

8. Tribe ASTEREAE

紫菀族 *zi wan zu*

Chen Yilin (陈艺林 *Chen Yi-ling*), Chen Yousheng (陈又生); Luc Brouillet, John C. Semple

Herbs, perennial, sometimes annual or biennial, subshrubs, or shrubs, sometimes lianas [or trees]. Leaves usually alternate, simple, margin entire, serrate, dentate, or pinnatisect, rarely pinnately lobed. Capitula radiate, sometimes disciform or rarely discoid. Phyllaries many, 1–5-seriate, imbricate or \pm equal, herbaceous, membranous or subleathery, margins \pm narrowly scarious. Receptacles flat or convex, sometimes hemispheric or conic, or rarely cup-shaped, alveolate or smooth, epaleate or rarely paleate. Ray florets 1 to numerous, 1(–3)-seriate, female, laminate or finely subulate, lamina yellow, rarely orange or reddish to brownish, or white to pink, blue, or purple, apex sometimes 2- or 3-toothed, sometimes multiseriate, with reduced lamina or elaminate, reduced to tube; disk florets bisexual or functionally male, yellow or rarely white, limb cylindric, funnellform, or campanulate; anther base obtuse, rarely caudate, apical appendage ovate to lanceolate; style branches with 2 adaxial stigmatic lines, apical appendages lanceolate to triangular, abaxially pilose, adaxially glabrous. Achenes cylindric, oblong, obovoid, or oblanceoloid, not blackened, usually ribbed or veined. Pappus 1–4-seriate, of barbed or barbellate, rarely long-barbed, fine or coarse bristles, sometimes of setae or scales (all or outermost series), or absent.

About 225 genera and 3,100 species: worldwide, especially in temperate areas of both hemispheres; 30 genera (three endemic, two introduced) and 237 species (112 endemic, 13 introduced) in China; one additional species (*Conyza stricta*) is of uncertain position.

- 1a. Capitula disciform or discoid.
 - 2a. Capitula globose to rounded or oblong; involucre patelliform or hemispheric; receptacles globose to hemispheric or obconic, often swollen, or cup- or funnel-shaped peripherally, convex centrally, rarely flat or convex (*Thespis*); pappus absent or coroniform, rarely of 6–13 short, coarse bristles (*Thespis*); herbs annual, rarely perennial.
 - 3a. Marginal floret corolla minutely tubular or absent; pappus of 6–13 short, coarse bristles; receptacles flat or convex; leaves unlobed 120. *Thespis*
 - 3b. Marginal floret corolla with filiform tube and/or lamina present; pappus absent or coroniform; receptacles globose to hemispheric or obconic, often swollen, or cup- or funnel-shaped peripherally, convex centrally; leaves often lyrate lobed or lobed, sometimes unlobed.
 - 4a. Herbs prostrate; involucre patelliform.
 - 5a. Marginal female florets cylindric-linear, funnel-shaped, or ovoid to urceolate, 2- or 3-lobed; disk florets functionally male; synflorescences racemiform or paniculiform, rarely solitary capitula 116. *Dichrocephala*
 - 5b. Marginal female florets tubular, outer 2-lobed, inner 3- or 4-lobed; disk florets bisexual; synflorescences solitary capitula or laxly corymbiform 118. *Grangea*
 - 4b. Herbs erect; involucre hemispheric.
 - 6a. Leaves pinnatifid or pinnatisect; receptacles cup-shaped or funnel-shaped peripherally (female), slightly convex centrally (disk); marginal female floret lamina none (outer) or short, narrowly funnellform (inner), 2-lobed, purple; disk florets 5-lobed; achenes oblong to \pm fusiform, not ribbed 117. *Cyathocline*
 - 6b. Leaves sometimes lyrate, sometimes lobed, or not lobed; receptacles convex, hemispheric or globose; ray floret lamina small, rounded, ovate or linear, white to purplish; disk florets 4-lobed; achenes narrowly obovoid, 2-ribbed 119. *Myriactis*
- 2b. Capitula cup-shaped; involucre hemispheric or campanulate to turbinate or cylindric; receptacles flat or \pm convex, or hemispheric-flattened or hemispheric-conic to lenticular-knobby; pappus of bristles (usually numerous, usually long); herbs perennial or annual, sometimes woody vines.
 - 7a. Capitula discoid.
 - 8a. Achenes obovoid; leaves eglandular (or sometimes stipitate glandular); capitula solitary at ends of branches, sometimes forming open paniculate-corymbiform synflorescences; disk floret lobes unequal 139. *Aster*
 - 8b. Achenes oblong or lanceolate; leaves gland-dotted or not; capitula in dense or loose corymbiform synflorescences, rarely solitary; disk floret lobes equal.
 - 9a. Involucre broadly obconic to campanulate or hemispheric, phyllaries 1–3-veined; leaves sometimes 3-veined; rhizomes robust 125. *Galatella*
 - 9b. Involucre shortly cylindric or sometimes obconic, phyllary midvein \pm distinct; leaves 1-veined; rhizomes slender 126. *Criminita*
 - 7b. Capitula disciform.
 - 10a. Woody vines, climbing; achenes angled, 3-ribbed 122. *Microglossa*
 - 10b. Herbs perennial or annual, climbing or erect; achenes compressed, flattened or cylindric, 2–4- or more ribbed or many veined (if 3-ribbed and angled then usually on ray only and disk achenes 2-ribbed).
 - 11a. Capitula solitary or 2–4-fascicled at ends of branches, shortly pedunculate or sessile; disk corolla lobes unequal, outer 2 longer; herbs perennial, climbing or erect 134. *Heteroplexis*

- 11b. Capitula terminal, solitary or few, or in racemiform, paniculiform, or corymbiform
synflorescences, pedunculate; disk corolla lobes equal; herbs perennial or annual, erect.
- 12a. Herbs annual, eglandular, glabrous (leaf margin ciliate) 144. *Symphotrichum*
- 12b. Herbs annual or perennial, glandular (sometimes eglandular), hairy.
- 13a. Involucres urceolate or subcylindric 141. *Erigeron*
- 13b. Involucres campanulate to hemispheric-campanulate.
- 14a. Disk florets functionally male (sterile); phyllaries 2- or 3-seriate 135. *Psychrogeton*
- 14b. Disk florets bisexual (fertile); phyllaries 3- or 4-seriate.
- 15a. Phyllaries subequal; disk floret limb shortly funnellform; achenes oblanceolate,
flattened 136. *Neobrachyactis*
- 15b. Phyllaries imbricate (unequal); disk floret limb funnellform; achenes oblong, compressed.
- 16a. Female florets elaminate; pappus 1-seriate; synflorescences corymbiform, sometimes
glomerate, glomerate-paniculiform, or paniculiform 121. *Eschenbachia*
- 16b. Female florets laminate, lamina short, filiform; pappus \pm 2-seriate, outer very short,
slender; synflorescences densely compound-corymbiform (see species incertae sedis
after *Eschenbachia*) *Conyza stricta*
- 1b. Capitula radiate.
- 17a. Ray floret lamina yellow, orange, red, or brownish.
- 18a. Small shrubs; pappus 3-seriate, outermost of 6 broad scales, inner (absent in disk florets) of flattened
bristles, innermost of strongly clavate bristles; leaf blade pinnatilobed; receptacles fimbriate 133. *Formania*
- 18b. Herbs perennial, sometimes biennial or annual, or subshrubs; pappus 1–3-seriate, outer few short bristles
or scales, inner series of bristles, innermost sometimes \pm clavate, or only short scales; leaf blade
subpinnatifid or unlobed; receptacles naked.
- 19a. Disk florets functionally male (sterile).
- 20a. Capitula \pm large; phyllaries unequal to equal; herbage sometimes or partly long white lanate or
cottony; achenes 8–10-veined; pappus bristles long barbellate 115. *Nannoglottis*
- 20b. Capitula medium-sized to small; phyllaries imbricate; herbage white tomentose to lanate, sessile
to short-stipitate glandular; achenes 2-ribbed; pappus bristles barbellate 135. *Psychrogeton*
- 19b. Disk florets bisexual (fertile).
- 21a. Plants resinous; phyllaries looped or hooked; pappus of few deciduous scales or awns 143. *Grindelia*
- 21b. Plants not resinous; phyllaries \pm appressed; pappus 1–3-seriate, outer few short bristles or scales,
inner series of bristles.
- 22a. Capitula numerous in terminal racemiform, paniculiform, or corymbose-paniculiform
synflorescences; achenes obconic to cylindric, sometimes \pm compressed, 8–10-veined 140. *Solidago*
- 22b. Capitula solitary; achenes oblong, compressed, 2(–4)-veined 141. *Erigeron*
- 17b. Ray floret lamina white, pink, purple, or blue.
- 23a. Pappus absent (that of disk sometimes 1-seriate short scales in *Aster*).
- 24a. Herbs scapiform, leaves basal, sometimes rosulate.
- 25a. Phyllaries leaflike; receptacles swollen or conic; involucre hemispheric or broadly campanulate; ray
florets 1-seriate; disk florets bisexual (fertile), numerous; achenes not beaked, strigillose 123. *Bellis*
- 25b. Phyllaries membranous; receptacles flat or convex; involucre campanulate; ray florets 3- or
4-seriate; disk florets functionally male (sterile), few; achenes shortly beaked, apically glandular 130. *Lagenophora*
- 24b. Herbs erect, leaves basal (often withered at anthesis) and cauline.
- 26a. Herbs biennial (winter annual); ray florets 3; disk florets few, functionally male (sterile); disk
achene pappus absent; ray achenes 3-ribbed 137. *Sheareria*
- 26b. Herbs perennial; ray florets numerous; disk florets numerous, bisexual (fertile); disk achene pappus
absent or 1-seriate short scales; achenes 2–5- or more ribbed 139. *Aster*
- 23b. Pappus present (rarely absent on ray achene only in *Erigeron*).
- 27a. Pappus 1-seriate, of caducous, barbellate, spiniform bristles; disk florets functionally male (sterile);
achenes 3-ribbed, slightly winged 131. *Calotis*
- 27b. Pappus 1–4-seriate, of persistent (deciduous in *Callistephus*) barbellate bristles; disk florets bisexual
(fertile); achenes 2- to many ribbed, not winged.
- 28a. Outer phyllaries large, leaflike, inner scarious; pappus 3-seriate, outermost of persistent, short scales,
inner 2 of deciduous bristles 132. *Callistephus*
- 28b. Outer phyllaries leaflike (not large) or membranous, inner membranous; pappus 1–4-seriate,
outermost of short setae or sometimes scales, inner of persistent (sometimes deciduous) bristles.
- 29a. Ray florets sterile; achene ribs indistinct; leaf blades often gland-dotted 125. *Galatella*
- 29b. Ray florets female, fertile; achene ribs distinct; leaf blades eglandular or sessile or stipitate glandular
(not gland-dotted).

- 30a. Subshrubs, strongly branched; leaf margins often revolute; phyllaries leathery 127. *Asterothamnus*
- 30b. Herbs perennial, biennial, or annual; leaf margins flat (rarely revolute); phyllaries membranous or leaflike.
- 31a. Pappus conspicuously elongating after anthesis; herbs annual 124. *Tripolium*
- 31b. Pappus not elongating after anthesis; herbs perennial, sometimes annual or biennial.
- 32a. Leaves basal, linear; achenes slightly veined, densely sericeous, eglandular; capitula solitary 128. *Arctogeron*
- 32b. Leaves basal and cauline (sometimes reduced, then basal not linear); achenes ribbed or veined, glabrous or sparsely to densely strigillose, glandular or eglandular; capitula in synflorescences or solitary.
- 33a. Achenes 7–10-veined; stems ascending, villous, eglandular 142. *Eurybia*
- 33b. Achenes 2–6-ribbed or -veined; stems usually erect, sometimes prostrate, glabrous or hairy, glandular or eglandular.
- 34a. Disk corollas \pm zygomorphic (1 lobe deeper).
- 35a. Herbs perennial, caespitose; basal leaves numerous (persistent); receptacle shallowly alveolate, naked 138. *Rhinactinidia*
- 35b. Herbs perennial, biennial, or annual, not caespitose, or rarely shrubs; basal leaves withered by anthesis; receptacle alveolate, fimbriate 139. *Aster*
- 34b. Disk corollas actinomorphic.
- 36a. Capitula small, numerous in dense corymbiform synflorescences; stems densely glandular; disk corolla limb shortly funnelform; achenes ovoid 129. *Turczaninovia*
- 36b. Capitula small or medium-sized, solitary or few to numerous in corymbiform, racemiform, or paniculiform synflorescences; stems \pm glandular or eglandular; disk corolla limb cylindric to funnelform or campanulate; achenes oblong or obovoid to oblanceoloid.
- 37a. Disk floret limb cylindric to narrowly funnelform; phyllary midvein reddish or orange 141. *Erigeron*
- 37b. Disk floret limb campanulate to funnelform; phyllary midvein not reddish or orange.
- 38a. Herbs perennial, sometimes annual, biennial, or shrubs, glandular or eglandular, glabrous or hairy; involucre hemispheric to campanulate, sometimes obconic; capitula solitary or in corymbiform, sometimes paniculiform synflorescences; achenes oblong or obovoid, compressed, 2–4(–7)-ribbed, glandular or eglandular 139. *Aster*
- 38b. Herbs perennial or annual, eglandular, glabrous (except distally in lines); involucre campanulate or cylindric; capitula in paniculiform synflorescences; achenes oblanceoloid, \pm compressed, 2–6-veined, eglandular 144. *Symphotrichum*

115. NANNOGLOTTIS Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 480. 1882.

毛冠菊属 mao guan ju shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Stereosanthus Franchet; *Vierhapperia* Handel-Mazzetti.

Herbs, perennial, rarely subshrubs; rhizome woody; herbage sometimes or partly long white lanate or cottony, stipitate glandular. Leaves alternate, basal and lower cauline long or shortly petiolate, blade lanceolate, ovate-lanceolate, oblong, orbicular, or cordate, margin coarsely serrate, mid and upper cauline sessile, often decurrent. Capitula \pm large, few to numerous in corymbiform synflorescences, rarely solitary, radiate. Involucre hemispheric or cup-shaped; phyllaries 2–4-seriate, unequal to equal, herbaceous, rarely papery, multiveined, margins of inner narrowly scarios, outer glandular or long hairy. Receptacles flat or slightly convex, \pm alveolate, naked. Ray florets outer with lamina yellow, reddish, or brownish, surpassing or \pm equaling phyllaries, inner 2- or 3-seriate, rarely few or absent, tubular, elaminate, shorter than styles; disk functionally male, yellow, narrowly funnelform, 5-lobed, lobes lanceolate to linear-lanceolate, often glandular; anther bases obtuse or acute; style branches of ray florets linear-lanceolate, long, of disk \pm appressed together, lanceolate, \pm short, densely hairy (outer), without receptive papillae. Achenes brown, oblong, sparsely strigose, pale 8–10-veined. Pappus of few short, thin bristles (sometimes absent), and many long, coarse or thin, long-barbellate bristles, those of disk sometimes few, short, thin.

Nine species: Bhutan, China, India, Nepal; nine species (six endemic) in China.

J. Q. Liu et al. (Molec. Phylogen. Evol. 23: 307–325. 2002) produced a molecular phylogeny of *Nannoglottis*, showing it is one of the earliest diverging lineages of Astereae. *Nannoglottis ravida* is the earliest diverging member of the genus and has been segregated under *N.* sect. *Monocephala* T. G. Gao & Y. L. Chen from all other species of the genus.

- 1a. Subshrubs; capitula solitary; ray florets yellow; leaves abaxially densely cottony 1. *N. ravidata*
- 1b. Perennial herbs; capitula numerous in corymbiform synflorescences; ray florets yellow, brownish, or reddish; leaves abaxially ± densely cottony or arachnoid, or glandular.
- 2a. Ray florets brownish or reddish, lamina slightly exceeding involucre.
- 3a. Basal leaves cordate, long winged petiolate 9. *N. yunnanensis*
- 3b. Basal leaves ovate-lanceolate, attenuate at base.
- 4a. Mid cauline leaves base abruptly narrowed into short, broadly winged petiole, margin denticulate, abaxially stipitate glandular 8. *N. hieraciophylla*
- 4b. Mid cauline leaves base attenuate, margin dentate, abaxially stipitate glandular, sparsely arachnoid 7. *N. carpesioides*
- 2b. Ray florets yellow, lamina distinctly exceeding involucre.
- 5a. Basal leaves abaxially densely lanate (glands not visible), sometimes arachnoid.
- 6a. Basal leaves long petiolate, cordate to orbicular or broadly ovate, margin shallowly dentate, teeth obtuse or acute, mid cauline abruptly smaller; phyllaries lanceolate 2. *N. delavayi*
- 6b. Basal leaves shortly petiolate, ovate to lanceolate, margin irregularly denticulate to dentate, mid cauline developed; phyllaries ovate to lanceolate-ovate 5. *N. latisquama*
- 5b. Basal leaves abaxially glandular or also arachnoid.
- 7a. Phyllaries papery, 3- or 4-seriate, unequal, outer shorter than inner 3. *N. gynura*
- 7b. Phyllaries herbaceous, 2- or 3-seriate, equal or subequal.
- 8a. Basal leaves attenuate at base, decurrent on stem, usually sessile 4. *N. hookeri*
- 8b. Basal leaves abruptly narrowed, long petiolate 6. *N. macrocarpa*

1. *Nannoglottis ravidata* (C. Winkler) Y. L. Chen, Kew Bull. 39: 432. 1984.

青海毛冠菊 qing hai mao guan ju

Senecio ravidus C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 13: 4. 1893; *Nannoglottis qinghaiensis* Y. Ling & Y. L. Chen.

Subshrubs; rhizome thickened, woody, multibranched. Stems erect, 12–20 cm tall, pubescent with white cottony hairs and glandular hairs, later glabrescent. Leaves: basal oblanceolate or spatulate-oblong, 4–5 × ca. 1 cm; mid cauline petiole to 5 cm, winged, blade oblong or elliptic, 4–11 × 0.5–2.5 cm, abaxially densely cottony, adaxially green, arachnoid or glabrous, base attenuate, margin repand-dentate or shallowly lobed, apex obtuse or rounded. Capitula solitary. Involucre hemispheric, 13–15 mm in diam.; phyllaries 2- or 3-seriate, linear-lanceolate, 9–11 × 1–1.5 mm, abaxially white cottony and glandular, apex often reflexed, acuminate. Ray florets yellow, lamina linear, ca. 10 × 1 mm; tubular florets fine, ca. 4 mm, apically finely hairy; disk florets yellow, 5–6 mm, lobes glandular. Achenes oblong, appressed hairy, finely ribbed. Pappus of white bristles 5–6 mm. Fl. and fr. Jul–Aug.

• Rocky mountains, shady slopes, thickets, meadows; 3700–4100 m. S Qinghai (Chindu), Xizang.

2. *Nannoglottis delavayi* (Franchet) Y. Ling & Y. L. Chen, Acta Phytotax. Sin. 10: 98. 1965.

厚毛毛冠菊 hou mao mao guan ju

Stereosanthus delavayi Franchet, J. Bot. (Morot) 10: 385. 1896.

Herbs, perennial; rhizome woody. Stems erect, 35–80 cm tall, arachnoid and sparsely villous, stipitate glandular, densely so above. Leaves: basal and lower cauline petiole long, 6–20 cm, blade cordate to orbicular or broadly ovate, 6–19.5 × 5–16.5 cm, abaxially densely arachnoid-tomentose, adaxially

arachnoid or glabrate, short-stipitate glandular, base cordate or abruptly attenuate, margin shallowly dentate, long-stipitate glandular, teeth obtuse or acute, mucronate, apex obtuse, mucronate; mid and upper cauline sessile, ± decurrent, abruptly smaller, decreasing upward, lanceolate, sometimes ± clasping. Capitula 3–18 in corymbiform synflorescences. Involucre hemispheric, 1.5–2 cm in diam.; phyllaries 3- or 4-seriate, lanceolate, subequal, abaxially sometimes sparsely to ± densely arachnoid, densely long-stipitate glandular, papery, margin long-stipitate glandular, sparsely arachnoid, moderately so apically, that of inner sometimes narrowly scarious, apex long acuminate. Ray florets yellow, lamina narrowly oblong, 9–15 × 1–3 mm, distinctly exceeding involucre; inner tubular 1- or 2-seriate, 2–4 mm, truncate, fimbriate; disk florets yellow, lobes ± glandular. Achenes narrowly oblong, 3–4 mm, strigose, 8–10-ribbed. Pappus of yellowish bristles 3–4 mm, some shorter and thinner, those of disk fewer, thinner. Fl. Jun–Sep.

• *Pinus* or *Quercus* forests; 2600–3600 m. SW Sichuan, NW Yunnan.

3. *Nannoglottis gynura* (C. Winkler) Y. Ling & Y. L. Chen, Acta Phytotax. Sin. 10: 97. 1965.

狭舌毛冠菊 xia she mao guan ju

Senecio gynura C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 14: 157. 1895; *Nannoglottis souliei* (Franchet) Y. Ling & Y. L. Chen; *Stereosanthus gynura* (C. Winkler) Handel-Mazzetti; *S. hieraciifolius* Diels; *S. souliei* Franchet.

Herbs, perennial; rhizome thick, woody. Stems erect, 17–100 cm tall, sparsely (to moderately above) stipitate glandular, sparsely and irregularly arachnoid (more regularly so above), or glabrate. Leaves: basal and lower cauline petiole relatively short, 3–8 cm, narrowly winged, blade obovate or elliptic, 6–20 × 2.5–6 cm, surfaces sparsely to moderately short-stipitate glandular, abaxial midvein sparsely arachnoid, base attenuate, margin irregularly, shallowly dentate to serrate, teeth mucronulate, apex obtuse or acute; mid cauline narrowly elliptic to lanceo-

late, base auriculate-clasping; upper cauline reduced upward, entire. Capitula (5–)10–27 in corymbiform synflorescences. Involucre 2–3.5 cm in diam.; phyllaries 3- or 4-seriate, linear-lanceolate, unequal, outer shorter than inner, papery, surfaces densely short-stipitate glandular, ± arachnoid, margin apically densely arachnoid ciliate, that of inner narrowly to moderately scarious, apex acuminate to caudate, tip often dark. Ray florets yellow, lamina narrowly oblong, 9–13 × 1.8–2.5 mm, distinctly exceeding involucre; inner tubular 2- or 3-seriate, yellow, 2–4 mm, obliquely truncate; disk florets numerous, 4–4.5 mm, lobes glandular (mostly at apex). Achenes brown, narrowly oblong, 4–6 mm, sparsely to moderately strigose, particularly distally, pale 8–10-veined. Pappus of white or whitish bristles 4–5.5 mm, those of disk fewer. Fl. Jul–Aug.

Pinus or *Picea* forests, thickets, gullies, grasslands on slopes; 3400–4000 m. Qinghai, Sichuan, Xizang, Yunnan [Nepal].

4. *Nannoglottis hookeri* (C. B. Clarke ex J. D. Hooker) Kitamura, Acta Phytotax. Geobot. 31: 50. 1980.

虎克毛冠菊 hu ke mao guan ju

Doronicum hookeri C. B. Clarke ex J. D. Hooker, Fl. Brit. India 3: 332. 1881.

