stems 2 or 3, grayish white, erect or procumbent, simple or with 1 or 2 branches, tomentose to villous. Leaves grayish white, densely tomentose especially on abaxial side. Basal leaves petiolate; leaf blade elliptic, ca. 5 × 2–3 cm, pinnatisect; lateral segments 2–5 pairs, elliptic to

ovate, margin entire; terminal segment ovate, larger than lateral segments. Stem leaves few, similar to basal leaves or undivided, narrowly elliptic to spatulate, margin entire. Capitulum 1(or 2). Involucre campanulate to obconic, 1–2 cm in diam. Phyllaries in ca. 6 rows, appendage yellowish brown; outer phyllaries triangular to lanceolate, arachnoid; middle phyllaries ovate, narrowly ovate to lanceolate, 4–10 × ca. 3 mm, glabrous; appendage of middle phyllaries broadly ovate, elliptic, or suborbicular, scarious, with 4–12 fimbriae on each side; inner phyllaries linear-lanceolate, ca. 11 × 1.5–2 mm; appendage of inner phyllaries suborbicular to spoon-shaped, lacerate. Outer florets ster-

ile, radiant, longer than inner florets. Corolla purple to pink. Achene whitish, obliquely oblong, ca. 6 mm, with an entire apical rim. Outer pappus elements in several rows, bristlelike, to ca. 2 mm, scabrid to serrulate; inner pappus elements bristlelike

to narrowly scalelike, ca. 1.5 mm, scabrid. Fl. and fr. Jul–Aug. $2n = 30$.

Dry mountain slopes; ca. 1200 m. N Xinjiang [Kazakhstan, Russia].

47. CRUPINA (Persoon) Candolle, Ann. Mus. Natl. Hist. Nat. 16: 157. 1810.

半毛菊属 ban mao ju shu

Shi Zhu (石铸 Shih Chu); Ludwig Martins

Centaurea subg. *Crupina* Persoon, Syn. Pl. 2: 488. 1807.

Herbs, annual. Stem slender, erect, apically corymbosely to paniculately branched. Leaves unarmed. Basal leaves simple. Stem leaves pinnatisect to pinnate. Capitula heterogamous. Phyllaries imbricate. Florets few; outer florets sterile or functionally male; inner florets 1 to few and bisexual. Achene dark brown, subcylindric to compressed, villous toward apex, apex truncate and with a rim. Pappus elements of two types; outer pappus elements in several rows, bristlelike, scabridulous; inner pappus elements few, in 1 row, scalelike, short.

Two or three species: N Africa, C and SW Asia, Europe; one species in China.

1. *Crupina vulgaris* Persoon ex Cassini in F. Cuvier, Dict. Sci. Nat. 12: 68. 1819.

半毛菊 ban mao ju

Centaurea crupina Linnaeus, Sp. Pl. 2: 909. 1753; *Serratula crupina* (Linnaeus) Villars.

Herbs 20–60 cm tall. Stem solitary, basally pubescent, apically glabrous. Leaves green, with few glochidiate hairs at margin and sometimes sparsely lanate pubescent on adaxial side of rachis. Basal leaves soon decaying, sessile, obovate, scabrid, margin entire or toothed, apex obtuse. Stem leaves sessile; lateral segments 3–5 pairs, linear to broadly linear, 1.4–4 mm wide, margin entire or sparsely minutely denticulate. Capitula 3–6(–15), laxly corymbose. Involucre at anthesis fusiform to

narrowly ellipsoid and 4–6 mm in diam., expanding in fruit to obconic and 7–12 mm in diam. Phyllaries pale green sometimes with purple tinge, in ca. 6 rows, herbaceous, striate, margin narrowly white scarious, apex acute; outer phyllaries broadly ovate to elliptic, 1.5–2.1 mm; middle and inner phyllaries elliptic-lanceolate, 5–11 × 1.5–2.5 mm. Corolla purple, filiform, ca. 1.1 cm, pubescent with richly branched hairs. Achene subcylindric, 3–5 mm, base rounded, villous toward apex; attachment scar basal, suborbicular. Outer pappus elements to ca. 6 mm, very unequal, scabridulous; inner pappus elements 5 or 6(–12), very short. Fl. and fr. Jul. $2n = 30$.

Slopes; ca. 1100 m. NW Xinjiang (Ili Kazak Zizhizhou) [Afghanistan, India, Kashmir, Kazakhstan, Kyrgyzstan, Russia, Tajikistan, Turkmenistan, Uzbekistan; Africa, SW Asia, Europe].

Crupina vulgaris is naturalized in North America.

48. CARTHAMUS Linnaeus, Sp. Pl. 2: 830. 1753.

红花属 hong hua shu

Shi Zhu (石铸 Shih Chu); Ludwig Martins

Kentrophyllum Necker ex Candolle.

Herbs, annual or perennial. Leaves pinnatilobed, pinnatisect, or undivided, margin usually spiny. Capitula homogamous, 1 to several at end of stem and branches. Involucre ovoid or narrowly ellipsoid. Outer phyllaries leaflike, rigid, spinosely toothed; inner phyllaries thin, sometimes with apical appendages. Florets bisexual. Stigmatic branches short. Achene ivory, ovoid, oblanceolate, or obpyramidal, 4-angled, glabrous, usually rugose toward apex, apex with a rim; outer achenes often without pappus; inner achenes usually with a persistent or connate and deciduous pappus. Pappus elements in many rows or absent.

About 47 species: C and SW Asia, Europe, Mediterranean region; one species (introduced) in China.

Carthamus lanatus Linnaeus is cultivated as an ornamental in the Beijing area and Shaanxi.

1. *Carthamus tinctorius* Linnaeus, Sp. Pl. 2: 830. 1753.

红花 hong hua

Herbs (20–)50–100(–150) cm tall, annual. Stem erect, apically branched; stem and branches white or whitish, smooth, glabrous. Leaves rigid, leathery, glabrous. Lower and middle stem leaves sessile, lanceolate, ovate-lanceolate, or elliptic, sim-

ple, 7–15 × 2.5–6 cm, base attenuate and semiamplexicaul, margin spinosely toothed or entire, apex acute; teeth very rarely pinnatipartite, apically with 1–1.5 mm spinules. Upper stem leaves lanceolate, decreasing in size upward, margin spinosely toothed; teeth apically with a ca. 3 mm spine. Capitula few to many, in a corymbose synflorescence, rarely 1. Involucre ovoid, ca. 2.5 cm in diam. Phyllaries in ca. 5 rows; outer phyllaries leaflike, ovate-lanceolate, 2–4 × ca. 1 cm, spiny; middle phyl-

laries 6–20 × 4–7 mm, constricted between pale parallel-veined basal part and leaflike apical part with green reticulate veins; inner phyllaries oblanceolate-elliptic to oblanceolate, ca. 22 × 5 mm, rigidly scarious, apex attenuate. Corolla red to orange, ca. 2.8 cm. Achene ovoid to ellipsoid, ca. 5.5 mm, 4-angled. Pappus absent. Fl. and fr. May–Aug. $2n = 24^*$.

Widely cultivated in China and occasionally naturalized in saline

and alkaline soils in dry and cold conditions in Gansu, Guizhou, Hebei, Heilongjiang, Jiangsu, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Xizang, Zhejiang [native origin unknown; widely cultivated].

The seeds of *Carthamus tinctorius* yield edible oil, and the florets are used medicinally or for extracting a red pigment used as dye. Because of its long cultivation, the precise origin is uncertain although it is probably SW Asia.

49. **CYANUS** Miller, Gard. Dict. Abr., ed. 4, [422]. 1754.