Herbs, perennial; rhizome woody. Stems erect, 10–85 cm tall, simple, often weakly lanate at first, stipitate glandular above. Leaves sessile or lowest winged petiolate, petiole to ca. 10 cm, blade lanceolate to oblanceolate, 7–22 × 1–8 cm, surfaces lanate or glabrescent, stipitate glandular, base attenuate, decurrent on stem, margin denticulate to sharply toothed, apex acute. Capitula 2–7 in corymbiform-cymose synflorescences. Involucre ± hemispheric, 15–20 mm in diam.; phyllaries 2- or 3-seriate, subequal, lanceolate, 10–15 × 1–4 mm, sparsely arachnoid and stipitate glandular, apex acuminate. Ray florets yellow, tube 2.3–4.5 mm, hairy above, lamina 8–13 × 1.7–3.3 mm, distinctly exceeding involucre; inner tubular 1- or 2-seriate, 2–3.5 mm, puberulent above; disk florets yellow, funnelform, 4–4.5 mm, lobes sparsely glandular. Achenes oblong, 4–5 mm, strigose distally. Pappus of white or brownish bristles 4–5 mm. Fl. Jun–Aug.

Pinus forests, sometimes among shrubs; 3400–4100 m. S Xizang (Yadong) [Bhutan, India (Sikkim), Nepal].

5. *Nannoglottis latisquama* Y. Ling & Y. L. Chen, Acta Phytotax. Sin. 10: 98. 1965.

宽苞毛冠菊 kuan bao mao guan ju

Stereosanthus yunnanensis Franchet, J. Bot. (Morot) 10: 385. 1896.

Herbs, perennial; rhizome thick. Stems solitary, erect, 12–70 cm, simple, ± densely white arachnoid and villous, long-stipitate glandular (notably above), partly glabrescent. Leaves: basal and lowest cauline petiole short, winged, blade ovate to lanceolate, sometimes obovate to oblanceolate, 4–20 × 3–17 cm, abaxially densely lanate to arachnoid, adaxially arachnoid, short-stipitate glandular, base attenuate, decurrent on stem, margin irregularly denticulate to dentate, apex obtuse or rounded, mucronate; mid cauline several, oblong, lanceolate, or ovate, sometimes obovate, apex obtuse or acute; upper cauline gradu-

ally reduced, surfaces white arachnoid-lanate or arachnoid, abaxially more densely so, adaxially ± glabrescent. Capitula (1 or)2–14, in corymbiform synflorescences, rarely solitary. Involucre hemispheric, 1.5–3.5 cm; phyllaries 3- or 4-seriate, subequal, herbaceous (inner papery), ovate to lanceolate-ovate, 13–18 × 2–5 mm, sometimes sparsely to densely white arachnoid, densely stipitate glandular, margin villous, long-stipitate glandular, distally moderately arachnoid ciliate, apex long acuminate. Ray florets yellow, oblong, 9–18 × 2–4 mm, distinctly exceeding involucre; inner tubular 2- or 3-seriate, 1.8–3.5 mm, truncate; disk florets yellow, tubular, 4–5.3 mm, lobes glandular. Achenes oblong, 4–4.5 mm, moderately strigose, 10-ribbed (sterile disk ovary glabrous or sparsely strigose distally). Pappus of straw-colored, coarse bristles 4–5 mm, plus some short, thin bristles, those of disk lacking or few and thin. Fl. Apr–Sep.

• *Pinus*, *Abies*, or mixed forests, thickets, grasslands, alpine meadows; 3200–3900 m. S and W Sichuan, NW Yunnan.

6. *Nannoglottis macrocarpa* Y. Ling & Y. L. Chen, Acta Phytotax. Sin. 10: 99. 1965.

大果毛冠菊 da guo mao guan ju

Herbs, perennial; rhizome ascending, woody. Stems erect, 30–100 cm tall, white lanate and sparsely villous, long-stipitate glandular. Leaves: basal long petiolate, blade ovate to ovate-lanceolate, 6–25 × 3–11 cm, abaxially stipitate glandular, adaxially sparsely arachnoid, very sparsely villous, stipitate glandular, margin coarsely dentate, apex obtuse; cauline sessile, lower ovate or elliptic, 15–20 × 8–18 cm, apex obtuse to acute; mid cauline up to 25, elliptic, 8–10 cm, base decurrent, apex acute; upper cauline ovate to ovate-lanceolate, base cordate, auriculate-clasping, apex acuminate. Capitula 3–20, in corymbiform-cymose synflorescences. Involucre hemispheric, 2–2.5 cm in diam.; phyllaries 2- or 3-seriate, subequal or outer slightly longer, lanceolate to linear-lanceolate, ca. 12 × 2–2.5 mm, herbaceous, abaxially short-stipitate glandular, margin apically lanate-ciliate. Ray florets yellow, lamina 6–8 × 0.6–1.3 mm, distinctly exceeding involucre; inner tubular 1- or 2-seriate, yellow; disk florets yellow, funnelform, 4–4.5 mm, lobes ca. 1.5 mm, short-stipitate glandular outside. Achenes oblong, 6–7 mm, ± densely strigose, 10–12-ribbed. Pappus of white to yellowish, coarse, unequal bristles 4–5 mm. Fl. Jul–Aug.

Forests, grasslands; 3500–3700 m. E Xizang (Bomi, Qamdo) [Nepal].

7. *Nannoglottis carpesioides* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 481. 1882.

毛冠菊 mao guan ju

Herbs, perennial; rhizome woody. Stems erect, 60–100 cm tall, sparsely arachnoid-tomentose, long-stipitate glandular, more densely so above. Leaves: basal and lower cauline dense, petiole to 10 cm, winged, blade oblong or obovate-oblanceolate, 10–33 × 6–16 cm, abaxially sparsely arachnoid, stipitate glandular, veins long villous to arachnoid, adaxially stipitate glandular, sparsely arachnoid or not, base attenuate, often decurrent on stem, margin coarsely dentate to serrate, apex acuminate; mid cauline ovate to ovate-lanceolate, abaxially stipitate

glandular, sparsely arachnoid, base attenuate, margin coarsely dentate; upper cauline reduced gradually, finely dentate. Capitula 3–12 in loose racemiform or corymbiform synflorescences. Involucre hemispheric, 1.5–2.5 cm in diam.; phyllaries 2- or 3-seriate, subequal or outer slightly longer, lanceolate to oblong-lanceolate, 9–12 mm, papery, ± densely stipitate glandular, sometimes base sparsely arachnoid, margin stipitate glandular, of inner narrowly scarious, apex acute to acuminate. Ray florets brownish, lamina oblong, 1.9–4 × 1.1–1.7 mm, slightly exceeding involucre, abaxially sparsely stipitate glandular; inner tubular 1- or 2-seriate; disk florets yellowish, tubular, lobes glandular at apex. Achenes oblong, 4.5–5 mm, strigose, 8–10-ribbed. Pappus of dirty white, coarse bristles, those of disk few, short. Fl. Jun–Jul.

• Forests on slopes, meadows, pastures; 2000–3400 m. Gansu, Qinghai, Shaanxi, Yunnan.

8. *Nannoglottis hieraciophylla* (Handel-Mazzetti) Y. Ling & Y. L. Chen, Acta Phytotax. Sin. 10: 101. 1965 [*“hieraciophylla”*].

玉龙毛冠菊 yu long mao guan ju

Vierhapperia hieraciophylla Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 629. 1937 [*“hieraciophylla”*].

Herbs, perennial; rhizome woody. Stems erect, 38–90 cm tall. Leaves: basal short, winged petiolate, blade ovate or oblong, 12–22 × 3.8–9 cm, abaxially stipitate glandular, base attenuate, margin dentate, villosulous; mid cauline broadly winged, shortly petiolate, blade abaxially stipitate glandular, sparsely villous on midvein, adaxially stipitate glandular, sparsely villosulous, base abruptly narrowed, margin denticulate; upper cauline sessile. Capitula 2–7, in corymbose synflorescences. Phyllaries 2–4-seriate, subequal, linear-lanceolate. Ray florets purplish-reddish, lamina 0.6–4 × 0.4–1.2 mm; inner tubular 1-seriate, filiform, sometimes unstable; disk florets numerous, yellowish, 4–5 mm, lobes glandular at apex. Achenes oblong, pilose, 8–10-ribbed. Pappus of few white bristles 3–4 mm. Fl. Jun–Sep.

• *Picea* forests or thickets; 3400–3800 m. NW Yunnan (Lijiang, Zhongdian).

9. *Nannoglottis yunnanensis* (Handel-Mazzetti) Handel-Mazzetti, Symb. Sin. 7: 1116. 1936 [*“yuenmanensis”*].

云南毛冠菊 yun nan mao guan ju

Nannoglottis carpesioides Maximowicz var. *yunnanensis* Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 57: 175. 1920 [*“Yüannanensis”*].

Herbs, perennial; rhizome thick, woody. Stems erect, solitary, 55–200 cm tall, white long villous below, sparsely to moderately (more densely under capitula) white arachnoid, densely long-stipitate glandular above. Leaves: basal long winged petiolate, withered and fallen at anthesis, blade cordate; lower cauline petiole 6–16 cm, broadly winged, blade subcordate, broadly ovate, ovate, or subelliptic, 9–25 × 4.5–18 cm, abaxially arachnoid, sessile glandular or short-stipitate glandular, adaxially scaberulous to glabrate, base broadly cuneate, truncate, or slightly cordate, decurrent on stem, margin irregularly dentate, apex obtuse, rounded, or acute, mucronulate; upper cauline gradually diminished, uppermost sessile, auriculate. Capitula 3–10 in corymbiform-cymose synflorescences. Involucre hemispheric, 1.7–2.5 cm in diam.; phyllaries 2- or 3-seriate, subequal, lanceolate or linear-lanceolate, 8–13 × 1.5–2 mm, abaxially densely short-stipitate glandular, sparsely arachnoid at base, margin arachnoid ciliate (more densely so apically), of inner narrowly scarious, apex acuminate. Ray florets brownish, lamina linear-lanceolate to triangular, 0.5–3 mm, slightly exceeding involucre, gradually reduced inward to inner tubular florets; inner tubular 2–4-seriate, 1–2 mm, obliquely truncate; disk florets numerous, yellowish, 2–5 mm, deeply lobed, lobes sparsely glandular. Achenes straw-colored, narrowly oblong, 3–4 mm, strigose, 8–10-ribbed, (sterile ovary of disk florets glabrous or sparsely strigose apically). Pappus of straw-colored bristles 3–4 mm, those of disk few, unequal. Fl. Jun–Jul.

• *Picea* forests, open pastures; 2900–4000 m. W Sichuan, NW Yunnan (Zhongdian).

116. *DICHROCEPHALA* L'Héritier ex Candolle, Arch. Bot. (Paris) 2: 517. 1833.

鱼眼草属 yu yan cao shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Herbs, annual, prostrate. Leaves alternate, lyrate or entire. Capitula small, disciform, orbicular or oblong, in racemiform or paniculiform synflorescences, rarely solitary. Involucre patelliform; phyllaries 2- or 3-seriate, margins narrowly scarious, fimbriate. Receptacle globose or obconic, swollen, alveolate, naked. Florets fertile; marginal female many seriate, white or yellow, without tube, lamina narrowly cylindrical, funnel-shaped, campanulate, or ovoid to urceolate, 2- or 3-lobed; disk florets bisexual, yellow or reddish, tube short, limb narrowly campanulate, 4- or 5-lobed; anther base obtuse; style branch tips lanceolate. Achenes obovoid, compressed, glabrous, sometimes basally and apically glandular, green apically, margins strongly 2-ribbed, of female florets sometimes faintly so. Pappus absent, of disk florets ± coroniform, sometimes with 1 or 2 short setae.

Four species: Africa, tropical Asia; three species in China.

- 1a. Corolla of female florets shortly funnel-shaped or campanulate; phyllaries ± puberulent; receptacle distinctly swollen, obconic, apex acute 1. *D. chrysanthemifolia*
 1b. Corolla of female florets cylindrical or ovoid to urceolate; phyllaries glabrous; receptacle globose, apex flat.
 2a. Female floret corolla narrowly cylindrical; leaves lyrate pinnatifid, base attenuate into winged petiole ... 2. *D. integrifolia*
 2b. Female floret corolla ovoid or urceolate; leaves usually pinnate, rarely lyrate pinnatifid, base expanded, auriculate-clasping, sessile 3. *D. benthamii*

1. *Dichrocephala chrysanthemifolia* (Blume) Candolle, Arch. Bot. (Paris) 2: 518. 1833.

菊叶鱼眼草 ju ye yu yan cao

Cotula chrysanthemifolia Blume, Bijdr. 918. 1826; *Dichrocephala abyssinica* Schultz Bipontinus ex Hochstetter; *D. grangeifolia* Candolle.

Herbs, annual, branched. Stems and branches rigid, white tomentulose, pubescent, or hispidulous, long-stipitate glandular, branches ascending, spreading or apically oblique. Leaves oblong or obovate, 3–5 × 0.8–2 cm, pinnatifid, pinnatipartite, or pinnatilobate, surfaces ± densely white strigose and puberulent, sparsely glandular, base expanded, auriculate-clasping; lateral lobes 2- or 3-paired, oblong, lanceolate, or triangular-lanceolate, margin 1- or 2-serrulate on one or both sides, or entire; lobes of lower leaves relatively small, of middle large, of upper gradually smaller, uppermost linear, entire or with 1- or 2-paired teeth. Capitula globose or oblong, ca. 7 mm in diam., solitary in upper leaf axil and in subracemiform synflorescences; peduncles ca. 5 cm, densely puberulent or puberulent-tomentose; bracts 1–3, linear or lanceolate. Phyllaries 1- or 2-seriate, slightly unequal, ca. 1.5 mm, margin white scarios, ± puberulent. Receptacles obconic, distinctly swollen, 5–6 mm in fruit, apex acute. Marginal female florets many seriate, purple, corolla shortly funnel-shaped or campanulate, ca. 0.7 mm, deeply 3–5-lobed, lobes sometimes sparsely glandular; disk florets functionally male, few, ca. 1 mm, limb funnelform, 4- or 5-lobed, externally sparsely viscid-glandular, pilose. Achenes straw-colored, oblanceoloid, compressed, apically ± glandular. Pappus absent or of disk florets with 1 or 2 bristles.

Grasslands on slopes, roadsides; ca. 2900 m. Xizang, Yunnan [Bhutan, India, Indonesia, Japan, Malaysia, Myanmar, Nepal, New Guinea, Philippines; Africa, Australia].

If varieties were recognized, the variety present in Asia would be *Dichrocephala chrysanthemifolia* var. *chrysanthemifolia*.

2. *Dichrocephala integrifolia* (Linnaeus f.) Kuntze, Revis. Gen. Pl. 1: 333. 1891.

鱼眼草 yu yan cao

Hippia integrifolia Linnaeus f., Suppl. Pl. 389. 1782; *Cotula bicolor* Roth; *C. latifolia* Persoon, nom. illeg. superfl.; *Dichrocephala auriculata* (Thunberg) Druce; *D. bicolor* (Roth) Schlechtendal; *D. latifolia* Candolle, nom. illeg. superfl.; *Ethulia auriculata* Thunberg; *Grangea latifolia* Lamarck ex Poirlet, nom. illeg. superfl.

Herbs, annual. Stems erect, 12–55 cm tall, robust, rarely slender, simple or branched from base, branches ascending, stems and branches sparsely to moderately white villous or pubescent. Leaves: petiole 1–3.5 cm, narrowly winged, base clasping, blade ovate, elliptic, or lanceolate, surfaces sparsely to moderately strigose, margin coarsely doubly serrate or incised,

villous-ciliate, base attenuate; mid cauline 3–12 × 2–4.5 cm, lyrate pinnatilobate, terminal lobe large, lateral lobes 1- or 2-paired; upper or lower often simple and gradually smaller. Capitula globose, 3–5 mm in diam., 5–26 in terminal paniculiform synflorescences; peduncles slender, to 3 cm. Phyllaries 2-seriate, unequal, oblong or oblong-lanceolate, 1–1.5 mm, membranous, margin scarios, fimbriate. Receptacle globose, apex flat. Marginal female florets many seriate, white, sometimes turning purplish, corolla narrowly cylindric, 0.4–0.5 mm, usually 2-lobed; disk florets few, ca. 0.5 mm, tube short, limb narrowly campanulate to funnelform, 4- or 5-lobed, sessile glandular. Achenes straw-colored, obovate, compressed, glabrous, sparsely glandular apically and/or basally. Pappus absent, or of disk florets sometimes with 1 or 2 bristles. Fl. and fr. year-round.

Slopes, shaded valleys, forests on slopes, watersides, meadows on clay, wastelands, roadsides, trailsides; 200–2000 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Thailand, Vietnam; tropical Africa, SW Asia (Iran)]; introduced in SW Asia (Azerbaijan, Georgia, Turkey), Australia, and Pacific islands].

This is a medicinal plant, used for dyspepsia, indigestion, as an antiphlogistic, and as an antiemetic.

3. *Dichrocephala benthamii* C. B. Clarke, Compos. Ind. 36. 1876.

小鱼眼草 xiao yu yan cao

Dichrocephala amphiloba H. Léveillé & Vaniot; *D. bodinieri* Vaniot.

Herbs, annual, 6.5–35 cm tall. Stems solitary or fascicled, robust, rarely slender, branched, sparsely to densely white villous or pubescent. Leaves sessile, blade ovate, obovate-oblong-spatulate, or oblong, surfaces sparsely villous, sometimes glabrescent or glabrate, veins densely villous-ciliate; mid cauline 3–6 × 1.5–3 cm, pinnate, rarely lyrate-pinnatilobate, sometimes unlobed, lateral lobes 1–3-paired, spatulate or broadly spatulate, base auriculate-clasping, margin coarsely crenate-serrate, densely or sparsely white shortly hairy. Capitula globose, 3–5 mm in diam., few or numerous in lax to dense corymbiform or paniculate-corymbiform synflorescences; peduncles slightly robust, puberulent or glabrate. Phyllaries 2- or 3-seriate, oblong, 1–1.5 mm, margin denticulate. Receptacle globose, apex flat. Marginal female florets many seriate, white, corolla ovoid or urceolate, 0.5–0.7 mm, 2- or 3-lobed; disk florets few, yellow-green, 0.8–0.9 mm, tube very short, limb funnelform, 4- or 5-lobed. Achenes straw-colored, obovoid, compressed, glabrous. Pappus absent, or of disk florets sometimes with 1 or 2 fine bristles. Fl. and fr. year-round.

Grasslands in valleys, riverbanks, fields, wastelands, roadsides; 700–3200 m. Gansu, Guangxi, Guizhou, Hubei, Sichuan, Xizang, Yunnan [Bhutan, Cambodia, India, Laos, Nepal, Vietnam].

117. CYATHOCLINE Cassini, Ann. Sci. Nat. (Paris) 17: 419. 1829.

杯菊属 bei ju shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Herbs, annual [or perennial]. Leaves alternate, pinnatifid or pinnatisect. Capitula small, globose, disciform, in corymbiform-

paniculiform or nearly racemiform synflorescences. Receptacles cup-shaped or funnel-shaped peripherally (bearing marginal florets), slightly convex centrally (bearing disk florets), non-alveolate, naked. Involucre hemispheric; phyllaries 2- or 3-seriate, subequal, oblong to lanceolate, margin scarious. Marginal florets female, fertile, many seriate, purple, tube filiform, lamina none (outer) to short, narrowly funnellform (inner), 2-lobed; disk florets bisexual, usually functionally male, few, limb funnellform, 5-lobed; anther base truncate, appendages triangular; style branch tips linear-lanceolate, of disk florets simple or cleft. Achenes minute, oblong to \pm fusiform, slightly flattened, not ribbed, apex \pm coroniform. Pappus absent.

Three species: tropical Asia; one species in China.

1. *Cyathocline purpurea* (Buchanan-Hamilton ex D. Don) Kuntze, Revis. Gen. Pl. 1: 333. 1891.

杯菊 bei ju

Tanacetum purpureum Buchanan-Hamilton ex D. Don, Prodr. Fl. Nepal. 181. 1825; *Cyathocline lyrata* Cassini; *C. stricta* Candolle; *Dichrocephala minutifolia* Vaniot.

Herbs, annual, 10–36+ cm tall. Stems erect, often branched from base, branches ascending, reddish purple or red tinged, villous, short-stipitate glandular, more densely so upward. Leaves: basal and lower cauline often deciduous by flowering, petiolate; mid cauline sessile, blade ovate or obovate, 2.5–12 cm, reduced distally, pinnatisect or pinnatifid, abaxially sparsely villous particularly along midvein, stipitate glandular, adaxially sparsely villous or glabrate, sparsely glandular, base expanded auriculate-clasping, segments opposite or oblique, interspersed with triangular lobes along rachis, larger and terminal segments

\pm lobed, margin spinose-serrate, \pm stipitate glandular. Capitula small, numerous or few in often dense terminal corymbiform or corymbiform-paniculiform synflorescences; peduncles densely white villous, \pm densely stipitate glandular. Involucre hemispheric, ca. 2 mm in diam.; phyllaries 2- or 3-seriate, subequal, membranous, abaxially sparsely white villous or glabrous, sometimes sparsely glandular (mostly distally), margin hyaline, scarious, \pm fimbriate, ciliate, apex acuminate, purple. Marginal female florets purple, tube filiform and short, limb narrowly funnellform, 2-lobed; disk florets 7–11, purple or lobes purple, tube cylindric, 0.6–0.8 mm, limb funnellform, ca. 1.6 mm, lobes triangular. Achenes oblong to fusiform. Fl. and fr. nearly year-round.

Forests, grasslands on slopes, ravines, watersides, roadsides, fields; 100–2000 m. Guangdong, Guangxi, Guizhou, Sichuan, Yunnan [Bangladesh, Bhutan, Cambodia, India, Laos, Myanmar, Nepal, Thailand, Vietnam].

118. GRANGEA Adanson, Fam. Pl. 2: 121. 1763.

田基黄属 tian ji huang shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Herbs, annual [or perennial], often prostrate. Leaves alternate, oblong-obovate to spatulate, lyrate-pinnatifid or serrate-dentate. Capitula disciform, globose, solitary or in laxly corymbiform synflorescences. Involucre patelliform; phyllaries 2- or 3-seriate, slightly unequal, herbaceous, inner series scarious at apex. Receptacle swollen, hemispheric or obconic, naked. Florets yellow. Marginal florets female, 1- to many seriate, corolla tubular, of outer usually 2-lobed, of inner 3- or 4-lobed; disk florets bisexual, fertile, limb narrowly campanulate, 4- or 5-lobed; anther base obtuse, apical appendage lanceolate; style branches truncate, obtuse or with triangular appendage, sometimes simple. Achenes compressed or subcylindric, apex truncate, often ringed. Pappus absent.

Nine species: tropical and subtropical Africa and Asia; one species in China.

1. *Grangea maderaspatana* (Linnaeus) Poiret, Encycl. Suppl. 2: 825. 1812.

田基黄 tian ji huang

Artemisia maderaspatana Linnaeus, Sp. Pl. 2: 849. 1753; *Cotula sphaeranthus* Link; *Grangea procumbens* Candolle; *G. sphaeranthus* (Link) K. Koch.