藍花矢車菊屬 lan hua shi che ju shu

Shi Zhu (石铸 Shih Chu); Ludwig Martins

Herbs, annual [or perennial]. Leaves arachnoid tomentose, often decurrent on stem. Capitula heterogamous, at end of stem and branches. Involucre ovoid. Phyllary appendages long decurrent, margin ciliate or dentate. Florets usually blue, rarely white, cream-colored, pink, or purple; marginal florets sterile, usually without staminodes, radiant, much enlarged. Achene pilose; attachment scar with a tuft of hairs at base. Pappus elements of two types; inner pappus elements similar to outer ones but distinctly shorter than innermost row of outer pappus elements.

About 25–30 species: SW Asia, Europe, Mediterranean region; one species (introduced) in China.

1. **Cyanus segetum** Hill, Veg. Syst. 4: 29. 1762.

藍花矢車菊 lan hua shi che ju

Centaurea cyanus Linnaeus, Sp. Pl. 2: 911. 1753; *C. cyanocephala* Velenovský.

Herbs 30–70 cm tall, annual or rarely biennial. Stem erect, branched from middle, rarely unbranched; stem and branches grayish white, thinly arachnoid floccose. Leaves abaxially grayish white and sparsely tomentose, adaxially green to grayish green and sparsely arachnoid. Basal and lower stem leaves petiolate; leaf blade narrowly elliptic-oblanceolate to lanceolate, undivided or lyrate-pinnatisect; lateral segments 1–3 pairs, narrowly elliptic-lanceolate, linear-lanceolate, or linear, margin entire; terminal segment narrowly elliptic-oblanceolate, margin serrulate. Middle stem leaves sessile, broadly linear to linear-lanceolate, rarely with lateral laciniae near base, 4–9 × 0.3–0.8 cm, base attenuate, margin entire, apex acute. Upper

stem leaves similar in shape to middle stem leaves, decreasing in size upward. Capitula few to many, corymbose or paniculate. Involucre ellipsoid, 5–13 mm in diam., sparsely arachnoid. Phyllaries in ca. 6 rows, appendaged; appendage brownish or white, scarious, fimbriate; outer and middle phyllaries elliptic to narrowly elliptic, 3–6 × 2–4 mm; inner phyllaries elliptic, 10–11 × 3–4 mm. Outer florets blue, white, red, or purple, longer than inner florets; inner florets bluish violet. Achene ellipsoid, ca. 3 mm, striate, sparsely pilose-pubescent. Pappus elements in several rows, scabrid; outer pappus elements bristlelike, 2–3 mm; inner pappus elements bristlelike to narrowly scalelike, 1–2 mm. Fl and fr. Feb–Aug. $2n = 24, 48^*$.

Occasionally naturalized in at least Qinghai and Xinjiang [native to Europe].

Cyanus segetum is widely grown in China as an ornamental. The whole plant is used medicinally, and the seed oil can be used for soap making.

50. **CENTAUREA** Linnaeus, Sp. Pl. 2: 909. 1753, nom. cons.

矢車菊屬 shi che ju shu

Shi Zhu (石铸 Shih Chu); Ludwig Martins

Calcitrapa Vaillant; *Centaurea* sect. *Hyalaea* Candolle; *Chartolepis* Cassini; *Cnicus* Linnaeus, nom. cons.; *Hyalaea* Jaubert & Spach; *Jacea* Miller.

Herbs, annual, biennial, or perennial. Leaves concolorous. Capitula heterogamous, 1 to numerous or paniculate-corymbose or paniculate-racemose. Involucre globose, ovoid, campanulate, or bowl-shaped. Phyllaries imbricate; apical appendage fimbriate, spiny, or scarious. Florets few to many; outer florets sterile, enlarged and radiant or ± as long as inner ones, without staminodes; inner florets bisexual. Corolla yellow, white, pink, or purple. Stigmatic branches short. Achene sparsely pubescent to glabrescent or glabrous, apical rim denticulate or smooth. Pappus usually present, of two types of elements; outer pappus elements bristlelike, usually in many rows, rarely in 1 row, persistent or caducous, scabrid; inner pappus elements short, usually scalelike.