Herbs, annual, (5–)10–30 cm tall. Stems slender, usually procumbent, branched, white villous or glabrescent in lower part by anthesis. Leaves usually obovate, oblanceolate, or obspatulate, 3.5–7.5 \times 1.5–2.5 cm, surfaces white villous, glandular; basal sessile, blade pandurate or lyrate-lobate, to ca. 10 \times 4 cm, base usually auriculate, terminal lobe obovate or suborbicular, margin coarsely dentate, lateral lobes 2–5-paired; upper gradually smaller. Capitula terminal, solitary, rarely paired, 8–10 mm in diam. Involucre hemispheric; phyllaries 2- or 3-seri-

ate, outer series lanceolate-ovate, 4–8 mm, outer surface villous, margin fimbriate, ciliate, apex acute to obtuse, inner series oblanceolate or obovate, clawed, obtuse. Receptacles hemispheric. Florets sparsely glandular; marginal female florets yellow, 2–6-seriate, corolla filiform, ca. 1 mm, shortly 2- or 4-lobed; disk florets shortly cylindric campanulate, ca. 1.5 mm, lobes ovate. Achenes compressed, glabrous, glandular, \pm thickly 2-ribbed, apex truncate, with a thickened, toothed ring. Pappus absent. Fl. and fr. Jan–Aug.

Riverbanks, watersides, rice paddies, sandy areas, meadows, open forests, thickets; below 100–1000 m. Guangdong, Guangxi, Hainan, Taiwan, S Yunnan [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam; tropical Africa].

The leaves are used medicinally as a stomachic, an antitussive, and for regulating menses.

119. MYRIACTIS Lessing, Linnaea 6: 127. 1831.

粘冠草属 nian guan cao shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Herbs, annual or perennial, herbage villous, long-stipitate glandular. Leaves alternate, basal and/or cauline, winged petiolate or sessile, blade oblanceolate-oblong to spatulate, sometimes lyrate, sometimes lobed, base clasping, margin \pm coarsely dentate or serrate. Capitula small, heterogamous, solitary or numerous in lax corymbose-paniculiform synflorescences; peduncle long. Involucre hemispheric; phyllaries 2- or 3-seriate, subequal, papery, margin scarious, hyaline, \pm fimbriate. Receptacles convex, hemispheric or globose, not alveolate, naked. Ray florets fertile, 2–5- or more seriate, tube short, lamina white to purplish, small, orbicular, ovate, or linear; disk florets functionally male, limb narrowly funnelform to campanulate, 4-lobed, lobes lanceolate; anther base obtuse; (disk) style branches appressed, without stigmatic lines, appendages lanceolate, abaxially hairy. Achenes narrowly obovoid, compressed, margin 2-ribbed, apex with short viscid collar (of ray florets), glabrous, \pm glandular. Pappus absent.

About 12–16 species: tropical Africa and Asia; five species (one endemic) in China.

- 1a. Ray florets 5- or more seriate, lamina orbicular or ovate.
 2a. Leaves simple, sometimes lower lobed or parted, lateral lobes 1- or 2-paired 1. *M. nepalensis*
 2b. Leaves lyrate-pinnatifid or lobed or pinnatisect, or sometimes lower leaves orbicular, simple 2. *M. humilis*
 1b. Ray florets (1 or) 2- or 3-seriate, lamina linear.
 3a. Mid cauline leaves narrowly to broadly ovate 3. *M. wightii*
 3b. Mid cauline leaves lanceolate, elliptic, or elliptic-lanceolate to oblanceolate.
 4a. Leaves serrate, parted or lobed, but not pinnatifid 4. *M. wallichii*
 4b. Leaves pinnatifid, sometimes lyrate 5. *M. delavayi*

1. *Myriactis nepalensis* Lessing, Linnaea 6: 128. 1831.

圆舌粘冠草 yuan she nian guan cao

Dichrocephala leveillei Vaniot.

Herbs, perennial, usually robust, 15–100 cm tall; rhizomes short, procumbent. Stems erect, often branched from middle or base, branches ascending, glabrous or sparsely villous. Leaves: basal and lower cauline winged petiolate, petiole to 10 cm, blade simple, large, ovate-elliptic, sometimes lobed or parted, lateral lobes 1- or 2(or 3)-paired, petiole base sheathing; mid cauline elliptic to ovate, 4–10 \times 2.5–4.5 cm, margin coarsely serrate or crenate, base decurrent into broad, winged petioles (lower) or sessile (upper), petiole base or blade base \pm auriculate-clasping; upper gradually smaller, sessile, elliptic, oblanceolate, or lanceolate, surfaces sparsely villosulous particularly on veins, more moderately so adaxially, base \pm auriculate-clasping. Capitula globose or hemispheric, 0.7–1.5 cm in diam., solitary or numerous in laxly corymbose-paniculiform synflorescences. Phyllaries 2- or 3-seriate, lanceolate, abaxially villosulous. Ray florets 8- or more seriate, lamina orbicular or ovate, 0.6–0.8 mm, apex rounded or emarginate; disk floret limb broadly funnelform, 1.2–1.3 mm, villosulous, 4-lobed. Achenes straw-colored, 1.6–2.1 mm, faces sometimes 1-veined, apical collar viscid, dark. Fl. and fr. Apr–Nov.

Forests, forest margins, thicket margins, slopes, wet areas on grassy-shrubby disturbed slopes, steep moist slopes, meadows, open and moist or humid areas along streamsides, ravines, roadsides; 700–3700 m. Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Sichuan, Xizang, Yunnan [Bhutan, India, Myanmar, Nepal, Pakistan, Vietnam].

2. *Myriactis humilis* Merrill, Philipp. J. Sci. 1(Suppl. 3): 244. 1906.

台湾粘冠草 tai wan nian guan cao

Myriactis bipinnatisecta Kitamura; *M. formosana* Kita-

mura; *M. humilis* var. *bipinnatisecta* (Kitamura) S. S. Ying; *M. longipedunculata* Hayata; *M. longipedunculata* var. *bipinnatisecta* (Kitamura) Kitamura; *M. longipedunculata* var. *formosana* (Kitamura) Kitamura.

Herbs, perennial, 10–35 cm tall; rhizomes short, oblique. Stems solitary or to 3, erect, branched, branches ascending, or simple, scapiform, glabrous or \pm puberulent. Leaves usually crowded in lower part (basal and lower cauline), petiole 2.5–4 cm, winged, blade elliptic, spatulate, or ovate, 2–3(–7) \times 1–2(–4) cm, lyrate-pinnatifid, pinnatifid, or lyrate-bipinnatisect, or simple and \pm orbicular to spatulate, surfaces sparsely to moderately strigose to glabrate, base auriculate-clasping, lateral lobes 2- or 3-paired, oblong to ovate or obovate, margin entire or 1-serrate on one side, terminal lobe large, broadly ovate to orbicular or oblong, margin coarsely serrate or lobed-serrate; upper cauline few, winged petiolate, blade oblanceolate-oblong or oblanceolate, pinnatifid, base auriculate-clasping, terminal lobe obtriangular or lanceolate; uppermost sessile, simple, blade narrowly oblong, entire or few toothed. Capitula hemispheric, 6–9 mm in diam., few (usually 3 or 4), solitary at ends of stems and branches or in open paniculate-corymbiform synflorescences; peduncle 1–12 cm. Phyllaries 2-seriate, subequal, oblong or narrowly oblong with narrow scarious margin, outer series pulverous-puberulent. Ray florets 8- or more seriate, tube and abaxial lamina hairy, lamina orbicular, apex emarginate or rounded; disk florets funnelform, 1–1.4 mm, limb base hairy, 4-lobed. Achenes brown, 1.6–2 mm, glabrous. Fl. and fr. May–Oct.

• Moist and humid places on shady slopes, roadsides; 1700–3000 m. Taiwan.

3. *Myriactis wightii* Candolle in Wight, Contr. Bot. India, 10. 1834.

粘冠草 nian guan cao

Myriactis javanica Candolle; *M. wightii* var. *cordata* Y. Ling & C. Shih.

Herbs, annual, 20–90 cm tall. Stems erect, usually branched from middle, rarely proximally, or simple, subscapose, branches ascending or spreading, densely to sparsely villous or glabrate in lower part. Leaves often with axillary branches or fascicled; lower blade ovate, or sometimes lyrate-pinnatifid, terminal lobe ovate; mid cauline petiole ± broadly winged, blade broadly to narrowly ovate, 5–8 × 3–6 cm, rarely lyrate-pinnatifid, terminal lobe same shape as blade, surfaces villous to strigose-villous or villous only along veins, base clasping or auriculate-clasping, margin deeply crenate or serrate or incised-serrate, entire in uppermost leaves or lateral lobes. Capitula few or numerous in terminal, laxly corymbiform or paniculate-corymbiform and lateral, laxly racemiform synflorescences; peduncle 0.4–5 cm. Involucre hemispheric, ca. 1.2 cm in diam. (in fruit); phyllaries 2 (or 3)-seriate, subequal, narrowly oblong to lanceolate, 3–4 mm, abaxially sparsely villous to glabrate, apex fimbriate-lacerate. Ray florets 2-seriate, tube ca. 0.4 mm, glandular, lamina linear, 0.8–1 × 0.1–0.2 mm, apex obtuse, sometimes 2-lobed; disk florets tube cylindrical, ca. 0.4 mm, limb campanulate, 0.8–1 mm, 5-lobed, glabrous or base of limb barely glandular. Achenes greenish to pale brown, 1.5–2.5 mm. Fl. and fr. Jul–Nov.

Forests on slopes, mixed forests, grasslands, streamsides; 1900–3600 m. Guizhou, Sichuan, Xizang, Yunnan [India, Indonesia, Nepal, Sri Lanka, Vietnam].

Myriactis wightii var. *cordata* (FRPS 74: 355. 1985), defined on the basis of mid cauline leaf bases, does not appear to warrant recognition.

4. *Myriactis wallichii* Lessing, *Linnaea* 6: 129. 1831.

狐狸草 hu li cao

Herbs, annual, 15–60 cm tall. Stems erect, often many branched from base or middle, branches ascending, spreading, long, white strigillose, sparsely villosulous, or glabrate. Leaves: petiole narrowly winged, base slightly expanded or auriculate-clasping, blade surfaces sparsely white strigillose, sometimes glabrate, base abruptly attenuate to rounded, margin serrate, repand-dentate, or entire; mid cauline blade narrowly elliptic-lanceolate or narrowly elliptic, 4–4.6 × 2–3 cm, uppermost similar or sublinear. Capitula hemispheric, ca. 1 cm in diam. (in

fruit), numerous in laxly corymbiform or subcorymbiform synflorescences, those of lower branches in paniculate-corymbiform or racemiform synflorescences; peduncle short and slender. Phyllaries 2-seriate, subequal, oblong or oblanceolate, 3–4 mm, sometimes sparsely pubescent at base. Ray florets 2- or 3-seriate, white becoming pink, lamina linear; disk florets yellow to yellow-green, limb campanulate. Achenes ca. 3.5 mm, shortly beaked, apically with a viscid secretion. Fl. Aug–Oct.

Grasslands, forests on slopes; 2600–3600 m. Guizhou, Hunan, Sichuan, Xizang, Yunnan [Afghanistan, Bhutan, India, Indonesia, Myanmar, Nepal, Pakistan, Thailand, Vietnam; SW Asia (Caucasus, Iran)].

5. *Myriactis delavayi* Gagnepain, *Bull. Soc. Bot. France* 68: 122. 1921.

羽裂粘冠草 yu lie nian guan cao

Herbs, perennial, 18–50 cm tall; rhizomes usually curved. Stems erect, sometimes ascending, branched from middle or sometimes simple, branches ascending, spreading, long, glabrous or sparsely strigillose. Leaves: petiole narrowly winged, base expanded and clasping, blade surfaces glabrate or sparsely strigillose along veins, margin sometimes sparsely strigillose-ciliate; basal and lower cauline blade oblanceolate, lyrate or pinnatifid; mid cauline blade homomorphic, oblanceolate to narrowly oblanceolate, 4–7 × 1–3.5 cm, pinnatifid, lateral lobes 1- or 2-paired, terminal lobe large, elliptic or long elliptic to ovate, margin serrate (often entire on lobes), mucronulate; upper blade narrowly oblanceolate or narrowly elliptic to (uppermost) linear, pinnatifid or pinnatifid, to (uppermost) serrate or entire. Capitula hemispheric, 6–8 mm in diam. (in fruit), few in lax racemiform synflorescences (terminal seeming subcorymbiform). Phyllaries 3-seriate, subequal, lanceolate or oblong to oblanceolate (inner), 3–4 mm, outer externally strigillose. Ray florets 2- or 3-seriate, tube 0.7–0.8 mm, glandular, lamina linear, 1.15–1.25 × 0.3–0.5 mm, apex rounded, entire; disk floret functionally male, tube 0.2–0.3 mm, limb campanulate, 1.1–1.3 mm, upper tube and limb base glandular, 4 (or 5)-lobed, lobes lanceolate, 0.75–0.8 mm. Achenes olive to pale brown, oblanceolate, compressed, 1.8–2.5 mm, short collar viscid. Fl. and fr. Aug–Sep.

Grasslands, forests on slopes; 2700–3000 m. Sichuan, Yunnan [Vietnam].

120. *THESPIS* Candolle, *Arch. Bot. (Paris)* 2: 517. 1833.

歧伞菊属 qi san ju shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Herbs, annual, dwarf, glabrous. Stems ascending to spreading, multibranched. Leaves alternate, simple, serrate or entire. Capitula disciform, small, globose, several, fascicled in divaricately branched corymbiform synflorescences, sessile or shortly pedunculate. Involucre hemispheric; phyllaries 2-seriate, herbaceous, subequal, broad, obtuse, margin scarious, 3-veined, usually slightly shorter than disk. Receptacle flat or convex, glabrous, with fine processes. Florets yellow; female fertile, multiseriate, corolla minutely tubular or lacking, glandular; disk florets functionally male, few, sterile, corolla tubular, tube short, limb funnelform, 4-lobed, lobe margins thickened, sometimes glandular; anther base obtuse, auriculate; style branches short, appressed. Achenes slightly compressed, small, minutely glandular or sparsely scabridulous, veined. Pappus of 6–13 short barbellate bristles in 1 series, of disk florets thin or absent.

Three species: SE Asia; one species in China.

1. *Thespis divaricata* Candolle, Arch. Bot. (Paris) 2: 517. 1833.

歧伞菊 qi san ju

Herbs, annual, 4–23 cm tall; root fusiform. Stems ascending, branched at base, sparsely pilose to glabrate. Leaves winged petiolate, blade obovate-lanceolate to obovate-spatulate, 1–2.5 × 0.5–1.5 cm, surfaces sparsely hispidulous on veins or glabrate, lateral veins 2–4-paired, base attenuate, margin coarsely serrate or entire, apex acuminate. Capitula 2–3 mm in diam., usually 5–10 fascicled. Involucre hemispheric; phyllaries

2-seriate, ovate-oblong, 1.5–2 mm, glabrous, margin entire, 3-veined. Female florets multiseriate, usually without corolla; disk florets few, corolla 1–1.1 mm. Achenes oblong-fusiform, slightly compressed, 0.7–0.8 mm, scabridulous, multiveined. Pappus of 8–13 pinkish bristles 0.44–0.54 mm, slightly shorter than styles in female florets, in disk florets of 6–8 white, smooth bristles ± equaling tube.

Field margins, roadsides; below 100–1000 m. Guangdong, S Yunnan (Xishuangbanna) [Bangladesh, Cambodia, India, Laos, Myanmar, Nepal, Thailand, Vietnam].

121. *ESCHENBACHIA* Moench, Methodus, 573. 1794.

白酒草属 bai jiu cao shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Dimorphanthus Cassini; *Edemias* Rafinesque.

Herbs, annual, biennial, or perennial. Stems erect, simple or branched, hirsute or strigose. Leaves alternate, margin entire, serrulate to coarsely serrate, pinnatifid, or pinnatifid. Capitula disciform, few to numerous, in corymbiform, sometimes glomerate, glomerate-paniculiform, or paniculiform synflorescences, rarely cymiform, rarely solitary. Involucre campanulate to hemispheric-campanulate; phyllaries 3- or 4-seriate, imbricate, obovate to ovate-lanceolate, lanceolate, linear-lanceolate, or linear, membranous, green ± widely along midvein, margin and apex scarios. Receptacles hemispheric-flattened, hemispheric-conic to lenticular-knobby, alveolate (central part bearing disk florets distinctly with wider alveolae), fimbriate. Florets fertile. Ray florets female, numerous, white, corolla reduced to filiform tube, elaminate, ca. 1/2 as long as style; disk florets bisexual, few to numerous, yellow or yellowish, limb funnelform, lobes 5; anther base obtuse; style branch tip short. Achenes oblong or lanceolate, compressed, ± strigillose, sometimes glandular, margin 2-ribbed. Pappus white to yellowish white or cinnamon to ± reddish, 1-seriate, sometimes basally connate in a ring, often deciduous, of subequal, fine, barbellulate bristles.

Number of species uncertain: Africa, S Asia; six species (three endemic) in China.

The genus *Conyza* Lessing, nom. cons., to which African and Asian species have been traditionally referred, is an American taxon that is phylogenetically nested within *Erigeron*, where it is treated here (only introduced species are in China). African and Asian species, however, do not belong to the North American clade but to the unrelated subtribe Grangeinae of the Astereae (Brouillet et al. in Funk et al., Syst. Evol. Biogeogr. Compositae, 589–629. 2009), an African group that repeatedly dispersed to S Asia. *Eschenbachia* is typified by *E. globosa* Moench, nom. illeg. superfl., based on *Erigeron aegyptiacus* Linnaeus. *Eschenbachia aegyptiaca* is part of the African subtribe Grangeinae (J. S. Strijk, pers. comm.). Most native Chinese species previously treated under *Conyza* appear assignable to *Eschenbachia* (except for *C. stricta*, species incertae sedis). The description of the genus given here is based solely on the species present in China.

- 1a. Leaves pinnatifid or pinnatifid.
 - 2a. Mid leaves pinnatifid, petiole base subclasping; capitula 12–15 mm in diam., in dense corymbiform synflorescences 1. *E. aegyptiaca*
 - 2b. Mid leaves pinnatifid, petiole base not clasping; capitula 6–10 mm in diam., in short, narrow, paniculiform synflorescences 2. *E. blinii*
- 1b. Leaves coarsely serrate or serrulate.
 - 3a. Annual or biennial herbs, taproot fusiform.
 - 4a. Stems densely villous, densely short-stipitate viscid glandular; mid cauline leaves shortly petiolate or subsessile, not clasping; capitula 3.1–7.9 mm in diam., in broadly paniculiform synflorescences; ray florets 1/5 or less as long as style 3. *E. leucantha*
 - 4b. Stems scabrous (below) to villous, eglandular; mid cauline leaves sessile, base subclasping; capitula 7.5–11 mm in diam., in glomerate or dense corymbiform synflorescences; ray florets 1/2 or less as long as style 4. *E. japonica*
 - 3b. Perennial herbs, rhizome or caudex woody.
 - 5a. Capitula 4–5 mm in diam.; phyllary margin narrowly scarios; cauline leaves oblong-lanceolate to lanceolate, coarsely serrate; disk floret lobes glandular 5. *E. perennis*
 - 5b. Capitula 6–7 mm in diam.; phyllary margin ± broadly scarios; cauline leaves linear-oblong to linear, sparsely serrulate or subentire; disk floret lobes hairy at apex 6. *E. muliensis*

1. *Eschenbachia aegyptiaca* (Linnaeus) Brouillet, **comb. nov.**

埃及白酒草 ai ji bai jiu cao

Basionym: *Erigeron aegyptiacus* Linnaeus, Syst. Nat., ed. 12, 2: 549; Mant. Pl. 1: 112. 1767 [*"aegyptiacum"*]; *Conyza aegyptiaca* (Linnaeus) Aiton; *E. hispidus* Candolle; *Eschenbachia globosa* Moench, nom. illeg. superfl.

Herbs, annual, 20–100 cm tall; taproot woody, fibrous rooted. Stems erect, branched from base or middle, branches ascending, striate, densely white long hirsute, stipitate glandular. Leaves: lower withered at anthesis; mid sessile, blade narrowly oblong to oblanceolate, 4.5–9.5 × 1.4–3 cm, surfaces densely hirsute, densely stipitate glandular, veins slightly prominent, base subclasping, margin pinnatilobed, lobes in 6 or 7 pairs, narrowly oblong, apex obtuse, terminal lobe larger, apiculate; upper oblanceolate, gradually reduced, pinnatilobed; uppermost lanceolate or linear-lanceolate, serrate only at base. Capitula 12–15 mm in diam., 2–4 in dense corymbiform synflorescences; peduncles slender, 1.5–4.5 cm, densely strigose-villose. Involucre hemispheric-campanulate, ca. 8 × 15 mm; phyllaries 3- or 4-seriate, linear, abaxially villous, margin scarious, apex acuminate, slightly reflexed, outer ca. 3 mm. Ray florets reduced to tube, filiform, 2–3.7 mm, ca. 1/2 as long as style, apex puberulent; disk florets 25–33, funnellform, 4.3–4.5 mm, tube ca. 2.7 mm, hairy above, limb 1.5–1.8 mm, lobes 0.5–0.6 mm, apex hairy. Achenes straw-colored, oblong or oblanceolate, compressed, 0.8–1.1 mm, sparsely strigillose, sometimes 1 additional rib on one face. Pappus 1-seriate, basally connate in a ring, sometimes deciduous, dirty white, of 10–16 fragile bristles, 5–6 mm.

Seasides, riverbanks. Fujian, Guangdong, Taiwan [Afghanistan, Bangladesh, India, Japan, Malaysia, Myanmar, Pakistan, Vietnam; Africa, SW Asia (Iran), Australia].

2. *Eschenbachia blinii* (H. Léveillé) Brouillet, **comb. nov.**

熊胆草 xiong dan cao

Basionym: *Conyza blinii* H. Léveillé, Repert. Spec. Nov. Regni Veg. 8: 452. 1910; *C. dunniana* H. Léveillé; *C. pinnatifida* Franchet (1896) and Dunn (1903), not (Thunberg) Lessing (1832), nor Buchanan-Hamilton ex Roxburgh (1832).

Herbs, annual, 40–90(–100) cm tall; taproot simple or rarely branched, fibrous rooted. Stems erect, simple or branched, branches ascending, striate, white long hirsute, densely long-stipitate glandular, densely leafy. Leaves: surfaces long hirsute and densely long-stipitate glandular, blade pinnatifid, rarely pinnatilobed, lobes in 3–6 pairs, linear, linear-lanceolate, or linear-oblanceolate, asymmetric, margin entire or sparsely coarsely serrate, apex acute, terminal lobe large, obovate-lanceolate, sparsely serrate; lower leaves petiolate, often withered at anthesis, sometimes marcescent; mid and upper sessile, ovate or ovate-oblong, 4–7.5(–10) × 2.5–3(–4) cm, base attenuate, not clasping. Capitula 6–10 mm in diam., in short, narrow, paniculiform synflorescences; peduncles densely hirsute, stipitate glandular. Involucre hemispheric-campanulate, ca. 6 × 10 mm; phyllaries 3- or 4-seriate, linear-lanceolate, abaxially hispid-villose, ± densely stipitate glandular, apex acuminate, outer ca. 3.5 mm, inner 6–7 mm, apex reddish purple, scarious, slightly reflexed.

Florets yellow. Ray florets reduced to tube, filiform, 2–2.5 mm, almost 1/2 as long as style, sparsely puberulent above or glabrous; disk florets 40–50, 4–4.5 mm, tube ± puberulent, limb funnellform, lobes lanceolate. Achenes oblong to oblanceolate, compressed, 0.8–1 mm, strigose. Pappus 1-seriate, basally connate in a ring, sometimes deciduous, white to yellowish white or cinnamon, bristles slightly longer than disk corollas.

• Grasslands on slopes, around boulders in karst formations, open places, roadsides; 1800–2600 m. Guizhou, Sichuan, Yunnan.

3. *Eschenbachia leucantha* (D. Don) Brouillet, **comb. nov.**

粘毛白酒草 nian mao bai jiu cao

Basionym: *Erigeron leucanthus* D. Don, Prodr. Fl. Nepal. 171. 1825 [*"leucanthum"*]; *Blumea conyzoides* H. Léveillé & Vaniot; *Conyza leucantha* (D. Don) Ludlow & P. H. Raven; *C. viscidula* Wallich ex Candolle; *Vernonia ampla* Vaniot (1903), not O. Hoffmann (1901).

Herbs, annual, 40–200 cm tall, sometimes bushy; taproot fusiform, woody, fibrous rooted. Stems erect, branched, upper branches divaricate, striate, densely villous, densely short-stipitate viscid glandular, densely leafy. Leaves: lower withered and fallen at anthesis; mid cauline shortly petiolate or sessile, not clasping, blade elliptic-oblong to ovate or lanceolate, 7–14 × 2.5–3.5 cm, surfaces ± densely sessile glandular, abaxially villosulous, adaxially scabrous, lateral veins 4–6-paired, abaxially prominent, base cuneate to attenuate, margin serrate to serrulate, teeth mucronulate, apex acuminate; upper blade lanceolate, reduced upward; uppermost (on synflorescence branches) sessile, 3–5 cm, margin entire or serrulate. Capitula 3.1–7.9 mm in diam., numerous, in broadly glomerate-paniculiform synflorescences; peduncles slender, 3–9 mm, densely long-stipitate glandular and/or villous. Involucre campanulate, 3.1–4 × 3.5–6.2 mm; phyllaries 3- or 4-seriate, outer green, linear-lanceolate, short, abaxially ± densely stipitate glandular and/or villous, margin sometimes narrowly scarious, apex acuminate, inner linear-lanceolate to linear-oblong, green along midvein, margin scarious, sometimes purplish, apex acuminate, often purplish. Ray florets white, reduced to tube, filiform, 0.3–0.65 mm, 1/5 or less as long as pinkish style, lacerate at apex, glabrous; disk florets 6–9, yellow becoming reddish, funnellform, 3.5–4.1 mm, tube ca. 2.2 mm, sparsely hairy above, limb ca. 3.9 mm, lobes lanceolate, ca. 0.6 mm. Achenes straw-colored to pale brown, lanceolate, compressed, 0.4–0.6 mm, sparsely strigillose. Pappus 1-seriate, basally connate in a ring, deciduous, yellowish or cinnamon to pale reddish, bristles 10–15, 3.5–4.5 mm. Fl. Sep–Dec.

Open slopes, ravines, field margins, dry margins of woods, thickets, roadsides, wastelands; 200–1800 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Taiwan, Yunnan [Bangladesh, Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Philippines, Nepal, Thailand, Vietnam; Australia].

4. *Eschenbachia japonica* (Thunberg) J. Koster, *Blumea* 7: 290. 1952.

白酒草 bai jiu cao

Erigeron japonicus Thunberg in Murray, Syst. Veg., ed.

14, 754. 1784 ["*japonicum*"]; *Blumea globata* Vaniot; *B. subcapitata* Matsumura & Hayata (1908), not Candolle (1836); *Conyza asteroides* Wallich ex Candolle (1836), not Linnaeus (1753); *C. japonica* (Thunberg) Lessing; *C. multicaulis* Candolle; *C. stricta* Wallich ex Candolle (1836), not Willdenow (1803); *C. veronicifolia* Wallich ex Candolle.

Herbs, annual or biennial, (15–)20–45+ cm tall; taproot simple, fusiform. Stems erect, branched from base or middle, sometimes simple, branches ascending or spreading, striate, white scabrous (below) to villous, more densely so upward, sometimes ± glabrescent below, eglandular. Leaves usually crowded in lower part, basal in rosette, shortly to long petiolate, petiole ± narrowly winged, blade elliptic or obovate to spatulate, 6–7 cm, base attenuate to rounded, apex rounded to obtuse; lower long petiolate, petiole often broadly winged upward, blade oblong or elliptic-oblong or oblanceolate, 3–13 cm, surfaces white villous, lateral veins 4- or 5-paired, abaxially prominent, base cuneate or attenuate, margin ± coarsely serrate, teeth mucronulate, strigose, apex rounded to obtuse or acute; mid dispersed, sessile, blade oblanceolate-oblong or oblong-lanceolate to lanceolate, 3.5–5 × 0.5–1.5 cm, base rounded, subclasping, margin serrate to serrulate, apex obtuse to acute; upper reduced, blade lanceolate or linear-lanceolate, surfaces strigose, eglandular, adaxially scabrous (and sometimes also abaxially), margin entire to sparsely serrulate. Capitula numerous, 7.5–11 mm in diam., usually crowded in glomerate or dense corymbiform synflorescences; peduncles slender, 4–6 mm, densely villous. Involucre campanulate to hemispheric-campanulate, 4–5.5 × 7.5–10 mm; phyllaries 3- or 4-seriate, abaxially villous, outer shorter, obovate to ovate-lanceolate, 2–2.9 mm, apex obtuse, inner lanceolate to linear, 3.8–5 mm, margin ± widely scarios, erose, often ± purplish (notably apically), apex acute or acuminate. Ray florets white becoming purplish, corolla filiform, 1.1–2 mm, 1/2 or less as long as style, apically ciliate; disk florets 15 or 16, pale yellow becoming reddish, 4–4.1 mm, tube ca. 2.25 mm, hairy distally, limb ca. 1.75 mm, lobes lanceolate, ca. 0.5 mm, apically hairy. Achenes straw-colored to pale brown, oblong, 1–1.2 mm, sparsely strigillose. Pappus basally connate in a ring, deciduous, pinkish white or cinnamon to reddish, bristles 10–14, 3.3–4.5 mm. Fl. Mar–Sep.

Forest margins, grassy slopes, dry meadows, exposed slopes, field margins, roadsides, gardens; 400–2500 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Afghanistan, Bhutan, India, Japan, Malaysia, Myanmar, Nepal, Pakistan, Thailand, Vietnam].

5. *Eschenbachia perennis* (Handel-Mazzetti) Brouillet, *comb. nov.*

宿根白酒草 *su gen bai jiu cao*

Basionym: *Conyza perennis* Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 630. 1937.

Herbs, perennial, 25–40 cm tall, collar surrounded by marcescent leaf bases; rhizomes thick, woody, erect or ascending. Stems solitary, erect, simple, striate, white hirsute, often also

strigillose. Leaves: basal rosulate, present at anthesis; basal and lower petiolate, petiole narrowly winged, usually 1/2 as long as blade, densely hirsute and hirsute-ciliate, petiole base clasping or subclasping, blade ovate or elliptic-ovate to lanceolate or oblanceolate, 5–9 × 1.5–2.5 cm, surfaces sparsely hirsute, base attenuate, margin coarsely serrate, hirsute-ciliate, lateral veins 3- or 4-paired, apex acute to obtuse; upper shortly petiolate or sessile, blade oblong-lanceolate to lanceolate, gradually reduced; uppermost base almost rounded, margin entire, apex acuminate. Capitula 4–5 mm in diam., numerous, usually in dense cymiform or partly glomerate synflorescences; peduncles 5–6 mm; bracteole 1, lanceolate, villous to strigillose or glabrate. Involucre campanulate, ca. 4 mm in diam.; phyllaries 3-seriate, lanceolate to linear-lanceolate, outer ca. 1/2 as long as inner, abaxially strigillose, margin narrowly scarios, sometimes erose-fimbriate apically, apex acuminate, inner 2.5–3.5 mm. Ray floret corolla reduced to tube, filiform, 1–1.5 mm, ca. 1/2 as long as style, apex hairy; disk florets ca. 23, ca. 3 mm, lobes lanceolate, glandular. Achenes oblong, ca. 0.7 mm, sparsely pilose to glabrate. Pappus white, almost equaling disk corollas. Fl. Feb–Apr.

• Thickets on sandy ground by riverbanks; ca. 1600 m. SW Guizhou, S Yunnan.

6. *Eschenbachia muliensis* (Y. L. Chen) Brouillet, *comb. nov.*

木里白酒草 *mu li bai jiu cao*

Basionym: *Conyza muliensis* Y. L. Chen, Fl. Reipubl. Popularis Sin. 74: 361. 1985.

Herbs, perennial, 3–21 cm tall, sometimes caespitose, collar surrounded by leaf base remains; caudex woody, ascending, branched, taprooted. Stems solitary or 2–4, slender, erect, simple, gray-white long strigose. Leaves: surfaces moderately long strigose, glabrescent, margin often serrulate distally, teeth mucronulate, rarely entire, strigose-ciliate; basal in rosette, present at anthesis, long petiolate, petiole narrowly winged, petiole base widened, clasping, blade oblanceolate to spatulate, 2–5 × 0.3–0.5 cm, base cuneate-attenuate, apex obtuse to acute, mucronate; cauline scattered, lowest petiolate, upper sessile or subsessile, not clasping, lower blade linear-oblanceolate to linear, 2–3.5 × 0.1–0.3 cm, base attenuate, margin sparsely serrulate or subentire, apex acute; upper blade gradually reduced, linear, margin entire or with 1 or 2 inconspicuous teeth. Capitula 6–7 mm in diam., usually 3–6 in corymbiform synflorescences, rarely solitary; peduncles slender, 3–8 mm. Involucre campanulate, ca. 4 × 6–8 mm; phyllaries 3-seriate, narrowly oblong or lanceolate, abaxially sparsely strigose, margin ± broadly scarios, erose-lacerate, apex acuminate or ± obtuse, outer ca. 1/2 as long as inner. Ray floret corolla reduced to tube, filiform, 1–1.2 mm, ca. 1/2 as long as style, apex hairy; disk florets 13–23, yellowish, narrowly funnelform, 2.5–3 mm, tube 1–1.5 mm, lobes lanceolate, ca. 0.5 mm, apex hairy. Achenes oblong, 1–1.2 mm, sparsely strigose, glandular. Pappus dirty to pinkish white, bristles ca. 10, 2.5–3.2 mm. Fl. Jun.

• Sandy riverbanks; ca. 2200 m. SW Sichuan (Muli).

Species incertae sedis

Conyza stricta Willdenow, Sp. Pl. 3: 1922. 1803.

劲直白酒草 jin zhi bai jiu cao

Herbs, annual, woody taprooted, and fibrous rooted. Stems erect, 30–65 cm tall, finely striate, multibranched from base or middle, branches slender, strict, densely grayish scabrous, ± densely sessile or short-stipitate glandular, densely leafy. Basal leaves fallen at anthesis; lower and mid cauline petiole narrowly winged, base subclasping, blade obovate, sometimes oblanceolate, 3–5.5 × 0.5–1.3 cm, surfaces densely grayish scabrous, densely sessile or short-stipitate glandular, lateral veins 3- or 4-paired, abaxially distinct, base cuneate or attenuate, margin coarsely serrate or pinnatifid, mucronate, rarely entire, apex obtuse, mucronate, or apiculate; mid upper sessile, linear-ob lanceolate, 1.2–2 × 0.2–0.4 cm, 1-veined, margin entire, sometimes 3-fid; uppermost gradually reduced, linear. Capitula (2–)3 mm in diam., numerous, in dense compound-corymbose synflorescences; peduncles 2–4 mm, densely villous-scabrous. Receptacle convex, ± alveolate, not fimbriate. Involucre campanulate, 2–2.5 mm in diam.; phyllaries 3-seriate, linear-lanceolate, margin narrowly scarios, entire, apex acuminate, outer green, ca. 1.6 mm, villous-scabrous, sessile glandular, inner green along midvein, 1.5–4 mm, apex ± reflexed. Florets yellow, fertile. Ray florets female, 1.1–1.7 mm, tube sparsely hairy, lamina white, linear, 0.4–0.46 mm, sometimes 2- or 3-lacerate, ± equaling or sometimes shorter than style; disk florets 4 or 5(–7), bisexual, narrowly funnelform, 1.6–2.1 mm, tube 0.8–1.4 mm, sparsely hairy, limb 0.7–0.9 mm, lobes 0.3–0.5 mm, lanceolate, glandular, sometimes eglandular. Achenes narrowly ovate, 0.3–0.65 mm, sparsely strigose, margin slightly 2-ribbed. Pappus orangish, ± 2-seriate, outer very short, thin, inner of 12–15 barbellate bristles 1–1.9 mm, almost equaling disk corollas. Fl. (Aug–)Sep–Nov.

Grasslands on slopes, field margins; 1100–2600 m. Hainan, Sichuan, S Xizang, Yunnan [Afghanistan, Bhutan, India, Myanmar, Nepal, Pakistan, Thailand, Vietnam; E Africa].

Conyza stricta belongs to the polyphyletic African conyzas. In

phylogenies (J. S. Strijk, pers. comm.), it is distinct from the species here placed in *Eschenbachia*, close to the African genus *Nidorella* Cassini. It is yet unclear whether it belongs there or in a new, separate genus. It does not belong in *Conyza* s.s., a synonym of *Erigeron*.

- 1a. Lower leaf margin coarsely serrate, rarely entire; upper leaves gradually reduced var. *stricta*
- 1b. Lower leaf margin deeply repand-pinnatifid, lobes 2-paired, oblong-ob lanceolate or cuneate, margin entire, terminal lobe larger; upper leaves and those on branches 3-fid var. *pinnatifida*

Conyza stricta var. **stricta**

劲直白酒草(原变种) jin zhi bai jiu cao (yuan bian zhong)

Stems 30–65 cm tall, branched. Lower leaf margin coarsely serrate, rarely entire; upper leaves gradually reduced, simple. Fl. Sep–Nov.

Grasslands on slopes, field margins; 1100–2300 m. Hainan, Sichuan, Yunnan [Bhutan, India, Myanmar, Nepal, Thailand, Vietnam; E Africa].

Conyza stricta var. **pinnatifida** Kitamura in H. Hara, Fl. E. Himalaya, 337. 1966.

羽裂白酒草 yu lie bai jiu cao

Erigeron pinnatifidus D. Don, Prodr. Fl. Nepal. 172. 1825, not Thunberg (1800); *Conyza absinthifolia* Candolle; *C. mairei* H. Léveillé; *C. pinnatifida* Buchanan-Hamilton ex Roxburgh (Oct–Dec 1832), not (Thunberg) Lessing (Jul–Aug 1832), nor Franchet (1896), nor Dunn (1903); *E. trisulcus* D. Don.

Stems 30–45 cm tall, usually branched from middle or base, rarely simple. Lower leaf margin deeply repand-pinnatifid, lobes 2-paired, oblong-ob lanceolate or cuneate, margin entire, terminal lobe larger; upper leaves and those on branches 3-fid. Fl. Aug–Nov.

Grasslands on slopes; 1800–2600 m. Sichuan, S Xizang, Yunnan [Afghanistan, Bhutan, India, Myanmar, Nepal, Pakistan].

122. MICROGLOSSA Candolle, Prodr. 5: 320. 1836.

小舌菊属 xiao she ju shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Vines [or subshrubs], woody, climbing [or erect]. Leaves alternate, petiolate, blade ovate, margin entire or crenulate. Capitula disciform, small, numerous, in crowded compound-corymbiform synflorescences. Involucre campanulate; phyllaries multiseriate, imbricate, oblong-lanceolate or linear, scabrid, apex obtuse, outer shorter. Receptacles convex [or flat], alveolate, naked, glabrous. Florets fertile; ray florets numerous, lamina white, filiform, shorter than style; disk florets bisexual, yellow, limb narrowly funnelform, 3–5-lobed; anther base obtuse; style branch tips lanceolate. Achenes obovoid, strigillose, margin angled, 3-ribbed. Pappus reddish to cinnamon, of numerous 1–3-seriate, ± equal, barbellate bristles.

About ten species: Africa, Asia; one species in China.

1. Microglossa pyrifolia (Lamarck) Kuntze, Revis. Gen. Pl. 1: 353. 1891.

小舌菊 xiao she ju

Conyza pyrifolia Lamarck, Encycl. 2: 89. 1786; *C. syringi-*

folia Meyen & Walpers; *Erigeron pyrifolius* (Lamarck) Benth; *Microglossa volubilis* Candolle.

Vines, woody, 0.7–3 m tall, climbing. Stems divaricately branched, striate, villosulous, densely minutely stipitate glan-

dular, glabrescent. Leaves abaxially pale green, adaxially green, ovate, 5–10 × 2.5–4 cm, abaxially densely stipitate glandular, veins densely ferruginous villosulous, adaxially scabrid, base attenuate, margin undulate, crenulate, ciliate, veins pronounced, apex acuminate, mucronate. Capitula 5–6 mm in diam., numerous in axillary or terminal, dense compound-corymbiform synflorescences. Involucre campanulate; phyllaries 4- or 5-seriate, membranous, midvein brown, apex obtuse, ± erose, outer ovate-lanceolate, 0.7–2 mm, abaxially sparsely villosulous, stipitate glandular, midvein pronounced, distally enlarged, middle and inner linear-lanceolate, 2–5 mm, margin hyaline, midvein thin, glabrous, middle sometimes ± stipitate glandular, inner eglandular. Receptacles convex. Ray florets numerous,

lamina filiform, ca. 1 mm; disk florets yellow, ca. 5 mm, tube and limb base hairy, limb funnelform, ca. 2.5 mm, lobes 5, linear-triangular, ca. 1 mm. Achenes obovoid, slightly compressed, ca. 1 mm, 3- or 4-ribbed, sometimes veined, sparsely strigillose, stipitate glandular apically. Pappus 2- or 3-seriate, of cinnamon to reddish or white, thin bristles, outer 0–2, ca. 1 mm, inner ca. 4 mm, tapering, innermost 4.2–4.5 mm, slightly clavate. Fl. and fr. year-round.

Thickets on slopes, open forests, forest margins, stream banks, wastelands, edges of bamboo plantations; sea level to 1800 m. Guangdong, Guangxi, Guizhou, Hainan, Taiwan, Yunnan [Bangladesh, Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Philippines, N Thailand, Vietnam; Africa].

123. *BELLIS* Linnaeus, Sp. Pl. 2: 886. 1753.

雏菊属 *chu ju shu*

Chen Yilin (陈艺林 *Chen Yi-ling*); Luc Brouillet

Herbs, annual or perennial, scapose, caespitose, or stem rarely branched. Leaves rosulate, blade spatulate or oblanceolate, entire or repand-dentate. Capitula radiate, often solitary, heterogamous, pedunculate or scapose. Involucre hemispheric or broadly campanulate; phyllaries 2-seriate, unequal to subequal, leaflike. Receptacle swollen or conic, naked. Ray florets 1-seriate, white, often tinged purplish crimson, apically entire; disk florets numerous, yellow, fertile; style branch tips short, triangular. Achenes obovoid, compressed, 2-ribbed, beakless. Pappus absent or rarely of few, very short, basally connate bristles.

Eight species: Asia, Europe; one species (introduced) in China.

1. *Bellis perennis* Linnaeus, Sp. Pl. 2: 886. 1753.

雏菊 *chu ju*

Herbs, perennial or annual, scapose, 10–25 cm tall; scape sparsely villosulous, strigose, sparsely, minutely stipitate glandular distally (near capitulum). Leaves basal, rosulate, petiole long, winged, blade spatulate, 2–6 × 0.9–2.8 cm, base attenuate, margin serrate to crenate, apex obtuse, sometimes retuse, mucronulate. Capitula terminal, solitary. Involucre hemispheric or broadly campanulate, 5–6 mm; phyllaries 2-seriate, subequal,

oblanceolate, leaflike, surfaces sparsely villous, margin narrowly scarios, sparsely ciliate, midvein thin, translucent, apex obtuse, scarios, ciliate. Ray florets white or pinkish, lamina ca. 10 × 1 mm; disk florets yellow, ca. 2 mm, limb campanulate, ca. 1.5 mm, sparsely hairy proximally, lobes erect, triangular, ca. 0.5 mm, eglandular. Achenes strigillose. Pappus absent.

Ravines. Sichuan [native to N Africa (Morocco), SW Asia, and Europe; widely introduced and naturalized elsewhere].

An ornamental, this species is widely cultivated in gardens and parks.

124. *TRIPOLIUM* Nees, Gen. Sp. Aster. 10, 152. 1832.

碱菀属 *jian wan shu*

Chen Yilin (陈艺林 *Chen Yi-ling*); Luc Brouillet

Herbs, annual. Stems erect. Leaves alternate, entire or sparsely serrate. Capitula radiate, in corymbiform synflorescences. Involucre cylindrical-campanulate; phyllaries 2- or 3-seriate, outer shorter, loosely imbricate, fleshy becoming membranous when dry, 3- or more veined, margins scarios. Receptacle ± flat, alveolate, alveola margin crenulate, naked. Florets fertile. Ray florets female, 1-seriate, lamina bluish white to bluish violet or pinkish; disk florets bisexual, numerous, yellow, narrowly funnelform, 5-lobed; anther base obtuse; style branch tips lanceolate. Achenes monomorphic, narrowly oblong, compressed, glabrous or sparsely strigose, margin 2-ribbed, faces 1-veined. Pappus in 3 or 4+ series, of white to dirty white or pinkish to reddish, thin, barbellate bristles, conspicuously elongating after anthesis, becoming 2 × as long as involucre.

One species: N Africa, Asia, Europe.

1. *Tripodium pannonicum* (Jacquin) Dobroczejewa in Visjulina, Fl. URSR 11: 63. 1962.

碱菀 *jian wan*

Aster pannonicus Jacquin, Hort. Bot. Vindob. 1: 3. 1770;

A. macrolophus H. Léveillé & Vaniot; *A. maritimus* Lamarck; *A. palustris* Lamarck; *A. papposissimus* H. Léveillé; *A. salinus* Schrader; *A. tripodium* Linnaeus; *A. tripodium* subsp. *pannonicum* (Jacquin) Soó; *Tripodium pannonicum* subsp. *maritimum* Holub, nom. illeg. superfl.; *T. pannonicum* subsp. *tripodium*

(Linnaeus) Greuter; *T. vulgare* Nees, nom. illeg. superfl.