About 300–450 species: most in C and SW Asia and Mediterranean region; seven species (one introduced) in China.

All of the native species in China occur in Xinjiang. *Centaurea nigrescens* Willdenow, native to Europe, is grown as a garden plant at the Summer Palace in Beijing.

- 1a. Capitula concealed by uppermost leaves; uppermost leaves large 1. *C. benedicta*
 1b. Capitula visible; uppermost leaves diminished.

- 2a. Appendage of middle phyllaries unarmed, hyaline, margin entire or slightly lacerate.
 3a. Involucre 12–18 mm in diam.; stem leaves decurrent 2. *C. glastifolia*
 3b. Involucre 4–6 mm in diam.; stem leaves sessile 3. *C. pulchella*
 2b. Appendage of middle phyllaries fimbriate or spiny.
 4a. Appendage of middle phyllaries fimbriate, blackish 4. *C. scabiosa*
 4b. Appendage of middle phyllaries spiny, pale.
 5a. Terminal spine of middle phyllaries straight, (3–)10–25 mm 7. *C. iberica*
 5b. Terminal spine of middle phyllaries arcuate, 1–4 mm.
 6a. Bisexual florets 3–7; pappus present 5. *C. virgata*
 6b. Bisexual florets ca. 12; pappus absent 6. *C. diffusa*

1. *Centaurea benedicta* (Linnaeus) Linnaeus, Sp. Pl., ed. 2, 2: 1296. 1763.

藏掖花 *cang ye hua*

Cnicus benedictus Linnaeus, Sp. Pl. 2: 826. 1753.

Herbs 5–50 cm tall, annual. Stem erect, usually divaricately branched; stem and branches densely setiferous. Leaves setiferous pubescent with multicellular hairs, pinnatifid or pinnatifid, prominently reticulate-veined especially on abaxial side, margin spinose to spinosely toothed. Basal leaves petiolate; leaf blade oblong, ca. 30 × 8 cm, runcinate to pinnatifid, often withered at anthesis. Lower and middle stem leaves petiolate; petiole winged; leaf blade narrowly elliptic, decreasing in size upward, pinnatifid or pinnatifid, base attenuate; lobes triangular, narrowly elliptic-triangular, or narrowly elliptic. Upper stem leaves sessile, base amplexicaul and shortly decurrent onto stem. Uppermost leaves exceeding capitula. Capitula few to several, rarely 1, solitary at end of stem and branches, concealed by subtending leaves. Involucre ovoid, ca. 2 cm in diam. Phyllaries imbricate, in 4 or 5 rows; outer phyllaries ovate, ca. 10 × 5 mm, leaflike, apex acute and tipped with a 3–6 mm spine; middle phyllaries elliptic, elliptic-lanceolate, or lanceolate, ca. 15 × 3–6 mm, apex with a rigid pectinately divided spine; inner phyllaries broadly linear, ca. 20 × 2.5 mm. Sterile florets filiform. Corolla pale yellow. Achene cylindrical, ca. 8 mm, conspicuously many ribbed, glabrous, apex with a denticulate rim. Outer pappus elements in 1 row, ca. 1 cm, rigid, scabridulous; inner pappus elements much shorter, ciliate to inconspicuously arachnoid. Fl. and fr. Jun–Jul. $2n = 22$.

Mountain slopes; ca. 2300 m. Xinjiang (Tian Shan) [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; N Africa, SW Asia, Europe].

Centaurea benedicta is native to N Africa, C and SW Asia, and Europe but has become naturalized in other areas.

This species is cultivated in Chinese gardens. The whole plant is used medicinally.

2. *Centaurea glastifolia* Linnaeus subsp. *intermedia* (Boissier) L. Martins, **comb. et stat. nov.**

薄鳞菊 *bao lin ju*

Basionym: *Chartolepis intermedia* Boissier, Diagn. Pl. Orient., ser. 2, 3: 64. 1856; *Centaurea chartolepis* Greuter.