Herbs, annual. Stems hollow, striate, erect, 25–50(–80) cm tall, solitary or several and caespitose, branched sometimes from base, sometimes only above, branches often spreading, glabrous. Leaves fleshy, glabrous, basal withered at anthesis; lower cauline linear or oblong-lanceolate, 5–10 × 0.3–1.2 cm, margin entire or slightly crenulate, apex acute; mid sessile, narrowed; upper reduced. Capitula numerous, in paniculate-corymbiform synflorescences, long pedunculate. Involucre 4–7 mm in diam.; phyllaries green, glabrous, margin often purplish,

outer ovate to lanceolate, 2.5–5 mm, apex obtuse to acute, inner narrowly oblong, 7–8 mm. Ray florets 13–25, lamina 10–12 × 1–2 mm, glabrous; disk florets 19–22, 8–9 mm, lobes lanceolate, 1.5–2 mm, glabrous. Achenes compressed, 2.5–3 mm. Fl. and fr. Aug–Dec.

Salt marshes, salt marsh meadows, moist meadows, open sandy areas, littoral areas, riversides; sea level to 2500 m. Gansu, Hebei, Heilongjiang, Hunan, Jiangsu, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Zhejiang [Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Russia (Far East, Siberia), Tajikistan, Turkmenistan, Uzbekistan; N Africa, SW Asia, Europe].

125. GALATELLA Cassini in F. Cuvier, Dict. Sci. Nat. 37: 463, 488. 1825.

乳菀属 ru wan shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Aster subg. *Galatea* Cassini, Bull. Sci. Soc. Philom. Paris 1818: 165. 1818; *Crinitaria* Cassini.

Herbs, perennial; rhizome robust. Stems erect or ascending, usually branched above, rarely simple. Leaves sessile, blade oblong or lanceolate to linear, often gland-dotted, lower 3-veined, mid and upper 1-veined, margin entire, often recurved. Capitula radiate, sometimes discoid, small or medium-sized, in corymbiform synflorescences, rarely solitary. Involucre obconic or campanulate to almost hemispheric; phyllaries 3–5-seriate, greenish or green along midvein, imbricate, membranous, glabrous or puberulent, 1–3-veined, margin usually scariosus, outer lanceolate to lanceolate-ovate, apex acute, innermost oblong to oblong-lanceolate, margin more widely scariosus, rounded or ± obtuse, apex sometimes acute. Receptacles slightly convex, alveolate, fimbriate. Ray florets sterile, without style, 5–20 in 1 series, rarely absent, lamina pinkish or bluish violet; disk florets bisexual, fertile, 5–60(–100), yellow, sometimes becoming pinkish violet, usually 1.5–2 × involucre length, limb funnellform, lobes 5, lanceolate or oblong-lanceolate; anther base obtuse, apical appendage lanceolate; style branch tip lanceolate or triangular. Achenes lanceolate or oblong, ± flattened, strigose, ribbed. Pappus 2(or 3)-seriate, of whitish, sometimes purplish tinged, unequal, ± stiff, barbellate bristles longer than achene, apex acute to ± clavate.

About 40–50 species: C and S Europe to NE Asia; 11 species in China.

The genus *Crinitaria*, often considered distinct (see *Crinatina* below), is typified by *Chrysocoma biflora* Linnaeus, a species that belongs to *Galatella* (Soják, Zprávy Krajsk. Vlastiv. Muz. Olomouci 215: 1–2. 1982).

- 1a. Leaves not gland-dotted, lower 3-veined, mid and upper 1-veined, or all 1-veined; plants glabrous, glabrate, or sparsely to ± densely arachnoid.
 - 2a. Ray florets absent; leaves linear, 1-veined, upper setiform; phyllaries abaxially shortly arachnoid (partly glabrescent) 11. *G. scoparia*
 - 2b. Ray florets present; leaves lanceolate to oblanceolate or linear-lanceolate, usually 3-veined, upper (sometimes some mid) linear; phyllaries abaxially glabrate or glabrous.
 - 3a. Lower and mid leaves lanceolate to oblanceolate or linear-lanceolate 9. *G. hauptii*
 - 3b. Lower and mid leaves linear-lanceolate.
 - 4a. Involucre subhemispheric; ray florets 15–20, light bluish violet; pappus brownish to pinkish 8. *G. tianschanica*
 - 4b. Involucre broadly obconic; ray florets 10–15, pinkish violet; pappus yellowish 10. *G. angustissima*
- 1b. Leaves gland-dotted on both surfaces or adaxially, sometimes inconspicuously so, lower and mid 3-veined, or mid and upper 1-veined; plants shortly papilliform hairy or glabrate.
 - 5a. Ray florets absent (rarely 1–4).
 - 6a. Leaves oblong-lanceolate or lanceolate to linear-lanceolate, lower and mid 3-veined; capitula numerous in corymbiform synflorescences 6. *G. biflora*
 - 6b. Leaves linear or linear-lanceolate, lower 3-veined, mid 1-veined; capitula solitary or 2 or 3 in corymbiform synflorescences 7. *G. regelii*
 - 5b. Ray florets 4–20, rarely absent.
 - 7a. Ray florets 4–10, disk florets 10–15.
 - 8a. Capitula numerous, usually in dense synflorescences; phyllaries 3-veined, rarely 1-veined, abaxially glabrate 4. *G. punctata*
 - 8b. Capitula few, in loose synflorescences; phyllaries usually 1-veined, rarely partly 3-veined, abaxially ± shortly arachnoid 5. *G. fastigiiformis*
 - 7b. Ray florets 8–15, disk florets 24–50.

- 9a. Leaf apex acuminate to long acuminate; plants 20–100 cm tall 3. *G. dahurica*
 9b. Leaf apex shortly acuminate; plants 20–60 cm tall.
 10a. Pappus white, entirely or partly tinged pinkish violet; involucre broadly obconic or subhemispheric, 6–8 × 9–12 mm; phyllaries abaxially glabrate 1. *G. chromopappa*
 10b. Pappus yellowish; involucre campanulate to hemispheric, 4–5 × 7–8 mm; phyllaries abaxially usually shortly arachnoid 2. *G. altaica*

1. *Galatella chromopappa* Novopokrovsky, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 7. 124. 1948.

紫缨乳菀 *zi ying ru wan*

Herbs, perennial, 25–60 cm tall, shortly papilliform hairy. Stems solitary or numerous, ascending or sometimes erect, sparsely shortly arachnoid, ± scabrous (base of hairs), sparsely sessile glandular. Leaves crowded, lower withered at anthesis, mid sessile, lanceolate or linear-lanceolate, (2–)3–4 × 0.3–0.4 cm, surfaces (rarely only adaxial) gland-dotted, shortly papilliform hairy, ± shortly arachnoid (glabrescent), 3-veined, lateral veins sometimes distinct only near base, base cuneate, margin flat, scabrous, apex shortly acuminate, rarely long acuminate; upper (in synflorescence) reduced, linear-lanceolate or linear, ca. 1 × 0.1–0.15 cm, 1-veined. Capitula 3–6 in dense or slightly loose corymbiform synflorescences, rarely solitary, 12–18 mm in diam. Involucre broadly obconic to subhemispheric, 6–8 × 9–12 mm; phyllaries 3- or 4-seriate, membranous, greenish, sometimes pinkish violet at apex, margin scarious, erose-fimbriate, shortly arachnoid ciliate, abaxial surface glabrate or sparsely shortly arachnoid, 3-veined (outer 1-veined), rarely partly 1-veined, outer ovate-lanceolate, apex acute, inner larger, oblong or lanceolate-oblong, apex obtuse or acute. Ray florets 8–12, pinkish (or ?bluish) violet, lamina 12–16 mm; disk florets 35–60, pale yellow becoming pinkish, 7–8 mm, limb narrowly funnelform, lobes lanceolate to oblong-lanceolate. Achenes oblong, 4–5 mm, densely white strigose. Pappus white, entirely or partly tinged pinkish violet, 7–8 mm. Fl. Jul–Sep.

Mountain steppes, grasslands on slopes; ca. 2000 m. W Xinjiang [Kazakhstan, Russia, Uzbekistan].

Koroljuk (in Krasnoborov, Fl. Siberia 13: 39–43. 2007) does not mention *Galatella chromopappa* for Siberia (Russia). Its status may need to be assessed.

2. *Galatella altaica* Tzvelev, Fl. URSS 25: 582. 1959.

阿尔泰乳菀 *a er tai ru wan*

Galatella bipunctata Novopokrovsky, p.p.

Herbs, perennial, 20–60 cm tall, abundantly shortly papilliform hairy, ± scabrous, sparsely shortly arachnoid, at least often in upper part. Stems solitary or several, erect or ascending. Leaves dense, spreading or ascending, sessile, oblong or lanceolate-oblong to linear-lanceolate, 4–6 × 0.5–0.8 cm, surfaces (rarely only adaxial) gland-dotted, scabrous and/or arachnoid, 3-veined, base cuneate, apex shortly acuminate; upper (in synflorescences) reduced. Capitula 7–10, in corymbiform synflorescences, rarely solitary, 13–20 mm in diam. Involucre broadly campanulate to hemispheric, 4–5 × 7–8 mm; phyllaries 3- or 4-seriate, yellow-green, 1-veined or inconspicuously 3-veined, abaxially ± shortly arachnoid to glabrate, margin narrowly scarious, erose, shortly arachnoid ciliate, outer

ovate-lanceolate, apex acute, innermost larger, oblong, margin narrowly scarious, apex rounded to obtuse or acute. Ray florets 8–15, pinkish violet, lamina 15–18 mm; disk florets 25–50, pale yellow, 6–7 mm, limb funnelform, lobes oblong-lanceolate. Achenes oblong, 2.5–3 mm, densely strigose. Pappus yellowish, 6–7 mm. Fl. Jul–Sep.

Forest margins, stony slopes; ca. 1800 m. N Xinjiang [Mongolia, Russia; C Asia].

3. *Galatella dahurica* Candolle, Prodr. 5: 256. 1836.

兴安乳菀 *xing an ru wan*

Aster dahuricus (Candolle) Benth. ex Baker; *A. dahuricus* subsp. *yamatsutanus* (Kitagawa) Kitagawa; *A. yamatsutanus* Kitagawa; *Galatella macrosciadia* Gandoger; *G. songorica* Novopokrovsky; *G. songorica* var. *angustifolia* Novopokrovsky; *G. songorica* var. *discoidea* Y. Ling & Y. L. Chen; *G. songorica* var. *latifolia* Y. Ling & Y. L. Chen; *G. tarbagatensis* Novopokrovsky.

Herbs, perennial, 20–100 cm tall, densely shortly papilliform hairy, glabrate in lower part; rhizome long, slender, or thick. Stems solitary or several, erect or ascending, purplish at base, branched upward, branches slender, ascending, sometimes sparsely sessile glandular. Leaves dense, lower often withered at anthesis, mid sessile, blade oblong or oblong-lanceolate to linear-lanceolate or linear, (3–)4–5.5(–7) × 0.1–1.4 cm, both surfaces or only adaxially gland-dotted, 1- or 3-veined, base attenuate, margin scabrous, apex acuminate to long acuminate; upper blade linear-lanceolate to linear, ± reduced upward, 3-veined (lateral 2 sometimes faint), sometimes 1-veined. Capitula numerous, in dense to lax corymbiform synflorescences, rarely solitary, (3–)10–15 × (5–)15–25 mm; peduncles slender; bracts 1 or 2, linear, densely papillose. Involucre broadly campanulate or broadly obconic to subhemispheric, 3–6 × 5–10 mm; phyllaries 3- or 4-seriate, yellow-green, imbricate, abaxially papillose to glabrate or glabrous, membranous, margin fimbriate, villous-ciliate, back sometimes rounded, outer short, green area wide, lanceolate to ovate-lanceolate, 1-veined, margin leafy textured, apex acute, innermost larger, oblong to oblong-lanceolate, usually 3-veined, margin scarious, apex rounded to obtuse or sometimes acute, sometimes pinkish tinged. Ray florets 10–20, pinkish or pale violet, tube ca. 2 mm, lamina 10–16 × 1.5–3 mm, glabrous; disk florets 20–40(–80), pale yellow, sometimes becoming purplish tinged, 6–8 mm, limb funnelform, lobes lanceolate. Achenes lanceolate or oblong, 2–4 mm, ± densely strigose. Pappus whitish or dirty white to yellowish, 5–8 mm. Fl. Jul–Sep.

Meadows, grasslands on slopes, dry mountain slopes, stony slopes, forest margins, roadsides; 500–3900 m. Heilongjiang, Jilin, Liaoning, Nei Mongol, Xinjiang [Kazakhstan, Mongolia, Russia (Far East, Siberia), Uzbekistan].

Y. Ling and Y. L. Chen (FRPS 74: 269. 1985) regarded *Galatella songorica* as distinct from *G. macrosciadia* based on the more numerous capitula with smaller, differently shaped phyllaries, and on distribution. Such differences may be the result of phenotypic plasticity, a trade-off between the number and size of capitula in different ecological conditions, such as higher elevations. On the other hand, Koroljuk (in Krasnoborov, Fl. Siberia 13: 39–43. 2007) reduced *G. songorica* and *G. macrosciadia* to synonyms of *G. dahurica*. Measurements among these taxa overlap significantly, and we are recognizing a single entity, as does Koroljuk.

Y. Ling and Y. L. Chen (loc. cit.: 269, 360–361) recognized four, mostly rare, varieties in *Galatella songorica*: *G. songorica* var. *songorica*, *G. songorica* var. *discoidea*, *G. songorica* var. *angustifolia*, and *G. songorica* var. *latifolia*. The type of *G. songorica* var. *discoidea* is a specimen with immature, unopened capitula, and it is impossible to determine whether or not they are discoid; the distinguishing features are all based on the capitula, and the variety does not appear to warrant recognition. *Galatella songorica* var. *angustifolia* and *G. songorica* var. *latifolia* are both based on leaf width, a plastic character. The type (and single specimen seen) of *G. songorica* var. *latifolia* is from moister places, and this may be responsible for the slightly greater width of leaves. Both of these varieties appear to represent extremes of leaf variation and hardly appear to warrant recognition, at least until more material is collected and a morphometric study is done.

4. *Galatella punctata* (Waldstein & Kitaibel) Nees, Gen. Sp. Aster. 161. 1832.

乳菀 ru wan

Aster punctatus Waldstein & Kitaibel, Descr. Icon. Pl. Hung. 2: t. 109. 1805; *Galatea punctata* (Waldstein & Kitaibel) Cassini ex Lessing; *Galatella acutisquama* Novopokrovsky; *G. acutisquamoides* Novopokrovsky; *G. densiflora* (Avé-Lallemant) Novopokrovsky; *G. ledebouriana* Novopokrovsky; *G. punctata* var. *densiflora* Avé-Lallemant; *G. rossica* Novopokrovsky var. *densiflora* (Avé-Lallemant) Novopokrovsky.

Herbs, perennial, 28–80 cm tall, papilliform hairy, sparsely scabridulous, thinly shortly arachnoid; rhizome thick. Stems numerous, rarely solitary, erect. Leaves dense, sessile, blade lanceolate-oblong or linear-lanceolate to linear, adaxially or rarely both surfaces gland-dotted, base cuneate, 3-veined, apex long acuminate, mucronate; lower withered after anthesis; mid blade 4–6(–8) × 0.3–0.6 cm; upper reduced, blade linear, 5–10 mm. Capitula numerous, in dense, rarely slightly loose, corymbiform synflorescences, 7–12 × 8–12 mm. Involucre broadly obconic to campanulate, 3–5 × 4–6 mm; phyllaries 3- or 4-seriate, pale green, abaxially glabrate, margin narrowly to ± broadly scarious, erose-fimbriate, 3-veined, rarely partly 1-veined, outer small, ovate-lanceolate, apex acute, inner larger, oblong, apex obtuse or acuminate. Ray florets 5–10, pinkish violet, lamina 10–12 × ca. 2 mm; disk florets 10–15, pale yellow, sometimes pinkish violet tinged, 5–6 mm, limb funnel-form, lobes long, oblong-lanceolate. Achenes oblong, 3.5–4 mm, densely white strigose. Pappus brownish, 5–6 mm. Fl. Jul–Sep.

Grasslands on slopes, flood meadows; ca. 1700 m. N Xinjiang [Kazakhstan, Russia (Siberia); SW Asia, Europe].

5. *Galatella fastigiiformis* Novopokrovsky, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 7: 128. 1948.

扫枝乳菀 sao zhi ru wan

Herbs, perennial, 25–100 cm tall, shortly papilliform hairy; rhizome thick. Stems solitary or several, erect. Leaves lax or dense, sessile, blade linear-lanceolate or linear, adaxial surface or rarely both surfaces gland-dotted, or indistinctly gland-dotted abaxially, 3-veined, lateral often inconspicuous, base cuneate, apex long, rarely shortly, acuminate; mid 4–5.5 × 0.35–4 cm; upper (in synflorescences) reduced, linear, 1.5–2 × 0.1–0.2 cm. Capitula few, rarely 2 or 3, in relatively loose corymbiform synflorescences, 7–10 × 7–12 mm; peduncles ascending or curved. Involucre obconic, 3–5 × 5–6 mm; phyllaries 3- or 4-seriate, light yellowish green, membranous, usually 1- or rarely partly 3-veined, margin scarious, erose-fimbriate, shortly arachnoid ciliate, outer ovate-lanceolate, abaxially ± shortly arachnoid, apex acute, inner larger, oblong-lanceolate, glabrous or glabrate, apex obtuse or acute. Ray florets 4–8, pale pinkish violet, lamina ca. 10 × 1.5 mm; disk florets 11–15, pale yellow, 5–6.5 mm, limb narrowly funnel-form, lobes oblong-lanceolate. Achenes oblong to lanceolate, 3.5–4 mm, white long strigose, 3-veined. Pappus whitish to yellowish, slightly longer than disk corollas. Fl. and fr. Jul–Sep.

Grasslands on slopes, salt marsh meadows. N Xinjiang (Shawan) [Kazakhstan, Russia, Uzbekistan].

6. *Galatella biflora* (Linnaeus) Nees, Gen. Sp. Aster. 159. 1832.

盘花乳菀 pan hua ru wan

Chrysocoma biflora Linnaeus, Sp. Pl. 2: 841. 1753; *Crinitaria biflora* (Linnaeus) Cassini; *Galatella dracunculoides* Nees var. *discoidea* Candolle.

Herbs, perennial, caespitose, 45–100 cm tall, shortly papilliform hairy, scabridulous or glabrate; rhizome short. Stems numerous, rarely solitary, erect. Leaves dense, lower fallen after anthesis, mid sessile, usually dingy green, blade oblong-lanceolate or lanceolate to linear-lanceolate, 5.5–6 × 0.4–0.5 cm, surfaces gland-dotted or abaxially eglandular, scabridulous or glabrate, 3-veined, base gradually cuneate, apex long acuminate; upper reduced, linear-lanceolate. Capitula numerous, in usually dense, rarely slightly loose, corymbiform synflorescences, 8–11 × 10–12 mm. Involucre obconic, 3–5 × 4–7 mm; phyllaries 3- or 4-seriate, yellowish green, membranous, abaxially glabrate or ± scabridulous, 3-veined, rarely partly 1-veined, margin scarious, erose-fimbriate, outer small, ovate-lanceolate, apex acute, innermost larger, oblong, apex obtuse or acute. Ray florets usually absent, rarely 1–3(or 4); disk florets 8–25, pale yellow, 6–7 mm, limb funnel-form, lobes long, oblong-lanceolate. Achenes oblong, 3.5–4 mm, densely white silky. Pappus whitish, 5–6 mm. Fl. and fr. Jul–Sep.

Grasslands on slopes; ca. 1700 m. W Xinjiang [Kazakhstan, Russia].

7. *Galatella regelii* Tzvelev, Fl. URSS 25: 153. 1959.

昭苏乳菀 zhao su ru wan

Linowsyris punctata Regel & Schmalhaus, Trudy Imp. S.-Peterburgsk. Bot. Sada 5: 613. 1877, not Candolle (1836); *Galatella chromopappa* Novopokrovsky f. *discoidea* Novopokrovsky.

Herbs, perennial, 25–45 cm tall, shortly papilliform hairy, scabridulous. Stems numerous, ascending, sparsely sessile glandular. Leaves dense, lower withered and fallen after anthesis, sometimes 3-veined, mid sessile, dingy green, blade linear or linear-lanceolate, 3–4 × ca. 0.2 cm, both surfaces or adaxial surface gland-dotted, 1-veined, base cuneate, apex shortly acuminate, mucronate; upper reduced, linear. Capitula solitary or 2 or 3 in loose corymbiform synflorescences, 8–11 × 12–14 mm, with florets. Involucre broadly obconic, 4–5 × 5–8 mm; phyllaries 3-seriate, greenish, abaxially glabrous or glabrate, 1-veined, or partly 3-veined, margin scarious, erose-laciniate, outer short, lanceolate, apex acute, innermost oblong, apex obtuse or rounded-acuminate, sometimes purplish. Ray florets absent; disk florets 20–30, pale yellow, 5–6.7 mm, limb funnel-form, lobes oblong-lanceolate, long. Achenes oblong, 3–3.5 mm, densely white hairy. Pappus whitish, 5–6 mm. Fl. Jul–Sep.

Forest margins, grasslands on slopes; 1200–1800 m. W Xinjiang [Kazakhstan, Russia].

8. *Galatella tianschanica* Novopokrovsky, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 7: 130. 1948.

天山乳菀 tian shan ru wan

Herbs, perennial, 25–60 cm tall, sparsely to ± densely arachnoid, glabrescent. Stems numerous, rarely solitary, ascending, often arched. Leaves usually dense, concentrated mainly on lower half of stem and often oriented to one side, sessile, lower pale green, blade linear-lanceolate, 2.5–3 × 0.25–0.3 cm, slightly fleshy, not gland-dotted, 1-veined, base cuneate, apex shortly acuminate; upper few, reduced, linear, margin often revolute. Capitula solitary or 2–4 in loose corymbiform synflorescences, 8–10 × 15–20 mm. Involucre subhemispheric, 4–5 × 8–10 mm; phyllaries 3-seriate, greenish, abaxially glabrous or glabrate, membranous, inconspicuously 3- or partly 1-veined, margin scarious, erose-fimbriate, outer lanceolate to ovate, apex acute, inner longer, oblong, apex rounded or obtuse. Ray florets 15–20, light bluish violet, lamina oblong, ca. 10 × 3–3.5 mm; disk florets 35–50, pale yellow, 6–7 mm, limb narrowly funnel-form, lobes oblong-lanceolate. Achenes oblong-lanceolate, 3–4 mm, densely white strigose. Pappus brownish to pinkish, 5–6 mm. Fl. Jul–Sep.

Salt marshes, rare; ca. 1200 m. W Xinjiang (Aksu) [Kazakhstan].

9. *Galatella hauptii* (Ledebour) Lindley ex Candolle, Prodr. 5: 256. 1836.

鳞苞乳菀 lin bao ru wan

Aster hauptii Ledebour, Fl. Altaic. 4: 100. 1833, based on *A. fastigiatus* Ledebour, Icon. Pl. 2: t. 161. 1830, not Fischer (1812); *Galatella hauptii* var. *grandiflora* Avé-Lallemant; *G. squamosa* Candolle.