Herbs 40–100 cm tall, perennial. Stem erect, winged, sparingly branched. Leaves shortly strigose and gland-dotted, margin entire or inconspicuously serrulate. Basal leaves petiolate; petiole 4–20 cm; leaf blade elliptic to elliptic-oblongate,

6–10 × 2–6 cm. Lower stem leaves similar to basal leaves, base decurrent. Middle and upper stem leaves narrowly elliptic, elliptic-lanceolate, or linear-elliptic, decreasing in size upward, base long decurrent. Capitula few to several, in a laxly racemose-corymbose synflorescence. Involucre narrowly ellipsoid to ovoid, 1.2–1.8 cm in diam. Phyllaries in 6 or 7 rows, with an apical membranous appendage; outer and middle phyllaries ovate, 4–10 × 2.5–5 mm; appendage of outer and middle phyllaries ovate to lanceolate, ca. 5 mm wide, white hyaline except for a pale brown triangular area at base; inner phyllaries ovate-lanceolate, much longer than others. Corolla yellow, ca. 2.7 cm; corolla of outer florets 4- or 5-cleft, as long as or slightly shorter than inner ones. Achene ellipsoid, 5–6 mm, sparsely pilose. Outer pappus elements in many rows, bristlelike, to 1 cm, shortly plumose; inner pappus elements scalelike, oblong, very short. Fl. and fr. Jun–Aug.

Lakesides, thickets; ca. 800 m. Xinjiang (Junggar Pendi) [Kazakhstan, Russia; Europe].

3. *Centaurea pulchella* Ledebour, Icon. Pl. 1: 22. 1829.

琉苞菊 *liu bao ju*

Hylea pulchella (Ledebour) K. Koch.

Herbs (10–)20–70 cm tall, annual. Stem erect, branched, pubescent near base; branches ivory-white or straw-colored, ascending, slender, glabrous. Leaves arachnoid, glabrescent. Basal leaves withered at anthesis, shortly petiolate; leaf blade narrowly elliptic-lanceolate, margin repandly denticulate and sometimes pinnatifid near base. Lower and middle stem leaves sessile, lanceolate to linear-lanceolate, 2–3 × 0.2–0.3 cm, base cuneate-attenuate, margin entire or minutely serrulate, apex acute. Upper stem leaves similar to lower and middle stem leaves, decreasing in size upward. Capitula many, in a corymbose to paniculate synflorescence. Involucre narrowly ellipsoid to obconic, 4–6 mm in diam. Phyllaries in ca. 6 rows, glabrous, with distinct blackish longitudinal line; outer and middle phyllaries ovate to narrowly ovate, 1–5 × 0.7–1.5 mm excluding appendage; appendage of outer and middle phyllaries with a median brown stripe, spoon-shaped, suborbicular, or ovate, hyaline, decurrent on margin of phyllary, margin entire or slightly lacerate, almost completely concealing herbaceous part of phyllaries; inner phyllaries linear-lanceolate to linear, ca. 10 × 1.5 mm excluding appendage. Sterile florets not radiant. Corolla pink or white, ca. 1 cm, of even thickness. Achene obovoid, ca. 3 mm, sparsely pilose to glabrescent, with a shallowly denticulate rim. Outer pappus elements white, to 5 mm, scabridulous; inner pappus elements scalelike, 1–1.5 mm, ciliate and with a tuft of hairs at apex. Fl. and fr. Jun–Sep.

Mountain slopes, sandy areas, deserts; 700–2400 m. N Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Mongolia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

4. *Centaurea scabiosa* Linnaeus subsp. ***adpressa*** (Ledebour) Gugler, Ann. Hist.-Nat. Mus. Natl. Hung. 6: 132. 1907.

糙叶矢车菊 cao ye shi che ju

Centaurea adpressa Ledebour, Index Sem. Horti Dorpat. 1824, Suppl. 2: 3. 1824; *C. apiculata* Ledebour subsp. *adpressa* (Ledebour) Dostál; *C. scabiosa* var. *adpressa* (Ledebour) Candolle.