Herbs, perennial, (10–)20–50 cm tall, glabrous or glabrate, sparsely shortly arachnoid, or sparsely scabrous; rhizomes robust. Stems several or solitary, erect or often ascending. Leaves dense, sessile, green, not gland-dotted, glabrate or sometimes sparsely shortly arachnoid, base cuneate, apex shortly acuminate, mucronate; lower and some mid withered at anthesis; mid blade lanceolate to oblanceolate or linear-lanceolate, 3–7 × 0.3–0.5 cm, 1–3-veined; upper usually linear, 1-veined; uppermost

reduced. Capitula few in loose corymbiform synflorescences, rarely solitary, 8–15 mm; branch bracts several, linear, peduncles with scalelike bracteoles. Involucre broadly obconic, 6–10 × 3–5 mm; phyllaries 4- or 5-seriate, pale green, sometimes apically pinkish purple, abaxially glabrous or glabrate, membranous, margin narrowly to ± broadly scarious, erose-fimbriate, shortly arachnoid ciliate, 1-veined, outer short, ovate-lanceolate, apex acute, inner long, oblong, apex rounded or obtuse, sometimes acute. Ray florets 10–15, lamina pinkish violet, oblong, 13–15 × 2–3 mm; disk florets 45–50, pale yellow, often becoming pinkish purple tinged, 6–7 mm, limb narrowly funnel-form, lobes oblong-lanceolate. Achenes oblong, 5–5.5 mm, white strigose. Pappus whitish, 5–7 mm. Fl. Jul–Sep.

Mountain slopes, grasslands, stony slopes; 1100–1800 m. N Xinjiang [Kazakhstan, Mongolia, Russia].

10. *Galatella angustissima* (Tausch) Novopokrovsky, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 7: 136. 1948.

窄叶乳菀 zhai ye ru wan

Aster angustissimus Tausch, Flora 11: 487. 1828; *Galatella hauptii* (Ledebour) Lindley ex Candolle var. *tenuifolia* (Lindley ex Candolle) Avé-Lallemant; *G. tenuifolia* Lindley ex Candolle.

Herbs, perennial, 10–50 cm tall, sparsely shortly arachnoid, rapidly glabrescent (glabrous or glabrate), upper part sparsely shortly arachnoid. Stems solitary or several, erect or ascending. Leaves dense, sessile, green, not gland-dotted, base attenuate or cuneate, margin revolute, scabridulous, apex acuminate or sometimes obtuse (lower), mucronate; lower linear-lanceolate, to 0.4 cm wide, 3-veined; mid and upper usually linear, 2–4 × 0.1–0.2(–0.3) cm, 1-veined; uppermost (on synflorescence branches) numerous, reduced, bractlike. Capitula numerous, in lax corymbiform synflorescences, 8–18 × 10–15 mm. Involucre broadly obconic, 5–7 × 8–12 mm; phyllaries 4- or 5-seriate, greenish, often pinkish at tip, abaxially glabrate, membranous, margin narrowly scarious, erose, shortly arachnoid ciliate, sometimes keeled or rounded, thickened, 1-veined, outer ovate-lanceolate, apex acute, inner longer, oblong-lanceolate, apex rounded or obtuse. Ray florets 10–15, pinkish violet, lamina oblong, 13–15 × 2–3 mm; disk florets 10–35, pale yellow, 6–7 mm, limb funnel-form, lobes lanceolate. Achenes oblong, 3.5–5 mm, white strigose, 3-ribbed. Pappus yellowish, 5–7 mm. Fl. Jul–Sep.

Dry grasslands, steppes, stony slopes; 900–2000 m. N Xinjiang [Kazakhstan, Mongolia, Russia (Siberia)].

11. *Galatella scoparia* (Karelin & Kirilov) Novopokrovsky, Izv. Rossiisk. Akad. Nauk 12: 2274, 2279, 2283. 1918.

卷缘乳菀 juan yuan ru wan

Linosyris scoparia Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 378. 1842; *Aster scoparius* (Karelin & Kirilov) Kuntze (1891), not Nees (1818), nor Candolle (1836).

Herbs, perennial, 25–45 cm tall, ± sparsely to densely shortly arachnoid-tomentose, partly glabrescent; rhizome

woody. Stems numerous, rarely solitary, erect or ascending. Leaves sessile, grayish green, linear, 2–4 × 0.1–0.2 mm, not gland-dotted, subleathery, 1-veined, base tapered, margin strongly revolute, apex acute, arched, mucronate; lowest caducous, blades linear, sometimes 3-veined (lateral veins inconspicuous); upper (in synflorescences) reduced, almost setiform. Capitula 3–5 in loose, often irregularly corymbiform synflorescences, 12–17 × ca. 17 mm. Involucre broadly obconic, 10–15 × 10–18 mm; phyllaries 4–6-seriate, light green, grayish,

subleathery, abaxially shortly arachnoid, partly glabrescent, margin narrowly scarious, erose-fimbriate, shortly arachnoid ciliate, 1-veined, outer small, ovate or ovate-lanceolate, apex acute, inner larger, oblong, apex usually rounded to obtuse. Disk florets 14–20, pale yellow, 6.5–8 mm, limb narrowly funnellform, lobes oblong-lanceolate. Achenes oblong, 4–6 mm, densely white strigose. Pappus brownish, 6–7 mm. Fl. Jul–Sep.

Dry steppes, slopes, gravel. N Xinjiang [Kazakhstan, Russia].

126. CRINITINA Soják, Zprávy Krajsk. Vlastiv. Muz. Olomouci 215: 1. 1982.

麻菀属 ma wan shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Linosyris Cassini (1825), not Ludwig (1757).

Herbs, perennial; rhizomes slender and long, nodose. Stems several or solitary, erect or ascending, usually branched above. Leaves alternate, sessile, oblong to narrowly linear, gland-dotted or not, sometimes obscurely so, 1-veined, margin entire. Capitula discoid, numerous, in dense or loose, corymbiform synflorescences, rarely solitary. Involucre shortly cylindrical or obconic; phyllaries 3- to multiseriate, imbricate, greenish, glabrate or glabrescent, subleathery or membranous, margin usually narrowly scarious, midvein ± distinct, outer either much shorter or almost equaling length of inner but narrower, ovate, inner oblong, apex obtuse or ± acute. Receptacles slightly convex, irregularly alveolate. Disk florets fertile, bisexual, yellow, 5–40, usually exceeding involucre in length, lobes 5, lanceolate; anther base obtuse, apical appendage lanceolate; style branch tips ovate-lanceolate. Achenes oblong, abaxially ± flattened, long strigose, margin 1- or 2-ribbed. Pappus 2-seriate, of whitish or brownish, barbellate bristles, exceeding achenes.

About five species: mostly in steppe and forest-steppe zones of Europe and Asia; two species in China.

Current phylogenetic data are insufficient to determine whether *Crinitina* is sister to *Galatella*, paraphyletic to it, or derived from within it (in the latter two cases, it could be merged under *Galatella* as is sometimes done).

- 1a. Plants sparsely arachnoid, glabrescent; leaves linear to linear-oblong or oblong-linear, gland-dotted 1. *C. tatarica*
 1b. Plants gray tomentose; leaves oblong to linear-oblong, obscurely gland-dotted 2. *C. villosa*

1. *Crinitina tatarica* (Lessing) Soják, Zprávy Krajsk. Vlastiv. Muz. Olomouci 215: 2. 1982.

新疆麻菀 xin jiang ma wan

Chrysocoma tatarica Lessing, Linnaea 9: 186. 1834; *Crinitaria tatarica* (Lessing) Soják; *Linosyris tatarica* (Lessing) C. A. Meyer.

Herbs, perennial, ± caespitose, 10–35 cm tall, sparsely arachnoid, glabrescent. Stems several, erect or ascending. Leaves linear to linear-oblong or oblong-linear, 1–3 × 0.15–0.4 cm, both surfaces or only adaxially gland-dotted, scabrous, subleathery, 1-veined, base gradually attenuate to cuneate, apex obtuse, sometimes mucronate; upper reduced. Capitula numerous, in dense corymbiform synflorescences (bracts grading into phyllaries), 8–10 mm. Involucre shortly cylindrical or obconic, 3.5–5 mm; phyllaries 3- or 4-seriate, yellowish green, abaxially sparsely arachnoid to glabrate, thinly leathery, margin arachnoid, outer short, ovate, 1–3-veined, apex obtuse or acute, inner larger, oblong, 3–5-veined, margin broadly scarious, erose, apex obtuse. Disk florets 5–10, pale yellow, tubular, 5–6 mm. Achenes oblong, 3–4 mm, densely strigose. Pappus brownish, 5–6 mm. Fl. Jul–Sep.

Salt marshes, steppes, dry stony slopes; 700–1200 m. N Xinjiang [Kazakhstan, Russia (W Siberia); Europe].

2. *Crinitina villosa* (Linnaeus) Soják, Zprávy Krajsk. Vlastiv. Muz. Olomouci 215: 2. 1982.

灰毛麻菀 hui mao ma wan

Chrysocoma villosa Linnaeus, Sp. Pl. 2: 841. 1753; *Crinitaria villosa* (Linnaeus) Cassini; *Galatella villosa* (Linnaeus) H. G. Reichenbach; *Linosyris villosa* (Linnaeus) Candolle.

Herbs, perennial, often densely caespitose, 15–35 cm tall, gray tomentose. Stems usually numerous, erect, simple. Leaves oblong to linear-oblong or oblong-linear, obscurely gland-dotted, base gradually attenuate, apex acute to obtuse, mucronate; upper very reduced. Capitula numerous, in dense corymbiform synflorescences, 8–12 mm. Involucre shortly cylindrical or obconic, 6–9 mm; phyllaries sparsely grayish tomentose, glabrescent, subleathery, margin arachnoid ciliate, outer short, ovate, 1–3-veined, apex obtuse or acute, inner oblong, obtuse, larger, 3–5-veined. Disk florets 5–10, yellow, funnel-shaped, ca. 6.5 mm. Achenes 3–4 mm, densely strigose. Pappus whitish, sometimes brownish tinged, 6–9 mm. Fl. Jul–Sep.

Salt marshes, steppes, stony slopes. N Xinjiang [Kazakhstan, Russia (European part, W Siberia); SW Asia, E Europe (Ukraine)].

127. ASTEROTHAMNUS Novopokrovsky, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 13: 331. 1950.

紫菀木属 *zi wan mu shu*

Chen Yilin (陈艺林 *Chen Yi-ling*); Luc Brouillet

Subshrubs; rhizome woody. Stems numerous, erect or ascending, strongly branched, white to gray tomentose or arachnoid or villosulous to villous or villosulous-tomentose. Leaves sessile, small, crowded, subleathery, margin often revolute, 1-veined. Capitula radiate or sometimes discoid, solitary at ends of stems or branches or 3–5 in corymbiform synflorescences. Involucre broadly campanulate or subhemispheric; phyllaries 3- or 4-seriate, imbricate, usually unequal, often apically purple tinged, leathery, margin broad, scariosus, erose, whitish, midvein distinct, brownish or reddish, apex acute. Receptacles ± flat, alveolate, irregularly denticulate. Florets fertile. Ray florets female, blue, light violet, or whitish pink; disk florets bisexual, yellow, turning pink, limb funnelform to narrowly campanulate, 5-lobed, lobes lanceolate; anther base obtuse, appendage lanceolate; style branch tips triangular. Achenes oblanceoloid, ± compressed, 2- or 3-ribbed, ± densely strigose. Pappus white, yellowish, reddish, or dirty white, barbellate, equaling disk corollas, in 3 or 4 series, outermost few, short, thin, outer and inner long, acute, innermost few, ± slightly clavate.

About seven species: C Asia; five species in China.

- 1a. Leaves 1–2 mm wide, linear or linear-oblong.
 2a. Stems branched throughout, densely white or cinnamon villosulous; leaves linear, 10–15(–20) × 1–1.5 mm; capitula usually radiate, sometimes discoid, peduncles slender; phyllary apex greenish or white, rarely purplish 2. *A. fruticosus*
 2b. Stems branched in lower part only, gray-white tomentulose; leaves linear-oblong to linear, (8–)12–15 × 1.5–2 mm; capitula radiate, peduncles rather thick; phyllary apex purplish red 3. *A. centraliasiatricus*
 1b. Leaves 2–4 mm wide, oblong to oblong-lanceolate or oblong-ob lanceolate.
 3a. Leaves oblong-ob lanceolate, 6–8 × 2–3(–4) mm, apex shortly acuminate; bark at stem base reddish brown 1. *A. alyssoides*
 3b. Leaves oblong or oblong-lanceolate to oblong-ob lanceolate, 10–25 × 2–4 mm, apex obtuse to ± acute, mucronate; bark at stem base yellow-brown.
 4a. Leaves 10–12(–20) mm; phyllaries densely gray-white cottony, apex shortly acuminate to ± obtuse 4. *A. mollisculus*
 4b. Leaves 15–25 mm; phyllaries gray-white tomentulose, apex acuminate 5. *A. poliifolius*

1. *Asterothamnus alyssoides* (Turczaninow) Novopokrovsky, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 13: 336. 1950.

紫菀木 *zi wan mu*

Aster alyssoides Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 5: 198. 1832; *Kalimeris alyssoides* Candolle.

Low subshrubs, 8–15(–20) cm, white arachnoid-tomentulose. Stems branched from base, branches slender and short, lower part woody, bark reddish brown, herbaceous above, white arachnoid-tomentose, glabrescent. Leaves oblong-ob lanceolate, 6–8 × 2–3(–4) mm, surfaces white arachnoid-tomentose, adaxially apically ± glabrescent, 1-veined, base attenuate, margin often revolute, apex shortly acuminate. Capitula radiate, solitary at ends of stems or in corymbiform synflorescences. Involucre campanulate, 6–7 × 12–13 mm; phyllaries 3-seriate, arachnoid-tomentose, margin broadly scariosus, erose fimbriate, apex acute to obtuse, outer short, ovate-lanceolate, mid and inner oblong to oblong-ob lanceolate. Ray florets 6–9, lamina spreading, bluish, ca. 8 × 1 mm; disk florets ca. 12, yellow, 5–6 mm, limb funnel-shaped. Achenes ca. 3 mm, densely long strigose. Pappus white, ca. 5 mm.

Sandy and dry lands. Nei Mongol [S Mongolia].

2. *Asterothamnus fruticosus* (C. Winkler) Novopokrovsky, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 13: 337. 1950.

灌木紫菀木 *guan mu zi wan mu*

Kalimeris fruticosa C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 9: 419. 1886.

Subshrubs, densely leaved. Stems branched throughout, lower part woody, bark tan-colored to gray, upper part herbaceous, gray-green, densely white or cinnamon villosulous, ± glabrescent near base, distally sometimes ± densely stipitate glandular. Leaves linear, 10–15(–20) × 1–1.5 mm, reduced in size distally, surfaces arachnoid-tomentulose, densely so abaxially, sometimes adaxially glabrate, margin strongly revolute. Capitula usually radiate or sometimes discoid, in loose corymbiform synflorescences or solitary at ends of branches, 8–10 mm; peduncles slender, straight or ± curved; bracts small, linear, upper phyllary-like. Involucre campanulate, 5–7 × 8–10 mm; phyllaries 3- or 4-seriate, imbricate, glabrate or sparsely to moderately villous (particularly at base) to arachnoid, ± stipitate glandular, membranous, outer and mid smaller, ovate-lanceolate, inner oblong, margin broadly scariosus, glandular and sparsely villous-ciliate or eciliate, apex acuminate, green or white, rarely ± purplish red. Ray florets 7–10, purplish to lavender, tube 2–3.1 mm, tube and lamina base hairy, lamina spreading, 6–10 × 0.8–1.3 mm; disk florets 15–18, 4–5 mm, tube 2–2.2 mm, hairy, limb funnelform, 2.5–3.5 mm. Achenes (2–)3.5–4 mm, sericeous, glandular (not visible at maturity). Pappus yellowish white. Fl. and fr. Jun–Sep.

Gritty-stony foothills, stony riverbeds, sandy or rocky shrubby-grassy deserts; 1000–1600 m. Gansu, Xinjiang [Kazakhstan, Russia].

3. *Asterothamnus centraliasiaticus* Novopokrovsky, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 13: 338. 1950 [*“centrali-asiaticus”*].

中亚紫菀木 zhong ya zi wan mu

Aster alyssoides Turczaninow var. *achnolepis* Handel-Mazzetti.

Subshrubs 20–40 cm; rhizome thick. Stems numerous, erect or ascending, many branched in lower part, finely striate, woody at base, bark reddish brown, gray-white tomentulose, ± glabrescent, upper part herbaceous, gray-white villous, ± glabrescent, glandular distally. Leaves crowded, ascending or erect, linear-oblong to linear, (8–)12–15 × 1.5–2 mm, abaxially densely gray-white villous, adaxially gray-green, moderately to sparsely villous, base attenuate, margin revolute, apex acute. Capitula radiate, 8–10 × ca. 10 mm, in loose corymbiform synflorescences or solitary at ends of branches; peduncles rather thick, straight or curved; bracts small, linear. Involucre broadly campanulate, 6–7 × ca. 9 mm; phyllaries 3- or 4-seriate, imbricate, white villous to arachnoid, glandular at least distally, margin broadly scarious, erose, apex acuminate to acute or ± obtuse, usually purplish red, outer short, ovate or lanceolate, inner oblong. Ray florets 7–13, tube ca. 2.9 mm, glabrous, lamina pale purple to pale lilac, 10–12 × 1.2–2.7 mm; disk florets 11–19(–26), yellow turning reddish, ca. 5 mm, tube 1.8–2.5 mm, tube and limb base sparsely hairy, limb narrowly campanulate to funnellform, ca. 2.7 mm. Achenes straw-colored, 3–3.5 mm, white strigose. Pappus white or pale cinnamon. Fl. and fr. Jul–Sep.

Meadows, gritty-stony foothills, stony riverbeds, open sand dunes, deserts, grasslands; 1300–3400 m. Gansu, Nei Mongol, Ningxia, Qinghai, SE Xinjiang [S Mongolia].

Three varieties have been recognized, but morphological differences appear to be tenuous or the result of phenotypic plasticity. A thorough study is needed before recognition of these varieties is warranted. The varieties are *Asterothamnus centraliasiaticus* var. *centraliasiaticus*, *A. centraliasiaticus* var. *procerior* Novopokrovsky (Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 13: 340. 1950), and *A. centraliasiaticus* var. *potaninii* (Novopokrovsky) Y. Ling & Y. L. Chen (Fl. Reipubl. Popularis Sin. 74: 263. 1985; *Asterothamnus potaninii* Novopokrovsky, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 13: 341. 1950, “*Potanini*”). The main distinguishing characters given in descriptions were number of capitula in synflorescences (loose corymbiform in var. *centraliasiaticus* vs. 2 or 3 capitula in loose synflorescences in var. *procerior* and var. *potaninii*) and the degree of vestiture (gray-white tomentulose and glabrescent in var. *centraliasiaticus* vs. permanently, densely gray-white tomentulose in var. *procerior*; var. *potaninii* not mentioned). The typical variety is reported

throughout the range of the species; *A. centraliasiaticus* var. *procerior* is reported from W Gansu, N Qinghai, and SE Xinjiang; and *A. centraliasiaticus* var. *potaninii* is reported from E Gansu and Ningxia.

4. *Asterothamnus molliusculus* Novopokrovsky, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 13: 342. 1950.

软叶紫菀木 ruan ye zi wan mu

Subshrubs, (25–)30–40 cm tall. Stems erect or ascending, many branched, woody in lower part, bark yellow-brown, densely gray-white tomentose, ± glabrescent, current-year branches slender, spreading, ascending or ± curved, gray-white arachnoid-lanate. Leaves oblong or oblong-lanceolate, 10–12(–20) × ca. 3 mm, abaxially white arachnoid-lanate, adaxially shortly arachnoid, ± soft, base cuneate, margin revolute, apex obtuse to ± acute, mucronate. Capitula radiate, large, usually 1–3 in corymbiform synflorescences at ends of branches; peduncle short. Involucre broadly campanulate, ca. 8 × 8 mm; phyllaries 3- or 4-seriate, densely gray-white cottony, margin broadly scarious, erose, ciliate, apex shortly acuminate or ± obtuse, outer shorter, oblong or lanceolate, inner oblong. Ray florets 8, lamina spreading, (whitish pink or pale purple?) yellowish when dry, oblong, ca. 10 × 2.5–3 mm; disk florets 12, yellow, ca. 5 mm, limb narrowly campanulate. Achenes ca. 3.5 mm, moderately to densely strigose. Pappus whitish. Fl. Aug.

Meadows. Nei Mongol [Mongolia].

5. *Asterothamnus poliifolius* Novopokrovsky, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 13: 343. 1950.

毛叶紫菀木 mao ye zi wan mu

Subshrubs. Stems erect or ascending, many branched, woody in lower part, bark yellow-brown, herbaceous in upper part, ± densely arachnoid-tomentose, ± glabrescent. Leaves oblong or oblong-lanceolate to oblong-oblong-lanceolate, 15–25 × 2–4 mm, surfaces gray-white arachnoid-tomentose, adaxially ± glabrescent, midvein conspicuous, margin revolute, apex acute or ± obtuse, mucronate. Capitula radiate, large, in corymbiform synflorescences; peduncle short. Involucre broadly campanulate, 6–7 × 8–9 mm; phyllaries 3-seriate, gray-white tomentulose, margin broadly scarious, apex acuminate, purplish at middle and apex, outer short, ovate or ovate-lanceolate, inner lanceolate or oblong. Ray florets 6 or 7, lamina spreading, pale purple, oblong, ca. 8 × 3 mm; disk florets 12–15, yellow becoming ± pale purple, ca. 5 mm, limb funnel-shaped. Achenes 4–4.6 mm, densely strigose. Pappus white or yellowish brown. Fl. Sep. 2n = 18.

Grasslands; 1000–1900 m. Xinjiang [Mongolia, Russia (Tuva)].

128. ARCTOGERON Candolle, Prodr. 5: 260. 1836.

莎菀属 suo wan shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Herbs, perennial, mat-forming, scapiform; caudex branched; taproot thick. Leaves linear, base marcescent. Capitula radiate, solitary on scapes. Involucre campanulate; phyllaries 3- or 4-seriate, imbricate, narrowly lanceolate, membranous, acuminate, abaxially rounded, 1-veined, green along vein, often purplish apically, white toward margin, margins scarious, hyaline, erose. Receptacle flat, ± alveolate. Florets fertile. Ray florets white or pinkish white, twice as long as involucre, lamina ovate-oblong; disk florets

bisexual, yellow, cylindric-campanulate, 5-lobed, lobes triangular; anther base obtuse, apical appendage lanceolate; style branch tips lanceolate. Achenes oblong, slightly compressed, densely silvery sericeous, slightly veined. Pappus 3- or 4-seriate, of white to yellowish white barbellate bristles, some outer shorter and thinner.

One species: NE China, Mongolia, Russia (Far East).

1. *Arctogeron gramineum* (Linnaeus) Candolle, Prodr. 5: 261. 1836.

莎菀 suo wan

Erigeron gramineus Linnaeus, Sp. Pl. 2: 864. 1753; *Aster gramineus* (Linnaeus) Komarov.

Herbs, perennial; caudex branches ascending, thickly covered with marcescent leaf bases. Flowering scapes 2–5 (or 6), 0.5–1 cm (to 7+ cm in fruit). Leaves erect, linear, 1–10 cm ×

0.4–0.6 mm, surfaces glabrous (or sometimes ± arachnoid-pubescent?), rigid, 1-veined, base sheathing, margin recurved, roughly scabrous-ciliate. Capitula solitary on scapes, 1–2 cm in diam. Phyllaries densely villous, inner slightly longer, sometimes pinkish tipped. Ray florets lamina ca. 6 × 2 mm, pale; disk florets 3–6 mm, tube 1–2.5 mm, limb 2–3.5 mm, lobes ca. 0.5 mm. Achenes ca. 3 mm. Pappus inner bristles equaling disk corollas.