Herbs 50–100 cm tall, perennial. Stems solitary or few, erect, branched above middle; stem and branches sparsely floccose or arachnoid pubescent. Leaves scabrid, sparsely arachnoid. Basal leaves petiolate; petiole brown, fibrous, 5–8 cm; leaf blade oblanceolate to elliptic in outline, 15–20 × ca. 8 cm, pinnatisect; lateral segments 8–11 pairs, narrowly elliptic, broadly linear, narrowly oblanceolate, or spatulate, margin entire; terminal segment usually larger than lateral segments, margin entire or sometimes toothed. Stem leaves similar to basal leaves, decreasing in size upward; lower stem leaves shortly petiolate. Capitula few to many, corymbose or corymbose-paniculate at end of stem and branches. Involucre ovoid to campanulate, 1.2–2 cm in diam. Phyllaries imbricate, in 6 or 7 rows, appendaged; outer and middle phyllaries broadly to narrowly ovate, 4–13 × 3–5 mm, abaxially arachnoid, somewhat glabrescent; appendage of outer and middle phyllaries brown to blackish brown, small, fimbriate, narrowly decurrent on margin of phyllary, apex acute; inner phyllaries broadly linear, ca. 15 × 3 mm; appendage of inner phyllaries brown, scarious, fimbriate. Sterile florets as long as or slightly longer than bisexual ones. Corolla purple. Achene pale brown, ellipsoid, 4–7 mm, sparsely pubescent, with a subentire rim at apex. Outer pappus elements in several rows, bristlelike, to 6 mm, scabrid to serrulate; inner pappus elements scalelike, ca. 1 mm. Fl. and fr. Jun–Sep. $2n = 20$.

Deserts, steppes, flooded lands, farmlands; 400–1400 m. Nei Mongol, N Xinjiang [Kazakhstan, Kyrgyzstan, Russia, Uzbekistan; Europe].

5. *Centaurea virgata* Lamarck subsp. ***squarrosa*** (Boissier) Gugler, Ann. Hist.-Nat. Mus. Natl. Hung. 6: 248. 1907.

小花矢车菊 xiao hua shi che ju

Centaurea virgata var. *squarrosa* Boissier, Fl. Orient. 3: 651. 1875, based on *C. squarrosa* Willdenow, Sp. Pl. 3: 2319. 1803, not Roth (1800).

Herbs 25–70 cm tall, perennial. Stems few to several, erect, branched from above middle; branches spreading, rigid; stem and branches grayish green, arachnoid tomentose. Leaves densely minutely gland-dotted, arachnoid tomentose. Basal and lower stem leaves petiolate; petiole 3–7 cm; leaf blade elliptic in outline, 5–8 × 2–4 cm, pinnatipartite to bipinnatipartite; ultimate segments linear to narrowly elliptic, 0.7–3 mm wide. Middle stem leaves sessile, pinnatipartite. Upper leaves diminished, undivided. Capitula many, laxly and broadly paniculate, solitary or in pairs, easily detaching from peduncle after anthesis. Involucre ovoid, ellipsoid-ovoid, or cylindrical, 2.5–3.5 mm in diam.

Phyllaries in ca. 6 rows; outer and middle phyllaries elliptic, narrowly elliptic, or linear-lanceolate, 2–8 × 1–1.8 mm, puberulent; appendage of outer and middle phyllaries straw-colored or with a purple tinge, with 4–8 pectinately arranged 1–1.8 mm spinules on each side ending in a 1–2 mm arcuate-recurved spine; inner phyllaries linear-lanceolate, ca. 8 × 1.5 mm; appendage of inner phyllaries triangular to subulate, scarious. Sterile florets few, as long as bisexual ones, not or scarcely radiant; bisexual florets 3–7. Corolla purple to pink. Achene grayish, ovoid, 3–3.5 mm, pilose to subglabrous, apex with an almost smooth inconspicuous rim. Outer pappus elements in few rows, longest ca. 2 mm, scabridulous; inner pappus elements ca. 0.7 mm. Fl. and fr. Jun–Sep. $2n = 36$.

Mountain slopes, wastelands; 500–1500 m. Xinjiang (Tian Shan) [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia, Europe].

6. *Centaurea diffusa* Lamarck, Encycl. 1: 675. 1785.

铺散矢车菊 pu san shi che ju

Herbs 15–50 cm tall, biennial. Stems erect or diffuse, branched from base; stem and branches densely strigose and sparsely arachnoid. Leaves adaxially scabrous. Basal and lower stem leaves petiolate; leaf blade bipinnatisect. Middle stem leaves sessile. Upper leaves sessile, linear, margin entire. Capitula numerous, paniculate at end of stem and branches. Involucre ovoid-cylindrical to cylindrical, 3–5 mm in diam. Phyllaries in 5 or 6 rows; outer and middle phyllaries lanceolate to elliptic, 3–7 × ca. 1.5 mm; appendage of outer and middle phyllaries straw-colored, with 1–5 pectinately arranged spines on each side ending in a 2–4 mm arcuate-patent spine; inner phyllaries linear, ca. 8 × 1 mm; appendage of inner phyllaries scarious. Sterile florets few, as long as bisexual ones, not radiant; bisexual florets ca. 12. Corolla white. Achene dark brown with paler stripes, narrowly ovoid, ca. 2 mm, sparsely pilose, apex with a minute inconspicuous smooth apical rim. Pappus absent. Fl. and fr. Sep. $2n = 18, 36$.

Collected from Liaoning (Lüshun) but of unknown status as to being cultivated, escaped, or naturalized [native to SW Asia and Europe].

7. *Centaurea iberica* Treviranus ex Sprengel, Syst. Veg., ed. 16, 3: 406. 1826.

镇刺矢车菊 zhen ci shi che ju

Calcitrapa iberica (Treviranus ex Sprengel) Schur.

Herbs 20–100 cm tall, annual or biennial. Stem erect, divaricately branched; stem and branches sparsely setiferous; branches exceeding main axis. Leaves sparsely strigose and gland-dotted. Basal leaves petiolate; leaf blade lyrate pinnatipartite or lyrate pinnatisect. Middle stem leaves sessile, pinnatipartite or pinnatisect; lateral lobes or segments ca. 4 pairs, narrowly elliptic, oblanceolate, or linear-oblanceolate, margin inconspicuously denticulate, apex rounded, obtuse, acute, or mucronulate. Upper leaves decreasing in size upward, narrowly elliptic, lanceolate, oblanceolate, or elliptic-oblanceolate, margin denticulate or entire. Capitula in a corymbose-paniculate synflorescence. Involucre ovoid, 1–1.8 cm in diam. excluding spines. Phyllaries in 4–6 rows; outer and middle phyllaries

ovate, broadly ovate, or ovate-elliptic, $5-7 \times 4-8$ mm, with scarious margin and an apical spine; spine of outer and middle phyllaries straw-colored, (0.3-)1-2.5 cm, patent, sulcate, with 1 or 2 pairs of small accessory spines at base, apex pungent; inner phyllaries narrowly to broadly linear, $10-15 \times 3-6$ mm; appendage of inner phyllaries white or pale brown, scarious, margin entire or irregularly and coarsely dentate. Sterile florets not exceeding bisexual ones. Corolla pink to purple. Achene grayish

brown, ellipsoid, 3-4 mm, sparsely pubescent, apex subentire with an inconspicuous rim. Outer pappus elements in few rows, white, bristlelike, to 2 mm, scabrid; inner pappus elements scalelike, ca. 0.5 mm. Fl. and fr. Jun-Sep. $2n = 20$.

Mountain slopes; 500-900 m. NW Xinjiang [Afghanistan, Kashmir, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia, Europe].