Dry mountain slopes or stony slopes. Heilongjiang, Nei Mongol [Kazakhstan, Mongolia, Russia (Far East)].

129. **TURCZANINOVIA** Candolle, Prodr. 5: 257. 1836.

女菀属 nǚ wan shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Herbs, perennial; rootstock short and thick. Leaves alternate, linear-lanceolate. Capitula radiate, small, numerous, in dense corymbiform synflorescences. Involucre cylindric-campanulate; phyllaries 3- or 4-seriate, imbricate, shorter than disk florets, membranous, midvein green, margin scarious, apex obtuse to acute. Receptacle alveolate, margin lacerate. Ray florets female, 1-seriate, usually 7–10, white, lamina elliptic; disk florets several, bisexual, partly sterile, corolla yellow, limb shortly campanulate, lobes 5, lanceolate; anther base obtuse; style branch tips lanceolate or sometimes style undeveloped. Achenes dark brownish black or reddish, ovoid, weakly compressed, densely strigose, margins finely 2-ribbed. Pappus 2-seriate, of numerous dirty white, barbellate bristles, thin, subequal.

One species: China, Japan, Korea, Mongolia, Russia (Far East).

1. *Turczaninovia fastigiata* (Fischer) Candolle, Prodr. 5: 258. 1836.

女菀 nǚ wan

Aster fastigiatus Fischer, Mém. Soc. Imp. Naturalistes Moscou 3: 74. 1812; *A. flabellum* Vaniot; *A. micranthus* Vaniot & H. Léveillé; *A. micranthus* var. *achilleiformis* H. Léveillé; *Kalimeris japonica* Schultz Bipontinus.

Herbs, perennial. Stems erect, 30–80(–100) cm tall, glabrous below, sparsely strigose to densely strigose-tomentose upward. Lower leaves withered at anthesis, shortly petiolate, blade linear-lanceolate, 3–12 × 0.3–1.5 cm, abaxially gray-green, densely strigose-tomentulose, densely glandular, 3-veined, veins prominent, adaxially glabrous, base cuneate, margin entire, revolute, scabrous, apex acuminate; mid and upper gradually reduced upward, lanceolate or linear-lanceolate. Cap-

tula small, 5–7 mm, numerous in terminal, dense, corymbiform synflorescences; peduncles slender; bracts 2 or 3, sometimes grading into phyllaries. Involucre cylindric-campanulate or campanulate; phyllaries: outer series oblong, 1–1.5 mm, ± densely puberulent, apex obtuse, inner oblanceolate-oblong, green at apex and along midrib. Ray florets tube 1–2 mm, lamina narrowly oblong to narrowly elliptic, 2–3.5 × 1–1.5 mm; disk florets 3–4 mm, tube 1–1.5 mm, limb 1–3 mm, lobes recurved. Achenes straw-colored to reddish, oblong, ca. 1 mm, densely strigose, glabrescent. Pappus 2–3 mm, equaling or shorter than disk corolla. Fl. and fr. Aug–Oct.

Dry slopes, moist grassy meadows on riverbanks, roadsides; near sea level to 500 m. Anhui, Gansu, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Zhejiang [Japan, Korea, Mongolia, Russia (Far East)].

130. **LAGENOPHORA** Cassini, Bull. Sci. Soc. Philom. Paris 1816: 199. 1816

[“*Lagenifera*”], nom. cons.

瓶头草属 ping tou cao shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Herbs, annual [or perennial], scapiform. Leaves basal [or rarely cauline]. Capitula small, radiate or disciform, solitary, usually pedunculate or on scape, scape bracteate (bracts reduced). Involucre campanulate; phyllaries 2–4-seriate, unequal, membranous, 1-veined (midvein orangish). Receptacles flat or convex, not alveolate, naked. Ray florets female, 1–4-seriate, white to purple; disk florets few, usually sterile, functionally male, yellow, limb campanulate, 4- or 5-lobed; anther base obtuse; style branch tip lanceolate

or triangular. Achenes obovate to oblanceolate, flattened, ± glandular apically, margin 2-ribbed, apex rimmed, shortly beaked or not. Pappus absent.

Eighteen species: SE Asia, Australia, New Zealand, South America; one species in China.

1. *Lagenophora stipitata* (Labillardière) Druce, Rep. Bot. Soc. Exch. Club Brit. Isles 4: 630. 1917.

瓶头草 ping tou cao

Bellis stipitata Labillardière, Nov. Holl. Pl. 2: 55. 1806;
Lagenophora billardierei Cassini.

Herbs, annual, 3.5–12 cm tall. Leaves rosulate, persistent, petiole short, blade obovate to broadly spatulate, 1.2–3 × 0.7–1.3 cm, surfaces sparsely to moderately villosulous, base attenuate, margin repand-dentate, teeth mucronulate, villosulous, apex rounded to obtuse; scape bracts (leaves) 1 or 2, linear, 1–

1.5 × 3–5 mm. Capitula 4–7(–9) mm in diam., solitary. Involucre campanulate, ca. 2.5 × 3–5 mm; phyllaries 3- or 4-seriate, margin narrowly scarious, hyaline, entire, apex acute to obtuse, purple tinged, outer oblanceolate, ca. 1 mm, mid oblanceolate or narrowly elliptic, ca. 2 mm, inner linear-lanceolate. Ray florets 3- or 4-seriate, purplish, lamina linear, 1.5–2.5 × ca. 0.5 mm, enrolled by anthesis; disk florets 1.2–1.5 mm, tube 0.3–0.5 mm, limb shortly funnelform, 0.5–1 mm, 4- or 5-lobed, lobes deltate to triangular. Achenes asymmetrically oblanceolate, flattened, 2.5–3.5 mm, apex and beak glandular. Fl. and fr. Sep.

Forest margins, grasslands on slopes; 1700–1800 m. Fujian, Guangdong, Guangxi, Taiwan [India, Indonesia, Vietnam; Australia].

131. *CALOTIS* R. Brown, Bot. Reg. 6: t. 504. 1820.

刺冠菊属 ci guan ju shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Herbs, annual or perennial, or rarely subshrubs. Leaves alternate, entire or ± dissected. Capitula small, radiate or disciform, solitary or in open corymbiform synflorescences, pedunculate or sessile. Involucre hemispheric or broadly campanulate; phyllaries 3-seriate, unequal or subequal, margins scarious. Receptacle convex, not alveolate, naked. Ray florets female, 1- to many seriate, white, pink, violet, or purple; disk florets usually functionally male, limb funnelform, 5-lobed; anthers obtuse, entire; style branches linear, appendages short, obtuse. Achenes of ray florets obovoid to oblong, sometimes compressed, glabrous or strigillose, often winged. Pappus of (1 or)2 to many awns, spreading, spiniform, shortly barbellate, elongating after flowering, sometimes with 2 to many scales, rarely of barbellate bristles or absent.

About 28–30 species: mainly in Australia, few species in SE Asia; one species (endemic) in China.

1. *Calotis caespitosa* C. C. Chang, Sunyatsenia 3: 280. 1937.

刺冠菊 ci guan ju

Herbs, annual, 10–15 cm tall; taproot ± woody. Stems erect or ascending, ramified; branches slender, glabrous. Leaves cauline, sessile, blade linear-oblanceolate, 5–25 × 0.5–1.5 mm, gradually reduced distally, surfaces glabrous, base cuneate, margin entire, apex obtuse to acute, tip knobby. Capitula terminal, solitary. Involucre hemispheric, 1–1.5 mm; phyllaries 3-seriate, subequal, linear-lanceolate, 1–1.5 mm, surfaces glabrous, eglan-

dular, midvein prominent, translucent, margin sparsely ciliate. Ray florets 20–38, 1-seriate, lamina white, 0.9–1.5 × 0.3–0.4 mm, glabrous, eglandular; disk florets yellow, 1.3–1.4 mm, limb 0.8–0.9 mm, lobes erect, triangular, 0.3–0.5 mm, glabrous, eglandular. Achenes (ray) obovoid, ± trigonous, 0.8–1 mm, distally strigillose, ribs 3, 2 marginal slightly winged. Pappus of caducous, spiniform, barbellate bristles. Fl. and fr. Sep–Nov.

• Dry sandy and grassy areas by sea beaches; near sea level. Hainan.

132. *CALLISTEPHUS* Cassini in F. Cuvier, Dict. Sci. Nat. 37: 491. 1825, nom. cons.

翠菊属 cui ju shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Callistemma Cassini.

Herbs, annual or biennial. Leaves alternate, cauline, margin serrate or lobed. Capitula large, radiate, solitary, terminal on stem and at branch ends. Involucre hemispheric; phyllaries 2- or 3-seriate, imbricate, outer series large, leaflike, inner shorter, scarious. Receptacles flat or subconvex, alveolate, short paleae sometimes present. Ray florets 1- or 2-seriate, lamina usually red-purple, entire or shallowly 2-toothed at apex; disk florets bisexual, numerous, yellow, limb campanulate, shallowly 5-lobed; anther base obtuse, entire; style branches flattened, appendages triangular-lanceolate. Achenes oblanceoloid, slightly compressed, strigillose, sparsely, minutely stipitate glandular, 2-ribbed, 1 vein per side. Pappus 3-seriate, outer of persistent, short scales, inner 2 of deciduous, long, barbellate bristles.

One species: China, Japan, Korea, also widely cultivated.

1. *Callistephus chinensis* (Linnaeus) Nees, Gen. Sp. Aster. 222. 1832.

翠菊 cui ju

Aster chinensis Linnaeus, Sp. Pl. 2: 877. 1753; *Callistemma chinense* (Linnaeus) Skeels; *C. hortense* Cassini; *Diplopappus chinensis* (Linnaeus) Lessing.

Herbs, 20–100 cm tall. Stems erect, single, simple or sparingly branched, branches ascending, sometimes reddish, sparsely to moderately villous, sometimes sparsely to moderately minutely stipitate glandular. Leaves: lower withered by anthesis or persistent, gradually reduced distally; lower petiolate (to 1.2 cm), blade spatulate, ca. 0.9 cm; mid narrowly winged petiolate (2–4 cm, margin villosulous), blade ovate to lanceolate or oblanceolate, 2.5–6.5 × 2–4 cm, strigillose, abaxially sparsely pilosulous, midvein sparsely villosulous, adaxially glabrous, eglandular, base cuneate or attenuate-rounded, margin irregularly, coarsely serrate, teeth mucronulate, sometimes entire (distalmost), apex acuminate, mucronulate. Involucre 10–

15+ mm; phyllaries subequal, oblanceolate, apex obtuse, outer series 10–30 × 2–6 mm, glabrous, midvein ciliate proximally, margin white ciliate, apex mucronulate, inner series 10–30 × 2–6 mm, glabrous, eglandular, scarious, multiveined, veins translucent, proximally prominent, margin hyaline, erose, purple-tinged, apex erose. Ray florets 16–40+, lamina red, pink, blue, purple, violet, lilac, or white, 15–35 × 2–8 mm, tube sparsely strigillose, sparsely, minutely stipitate glandular apically; disk florets yellow, 4.5–5 mm, tube and limb base sparsely strigillose, limb 3.6–4 mm, lobes spreading, narrowly triangular, 1.2–1.3 mm, sparsely minutely stipitate glandular. Achenes mottled purple, grayish with age, 3–3.5 mm. Pappus: outer scales, reddish, ca. 0.1 mm, inner bristles white, ca. 4 mm, acute, innermost bristles 4.5–4.8 mm, weakly clavate. Fl. and fr. May–Oct.

Grasslands on slopes, stream banks, shady places or open forests, roadsides; 300–2700 m. Gansu, Hebei, Heilongjiang, Henan, Jiangsu, Jilin, Liaoning, Nei Mongol, Shandong, Shanxi, Sichuan, Xinjiang, Yunnan [Japan, Korea].

An ornamental plant, this species is widely cultivated worldwide.

133. **FORMANIA** W. W. Smith & J. Small, Trans. & Proc. Bot. Soc. Edinburgh 28: 91. 1922.

复芒菊属 fu mang ju shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Small shrubs. Leaves alternate, petiolate, leathery, pinnatifid. Capitula radiate, terminal, in corymbiform synflorescences, pedunculate. Involucre cylindrical; phyllaries 4-seriate, unequal, oblong or lanceolate-oblong, scarious, green distally. Receptacles flat, fimbriate. Ray florets female, 1-seriate, lamina pale yellow; disk florets bisexual, yellow, limb funnelform, 5-lobed; anther base sagittate with short, acute auricles at base, apical appendage long acute; style branch tip lanceolate. Achenes obovoid, strigillose, sparsely stipitate glandular, 3-ribbed. Pappus 3-seriate, outermost of 6 broad scales 1.5–2 mm, inner of 0 (disk) or 1 (ray) series of ± flattened, barbellate bristles ca. 3 mm, innermost of 3–5 strongly clavate bristles 3.8–4.2 mm (equaling base of disk corolla lobes).

• One species: China.

1. *Formania mekongensis* W. W. Smith & J. Small, Trans. & Proc. Bot. Soc. Edinburgh 28: 92. 1922.

复芒菊 fu mang ju

Shrubs, 30–100 cm tall. Branchlets gray-brown, villosulous, minutely stipitate glandular when young. Leaves narrowly winged petiolate (to 0.5–0.8 cm), blade ovate to obovate, 3–5-lobed, 1.2–2 × 0.5–2 cm, surfaces glabrous, minutely stipitate glandular in pits, viscid, base attenuate, margin irregularly serrate, teeth spinulose, remotely scabridulous. Capitula 2–12, ca. 7 mm; peduncle 1–10 mm, glabrous, densely stipitate glandu-

lar; bracts sometimes present. Involucre 5–6 mm; phyllaries: base hardened, surfaces glabrous, stipitate glandular, resinous, outer lanceolate-oblong, 1.5–2 × ca. 1 mm, distally leaflike, margin narrowly scarious, sparsely ciliate, apex acute, inner oblong, 3–5.5 × 1.2–1.5 mm, margin broadly scarious, hyaline, white ciliate, apex obtuse, tip reddish. Ray florets ca. 10, lamina 2.5–3 × ca. 0.7 mm; disk florets ca. 8, 4–4.2 mm, limb ca. 3 mm, lobes spreading, triangular, ca. 0.8 mm. Achenes (immature) ca. 2 mm.

• Dry rocky slopes, rock walls; ca. 3000 m. W Sichuan (Batang), NW Yunnan.

134. **HETEROPLEXIS** C. C. Chang, Sunyatsenia 3: 266. 1937.

异裂菊属 yi lie ju shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Herbs, perennial, climbing or erect. Leaves alternate, cauline, shortly petiolate, margin entire or serrulate, pinnately veined. Capitula disciform, solitary or 2–4-fascicled at ends of branches, shortly pedunculate or sessile. Involucre cylindrical or cylindrical-campanulate; phyllaries numerous, 5- or 6-seriate, imbricate, ovate to ovate-oblong. Receptacles flat, alveolate, glabrous. Florets fertile. Ray florets female, 1-seriate, 4–7, lamina fine, apex 3-toothed; disk florets bisexual, 4–6, yellow, limb narrowly campanulate, lobes 5, unequal, outer 2 longer; stamens 5, exerted; anther base obtuse; style branch tip triangular. Achenes oblong or oblong-obovoid, sparsely strigillose; achenes of ray florets slightly compressed, angled adaxially, slightly convex abaxially, 1-ribbed on both sides; achenes of disk florets 2-ribbed on both sides. Pappus 1-seriate, of yellowish white, subequal, barbellate bristles.

• Three species: China.

One of us (Brouillet) has not seen specimens of this genus.

- 1a. Stems and branches densely gray puberulent, eglandular; leaves lanceolate to oblong-lanceolate, adaxially scabrous, abaxially densely white villous 3. *H. sericophylla*
 1b. Stems and branches gray hairy and glandular; leaves lanceolate-elliptic or oblong-lanceolate or lanceolate, both surfaces scabrous, abaxially glandular.
 2a. Involucre 5–5.6 × 3–4 mm; ray florets ca. 7, disk florets ca. 3; abaxial leaf surface glandular 1. *H. vernonioides*
 2b. Involucre ca. 4 × 2–3 mm; ray and disk florets 4; both leaf surfaces densely glandular 2. *H. microcephala*

1. *Heteroplexis vernonioides* C. C. Chang, Sunyatsenia 3: 267. 1937.

异裂菊 yi lie ju

Herbs climbing. Stems olive, corymbosely branched above, branches spreading, lower to 16 cm, striate, gray puberulent, glandular. Leaves: petiole 3–5 mm, blade abaxially pale green, adaxially green, lanceolate-elliptic, 8–9 × 2–2.5 cm, surfaces scabrous, abaxially glandular, distal half hard papery, lateral veins distinct, connected toward margin, base cuneate, margin all or above middle sparsely serrulate, densely scabrous, apex acute; upper blade oblong, elliptic-oblong, or narrowly ovate, ca. 2 × 0.9 cm, base cuneate, margin entire, apex acute or slightly obtuse; uppermost subsessile, small. Capitula solitary or 2- or 3-fascicled; peduncles absent or to 6 mm; bracts ovate-lanceolate. Involucre 5–5.6 × 3–4 mm; phyllaries 5- or 6-seriate, outer ovate, obtuse, abaxial surface and margin sparsely pubescent, often glandular. Ray florets ca. 7; disk florets ca. 3, yellow, 4.5–5 mm, lobes incurved, outer 2 ca. 1.6 mm, inner ca. 1 mm. Achenes ca. 1.5 mm. Pappus ca. 4.3 mm. Fl. Oct.

- Limestone rocky sides in valleys. Guangxi (Jinxian).

2. *Heteroplexis microcephala* Y. L. Chen, Guihaia 5: 339. 1985.

小花异裂菊 xiao hua yi lie ju

Herbs, perennial, erect, 50–70 cm tall. Stems with short or long branches above, striate, densely gray appressed hispidulous, glandular. Leaves: petiole 2–3 mm, blade abaxially pale, adaxially dark green, thickly papery; mid cauline oblong-lanceolate or lanceolate, 5–10 × 1.5–2 cm, surfaces sparsely scabrous, densely glandular, lateral veins 5- or 6-paired, distinct abaxially, base cuneate, margin entire or rarely denticulate, apex acuminate, mucronulate; upper and on branches subsessile, small, ovate-lanceolate. Capitula solitary in leaf axils or 2–4

in racemose-corymbiform synflorescences; peduncles 4–8 mm, densely shortly appressed hairy; bracts 1 or 2(or 3), linear-lanceolate. Involucre cylindric or subcylindric, ca. 4 × 2–3 mm; phyllaries 4- or 5-seriate, scarious, outer ovate, 1–1.5 mm, slightly acute, inner oblong, 4–5 mm, obtuse, inconspicuously 1-veined, apex and margin puberulent. Ray florets 4, tube 2–2.5 mm, lamina fine, ca. 0.5 mm wide, shorter than style; disk florets 4, tube ca. 1.5 mm, glabrous, lobes linear-lanceolate, outer ca. 2 mm, inner 1–1.5 mm, apex puberulent. Achenes oblong, ca. 1 mm. Pappus ca. 4 mm. Fl. Jul–Dec.

- Limestone rocky slopes; ca. 300 m. Guangxi (Yangzhou).

3. *Heteroplexis sericophylla* Y. L. Chen, Fl. Reipubl. Popularis Sin. 74: 361. 1985.

绢叶异裂菊 juan ye yi lie ju

Herbs, erect. Stems gray-brown, simple or branched, striate, densely gray puberulent, eglandular. Leaves: petiole 2–3 mm, blade hard papery; mid cauline lanceolate to oblong-lanceolate, 11–14 × 2–2.5 cm, abaxially gray-green, densely white villous, adaxially green, strigose, lateral veins indistinct, base cuneate, margin entire or above middle ± sparsely serrulate, teeth mucronate, apex acuminate or long acuminate; upper subsessile, narrowly lanceolate, 6.5–10 × 1–1.8 cm, margin entire, apex acuminate; uppermost reduced, linear-lanceolate. Capitula solitary or 2- or 3-fascicled in leaf axils of short branches and in corymbiform synflorescences, shortly pedunculate or sessile; bracts linear-lanceolate. Involucre cylindric-campanulate, 3–4 × ca. 3 mm; phyllaries 5-seriate, obtuse, outer ovate, 1.5–1.8 mm, inner oblong, ca. 4 mm, white villous, margin ciliate, 1-veined. Ray florets 6 or 7, 1-seriate, lamina fine, ca. 0.5 mm; disk florets 5 or 6, 3.7–4 mm, lobes lanceolate, apex white puberulent. Achenes oblong, ca. 1.3 mm, 2-ribbed on both sides. Pappus ca. 3.5 mm. Fl. Sep–Oct.

- Open forests on hills; ca. 400 m. Guangxi.

135. PSYCHROGETON Boissier, Fl. Orient. 3: 156. 1875.

寒蓬属 han peng shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Herbs, perennial, annual, or biennial; rhizome usually thickly woody, sometimes thin and ± woody, stem base sheathed in marcescent leaf remains, rarely biennial or annual. Stems usually short, rarely tall, ± scapiform, sometimes branched, leafy. Leaves alternate, basal petiolate or subpetiolate, blade green or grayish, lanceolate, oblanceolate, obovate, or spatulate, white tomentose to lanate, often sessile or short-stipitate glandular, margin entire, coarsely serrate, or sometimes subpinnatifid, cauline leaves few, reduced, entire or dentate. Capitula solitary or few, terminal, rarely in racemiform or corymbiform synflorescences. Involucre campanulate; phyllaries 2- or 3-seriate, imbricate or ± equal, membranous, outer green distally, inner green along midvein, margin scarious. Ray florets fertile, many, white, yellow, or reddish, reduced to tube and elaminate or laminate, exceeding or shorter than style, entire or 2- or 3-lobed; disk florets functionally male, few or numerous, concolorous with ray florets, 5-lobed; anther base obtuse, appendages lanceolate; ray floret style linear, disk floret style lanceolate, branches fused. Achenes of ray florets obovoid or

narrowly oblong to oblanceoloid, compressed, ± strigose, marginally 2-ribbed, of disk florets linear, sterile. Pappus 1- or 2-seriate, outer of few short, thin bristles, inner of long, unequal, barbellate bristles, acute or slightly clavate, equaling disk florets.

About 20 species: C and SW Asia; two species in China.

- 1a. Perennial herbs; stems 3–19 cm tall, simple, sparsely to densely lanate; capitula solitary, 1.5–2.4 cm in diam.; female florets laminate, golden yellow 1. *P. poncinsii*
 1b. Annual or biennial herbs; stems to 55 cm tall, branched, densely villous-pilose; capitula numerous, 0.7–1 cm in diam., in corymbose-paniculiform synflorescences; female florets filiform, white 2. *P. nigromontanus*

1. *Psychogeton poncinsii* (Franchet) Y. Ling & Y. L. Chen, Acta Phytotax. Sin. 11: 427. 1973.

藏寒蓬 zang han peng

Aster poncinsii Franchet, Bull. Mus. Hist. Nat. (Paris) 2: 345. 1896; *Erigeron poncinsii* (Franchet) Botschantzev; *Psychogeton andryaloides* (Candolle) Novopokrovsky ex Krascheninnikov var. *poncinsii* (Franchet) Grierson.

Herbs, perennial, 3–19 cm tall; rhizome thickly woody, branched. Stems scapiform, erect or ascending, simple, densely to sparsely lanate, partly glabrescent, sessile or short-stipitate glandular. Leaves: surfaces sparsely or densely lanate to tomentose, short-stipitate or sessile glandular; basal petiolate, blade oblanceolate to obovate or spatulate, 1–6 × 0.3–1.5 cm, margin remotely coarsely serrate or slightly repand, rarely entire, apex acute to obtuse; cauline 3–5, sessile or shortly petiolate, blade oblanceolate to linear. Capitula 1.5–2.4 cm in diam., solitary. Phyllaries 2- or 3-seriate, linear-lanceolate to linear-oblanceolate, outer partly green or gray-green, abaxially densely to sparsely white tomentose or lanate, apex acute to acuminate, inner 6.5–8 × ca. 1 mm. Ray florets 4.4–5.4 mm, longer than pappus, tube 2.9–3.6 mm, sparsely hairy, lamina golden yellow, becoming reddish or purplish after anthesis, narrowly obovate to oblanceolate, 1.3–3.5 × 0.7–1.2 mm, apex 3-denticulate; disk florets narrowly funnellform, appressed hairy, tube 1.7–1.8 mm, limb 3–3.5 mm, lobes 0.3–0.5 mm. Achenes (ray florets) brown, ribs straw-colored, narrowly oblong to oblanceoloid, 3.6–3.8 mm, ± densely strigose. Pappus 2-seriate, yellowish white, 2.6–4.6 mm.

Valleys; 3000–4600 m. Xinjiang, W Xizang [Afghanistan, India, Pakistan, Russia, Tajikistan; SW Asia (Iran)].

2. *Psychogeton nigromontanus* (Boissier & Buhse) Grierson, Notes Roy. Bot. Gard. Edinburgh 27: 144. 1967.

黑山寒蓬 hei shan han peng

Erigeron nigromontanus Boissier & Buhse, Nouv. Mém. Soc. Imp. Naturalistes Moscou 12: 114. 1860; *Brachyactis iliensis* Ruprecht; *Conyza iliensis* Trautvetter; *E. kazakhstanicus* Sergievskaya.

Herbs, annual or biennial, 1–55 cm tall or more; taproots vertical or ascending. Stems erect, branched above, densely leafy, grayish, densely villous-pilose, short-stipitate glandular. Leaves densely villous-pilose, short-stipitate glandular, basal withered at anthesis, petiolate, petiole base clasping, blade spatulate to oblong; lower cauline long petiolate, blade obovate to oblanceolate, ca. 8 × 2.5 cm, base attenuate, margin entire or remotely serrulate, apex acute; mid cauline blade oblanceolate to lanceolate, ca. 3 × 0.75 cm, margin entire or remotely 1- or 2-serrulate per side; upper on branches reduced. Capitula 0.7–1 cm wide, usually numerous, in corymbose-paniculiform synflorescences; peduncles thin, 0.5–1 cm. Involucre campanulate; phyllaries subequal, 2- or 3-seriate, green along midvein, lanceolate to linear-lanceolate, ca. 4 × 0.5 mm, abaxially densely villous-pilose, short-stipitate glandular, margin scarios, apex acuminate. Female florets numerous, filiform, 1.75–2 mm, hairy, lamina ± obliquely cut; disk florets 6–12, ca. 3.5 mm, funnellform, lobes lanceolate, apex hairy. Achenes tan, oblanceoloid, ca. 2 × 0.5 mm, strigose. Pappus 1-seriate, sometimes also short outer series present, very short, of 20–24 barbellate bristles, 3–4.5 mm. Fl. Jul–Sep.

Subalpine meadows; 1200–1500 m. N Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan; SW Asia (Caucasus, Iran, Iraq, Turkey)].

136. *NEOBRACHYACTIS* Brouillet, gen. nov.

短星菊属 duan xing ju shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Type: *Neobrachyactis roylei* (Candolle) Brouillet.

Herbae annuae vel perennes, stipitato-glandulosae; caules erecti vel ascendentes, simplices vel ramosi. Folia alterna, basalia et caulina, ad marginem serrata vel interdum integra. Capitula disciformia vel radiata, in synflorescentias racemo-paniculiformes disposita, raro ad foliorum superiorum axillas solitaria vel aggregata; involucrem hemisphaericum vel campanulatum; phyllaria 2-ad 4-seriata, subaequalia, lineari-lanceolata vel lineari-oblonga, membranacea vel exteriora foliacea, ad marginem scariosa, glandulosa; receptaculum planum, infirme alveolatum, nudum. Flosculi omnes fertiles; flosculi radii feminei, numerosi, biseriatii, tubulosi vel breviter laminati, albi vel caerulescentes; flosculi disci bisexuales, minus numerosi, lutei vel incolorati, limbo breviter infundibuliformi, superne 5-lobo, lobis ovatis, antheris ad basin obtusatae, appendice apicali lanceolata, styli ramorum appendicibus triangulo-lanceolata. Achaenia oblanceolata, compressa, strigosa, ad marginem 2-costata; pappus biseriatius, setis exterioribus paucibus, brevibus, gracilibus, interioribus numerosis, luteis usque cinnamomeis, barbellatis, ad apicem acutis interdum leniter clavatis.

Herbs, annual or perennial. Stems erect to ascending or sometimes procumbent, often branching from base, stipitate glandular. Leaves basal and cauline, blade obovate to oblong-obovate or oblong-lanceolate, margin serrate or sometimes entire, \pm densely glandular. Capitula radiate or disciform, in racemose-paniculiform synflorescences, rarely solitary or crowded in upper leaf axils. Involucre hemispheric or campanulate; phyllaries 2–4-seriate, subequal, membranous, outer leaflike, linear-oblong or linear-lanceolate, stipitate glandular, margins villous-ciliate, outer green except white margin, margin of inner narrowly scarious, erose, \pm ciliate. Receptacles flat, weakly alveolate, glabrous. Florets fertile. Ray florets numerous, 2-seriate, white or bluish, reduced to tube or shortly laminate, tube shorter than style, apex ciliate, lamina, if present, filiform, exceeding style; disk florets bisexual, less numerous, yellow or uncolored, shorter than to \pm equaling pappus, limb shortly funnellform, 5-lobed, lobes ovate, short; anther base obtuse, apical appendage lanceolate; style branch tips triangular-lanceolate. Achenes oblanceolate, flattened, long strigose, marginally 2-ribbed. Pappus 2-seriate, outer of few short, thin bristles, inner of numerous yellowish to cinnamon, barbellate bristles, apex acute or sometimes slightly clavate.

Three species: C, N, and S Asia; three species in China.

The genus *Neobrachyactis* is distinct from *Brachyactis* s.s., the type of which, *B. ciliata* (Ledebour) Ledebour (*Erigeron ciliatus* Ledebour), belongs to the North American genus *Symphotrichum*. The notably glandular herbage and the compressed, 2-ribbed achenes clearly distinguish the species of *Neobrachyactis* from *S. ciliatum*.

- 1a. Perennial herbs; upper leaves sessile, subclasping at base, shortly decurrent on stems; capitula solitary or 3 or 4 crowded at ends of stems and branches; phyllaries longer than disk florets; ray florets longer than disk florets, lamina bluish, exceeding style 1. *N. anomala*
- 1b. Annual herbs; upper leaves sessile or shortly petiolate, not decurrent; capitula \pm numerous, in racemiform or racemose-paniculiform synflorescences; phyllaries shorter than disk florets; ray florets shorter than disk florets, lamina white, shorter than style, or tube apex obliquely lobed, elaminate.
- 2a. Stems moderately to densely stipitate glandular and sparsely villous; capitula 1–1.2 cm in diam., numerous, in racemiform or racemose-paniculiform synflorescences; phyllaries green, ca. 1/3 shorter than disk florets, outer shorter than inner, \pm villous and densely short-stipitate glandular 2. *N. roylei*
- 2b. Stems densely brown glandular; capitula 1.5–2 cm in diam., few, in racemiform synflorescences; phyllaries dark brown, slightly shorter than disk florets, outer often longer than inner, densely brown glandular 3. *N. pubescens*

1. *Neobrachyactis anomala* (Candolle) Brouillet, comb. nov.

香短星菊 xiang duan xing ju

Basionym: *Erigeron anomalus* Candolle, Prodr. 5: 293. 1836 [“*anomalum*”]; *Aster menthedorus* (Benth) Govaerts; *Brachyactis anomala* (Candolle) Kitamura; *B. indica* C. B. Clarke; *B. menthadora* Benth.

Herbs, perennial, 60–95 cm tall, with sweet menthol odor. Stems erect, rigid, tinged pinkish violet, shortly branched, long-stipitate glandular. Leaves crowded, surfaces densely stipitate glandular, veins sparsely villous; basal and lower cauline long petiolate, basal fallen at anthesis, obovate or oblong-lanceolate, 1.5–5 \times 0.5–1.5 cm, margin serrate, apex acute or arcuate; upper sessile, gradually reduced, base subclasping, decurrent, \pm rounded. Capitula radiate, solitary or 3 or 4 crowded at ends of stems or branches, 1–1.5 cm in diam.; peduncles 5–10 mm. Involucre hemispheric-campanulate; phyllaries 2- or 3-seriate, membranous, outer often 1 or 2, leaflike, green along midvein, inner linear or linear-lanceolate, 6–7 mm, sparsely villous, sparsely stipitate glandular, margin narrowly scarious, apex acute or acuminate, pinkish violet, equaling or longer than disk florets. Florets fertile. Ray florets numerous, \pm 2-seriate, 5–6 mm, lamina bluish, longer than style, narrow, apex 3-toothed; disk florets ca. 5 mm, tube and limb base often hairy, limb funnellform, lobes lanceolate, glabrous. Achenes brown, oblanceolate, compressed, 3–3.5 mm, sparsely strigose. Pappus pinkish to brownish, 2-seriate, outer bristles short, inner unequal, longer than achene, barbellate. Fl. and fr. May–Sep.

Alpine thicket margins, grasslands on slopes; 3300–4000 m. S Xizang (Nyalam to Yadong) [Bhutan, India, Nepal].

2. *Neobrachyactis roylei* (Candolle) Brouillet, comb. nov.

新疆短星菊 xi jiang duan xing ju

Basionym: *Conyza roylei* Candolle, Prodr. 5: 381. 1836; *Brachyactis roylei* (Candolle) Wendelbo; *B. umbrosa* (Karelin & Kirilov) Benth; *C. umbrosa* Karelin & Kirilov; *Erigeron umbrosus* (Karelin & Kirilov) Boissier.

Herbs, annual, 3–35 cm tall. Stems erect or ascending, sometimes procumbent, green or tinged pinkish, branched from base or upper part, densely leafy, densely stipitate glandular, densely hirsute-villous. Leaves: surfaces \pm densely stipitate glandular, hirsute-villous; basal withered and fallen at anthesis, long petiolate, blade obovate or obovate-oblong, 0.5–4 \times 0.3–1.5 cm, base cuneate to attenuate, margin coarsely serrate, apex obtuse or arched; cauline shortly petiolate, blade obovate, base attenuate to cuneate; upper reduced, margin coarsely serrate or subentire. Capitula numerous, in racemiform or racemose-paniculiform synflorescences, 1–1.2 cm in diam. Involucre campanulate; phyllaries 3- or 4-seriate, membranous, linear-lanceolate, shorter than or equaling disk florets, abaxially densely stipitate glandular, sparsely villous, margin narrowly scarious, outer shorter than inner, 5–7 \times 0.6–1 mm. Ray florets numerous, reduced to tube, white, 2.2–2.6 mm, sparsely hairy above, apex oblique, ciliate, or sometimes laminate; disk florets yellow, 3.5–3.6 mm, tube 2.4–2.8 mm, limb shortly funnellform, upper tube and limb hairy, lobes ovate, 0.25–0.4 mm. Achenes lanceolate, compressed, 1.8–2.2 mm, strigose. Pappus yellowish to cinnamon, 2-seriate, 3.6–3.9 mm, inner \pm equaling disk corolla. Fl. and fr. Jul–Sep.

Among rocks and shrubs; 1800–4300 m. N Xinjiang, N and W Xizang [Afghanistan, India, Kazakhstan, Nepal, Pakistan, Russia, Uzbekistan; SW Asia (Iran)].

3. *Neobrachyactis pubescens* (Candolle) Brouillet, **comb. nov.**

腺毛短星菊 xian mao duan xing ju

Basionym: *Conyza pubescens* Candolle, Prodr. 5: 381. 1836; *Brachyactis pubescens* (Candolle) Aitchison & C. B. Clarke; *B. robusta* Benth.

Herbs, annual, 4–20 cm tall. Stems erect or ascending, branched, densely leafy, densely brownish yellow stipitate glandular. Leaves: surfaces densely glandular, basal withered and fallen at anthesis, shortly petiolate, blade obovate or oblong-obovate, 1–4 × 0.5–1.5 cm, base cuneate, margin sparsely

roughly serrate, apex obtuse or arched; upper subsessile, reduced, margin almost entire or sparsely serrate. Capitula few, in racemiform synflorescences, 1.5–2 cm in diam.; peduncles thick, 1–1.8 cm. Involucre hemispheric; phyllaries 2- or 3-seriate, dark brownish, oblong or oblong-lanceolate, slightly shorter than disk florets, abaxially densely brown glandular, apex acute or acuminate, outer often longer than inner, 5–7 × 1–1.2 mm. Ray florets numerous, white, finely tubular, together with style 4–4.5 mm, apex obliquely lobed or finely laminate, upper tube puberulent; disk florets uncolored, 4–4.5 mm, lobes short, upper tube and lobe apex puberulent. Achenes oblong, ca. 2 mm, compressed, strigillose. Pappus dirty white, 2-seriate, outer bristles short, inner ± equaling disk corolla. Fl. and fr. Jul–Oct.

Mountain slopes; ca. 5200 m. W Xizang [Afghanistan, India, Nepal, Pakistan].

137. SHEARERIA S. Moore, J. Bot. 13: 227. 1875.

虾须草属 xia xu cao shu

Chen Yousheng (陈又生); Luc Brouillet

Herbs, biennial (or winter annual). Stems erect to ascending. Leaves basal 1st year, cauline 2nd year, alternate, margin entire. Capitula radiate, small, terminal or axillary. Involucre campanulate; phyllaries 2-seriate, unequal, ovate, outer 2 oblong, smaller. Receptacles flat, epaleate. Ray florets female, white or pinkish, lamina elliptic-oblong, entire or 3-toothed; disk florets functionally male (ovary sterile), yellow, limb campanulate, (4 or)5(or 6)-lobed; anther base obtuse; style undivided, lanceolate. Achenes oblanceoloid to obovoid, 3-ribbed. Pappus absent.

- One species: China.

1. *Sheareria nana* S. Moore, J. Bot. 13: 227. 1875.

虾须草 xia xu cao

Sheareria leshanensis Z. Y. Zhu; *S. polii* Franchet.

Herbs, biennial (or winter annual), 10–100 cm tall, taprooted. Stems ramified. Leaves shortly petiolate (lower) or sessile, blade lanceolate to oblanceolate, 4–50 × 1.3–6 mm, surfaces glabrous, eglandular or sometimes sparsely minutely stipitate glandular on abaxial base of petiole, margin sparsely ciliate, apex acute to obtuse, mucronulate; upper smaller, bract-like. Capitula 2–2.2 mm; peduncles 3–5 mm. Phyllaries 4 or 5, green, surfaces glabrous or sparsely strigillose, eglandular, mar-

gin scariosus, ciliate, apex obtuse. Ray florets 3 or 4, tube ca. 1 mm, minutely stipitate glandular, lamina white or pinkish tipped, ca. 2 × 1–1.2 mm, becoming coiled; disk florets functionally male, 2 or 3, yellow, 1.5–2 mm, tube 0.5–0.6 mm, limb ca. 1.2 mm, lobes spreading to recurved, triangular, ca. 0.4 mm, tube, limb, and lobe base glabrous, minutely stipitate glandular. Achenes brown, 3.5–4 mm, 3-ribbed, ribs narrow, minutely stipitate glandular. Fl. Apr–Nov, fr. Oct–Nov.

- Fields, moist grasslands, sandy stream banks; sea level to 700 m. Anhui, Guangdong, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Yunnan, Zhejiang.

Fruit of ray florets develop while disk florets are opening.

138. RHINACTINIDIA Novopokrovsky, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 7: 114, 134. 1948.

岩菀属 yan wan shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Rhinactina Lessing, Linnaea 6: 119. 1831, not Willdenow (1807); *Borkonstia* Ignatov, nom. illeg. superfl.; *Krylovia* Schischkin, nom. illeg. superfl.

Herbs, perennial, caespitose; rhizomes thick, woody, caudices many branched, clad with marcescent petiole bases. Stems erect, branched or simple, densely curved-strigose. Leaves: basal numerous, petiolate, blade obovate, oblanceolate, or oblong-obovate, 3-veined, margin entire or sparsely serrate, base attenuate, cauline shortly petiolate or sessile, obovate-oblong or oblanceolate, rarely linear, densely curved-strigose, sessile glandular. Capitula radiate, solitary at ends of branches or several in racemiform synflorescences. Involucre broadly campanulate or subhemispheric; phyllaries 3- or 4-seriate, imbricate, green distally, becoming yellow-brown, oblong or lanceolate, sparsely strigose, subleathery, back rounded, margin scariosus, sometimes ciliate, apex obtuse or ± acute, outer shorter. Receptacles slightly convex, irregularly, shallowly alveolate, naked. Florets numerous, fertile. Ray florets pale purple, 2 × longer than disk florets; disk florets bisexual, numerous, yellow or purplish, ± zygomorphic, upper tube and limb base hairy, limb

campanulate, lobes 5, lanceolate, 1 inner longer; anther appendage triangular to lanceolate, base acuminate; style appendages triangular. Achenes brown, oblanceolate, 2-ribbed, strigose, 1-ringed at base. Pappus 3-seriate, of white or dirty white, barbellate bristles, outer short, inner acute, innermost tip \pm clavate, nearly equaling disk corollas.

Four species: C and N Asia; two species in China.

- 1a. Basal leaves spatulate to obovate or oblanceolate, 2.5–4.5 cm, apex obtuse or rounded; capitula several at ends of stems and branches; plants to 25 cm tall 1. *R. limoniifolia*
 1b. Basal leaves oblong-obovate, less than ca. 2.5 cm, apex acute or somewhat acute; capitula solitary at ends of stems; plants less than ca. 10 cm tall 2. *R. eremophila*

1. *Rhinactinidia limoniifolia* (Lessing) Novopokrovsky ex Botschantzev, *Novosti Sist. Vyssh. Rast.* 23: 179. 1986.

岩菀 yan wan

Rhinactina limoniifolia Lessing, *Linnaea* 6: 119. 1831; *Aster limoniifolius* (Lessing) B. Fedtschenko (1915), not Greene (1900); *A. obovatus* C. A. Meyer (1833), not (Nuttall) Elliott (1823); *Borkonstia limoniifolia* (Lessing) Ignatov; *Krylovia limoniifolia* (Lessing) Schischkin.

Herbs, perennial, subscapiform. Stems several, ascending, simple, 3–20(–25) cm, \pm densely strigose. Leaves: basal many, rosulate, petiole equaling blade or shorter, base expanded, blade spatulate to obovate or oblanceolate, 2.5–4.5 \times 1–2 cm, surfaces strigose, usually 1-veined, rarely inconspicuously 3-veined, base attenuate, clasping, margin entire or sparsely serrulate, apex acute or \pm obtuse, rarely rounded; cauline few, shortly petiolate or sessile, blade narrowly oblong or oblanceolate to lanceolate-linear, base cuneate, apex acute to obtuse. Capitula solitary at ends of stems or branches, 1.5–2 cm in diam. Involucre subhemispheric to broadly campanulate, 5–6(–7) \times 8–10 mm; phyllaries 3-seriate, \pm leathery, margin narrowly scarious, erose to fimbriate, sometimes ciliate, apex acuminate, sometimes acute, outer shorter, green, lanceolate, sparsely scabrous, mid and inner oblong, scabrous or glabrous in lower half. Ray florets lamina light violet, (10–)13–15 \times ca. 2 mm; disk florets yellow, 4.5–6 mm, lobes lanceolate. Achenes ca. 4 mm, densely strigose. Fl. and fr. Jun–Aug.

Rocky or grassy slopes; 1200–3500 m. NW and W Xizang [Kazakhstan, Mongolia, Russia (W Siberia), Uzbekistan].

2. *Rhinactinidia eremophila* (Bunge) Novopokrovsky ex Botschantzev, *Novosti Sist. Vyssh. Rast.* 23: 180. 1986.

沙生岩菀 sha sheng yan wan

Aster eremophilus Bunge, *Mém. Acad. Imp. Sci. St.-Petersbourg Divers Savans* 2: 599. 1835; *A. uniflorus* (Bunge ex Candolle) B. Fedtschenko (1915), not Moench (1794), nor Michaux (1803), nor (Hooker) Kuntze (1891), nor (Linnaeus) E. H. L. Krause (1905); *Borkonstia eremophila* (Bunge) Ignatov; *Krylovia eremophila* (Bunge) Schischkin; *Rhinactina uniflora* Bunge ex Candolle.

Herbs, perennial, scapiform. Stems several, simple, 3–8(–10) cm, \pm densely strigose. Leaves: basal many, rosulate, petiole equal to blade or shorter, base expanded, clasping, blade oblong-obovate to oblanceolate, 1.5–4 \times 0.3–0.8 cm, surfaces densely strigose, usually 1-veined, rarely inconspicuously 3-veined, base attenuate, margin entire or sparsely serrulate, apex acute or \pm obtuse, rarely rounded; cauline few, sessile, reduced, narrowly oblong or linear, base cuneate, apex obtuse. Capitula solitary at ends of stems, 1.5–2 cm in diam. Involucre subhemispheric, 5–6 \times ca. 10 mm; phyllaries 3-seriate, leathery, margin narrowly scarious, erose, sometimes ciliate, apex acuminate, outer shorter, lanceolate, \pm densely strigose, mid and inner oblong, strigose or almost glabrous in lower half. Ray florets lamina light violet, 13–15 \times ca. 2 mm; disk florets yellow, 4.5–5.5 mm, lobes lanceolate. Achenes ca. 4 mm, densely strigose. Fl. Jun–Jul.

Steppes and dry pebbly slopes; 1800–2700 m. C and N Xinjiang [Kazakhstan, Mongolia, Russia (Altai, W Siberia)].

139. *ASTER* Linnaeus, *Sp. Pl.* 2: 872. 1753.

紫菀属 zi wan shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet, John C. Semple

Herbs, perennial, rarely annual or biennial, subshrubs or shrubs, generally rhizomatous, sometimes somewhat woody. Stems erect, sometimes decumbent to ascending, or procumbent. Leaves alternate, rarely opposite, sessile or petiolate, obovate to elliptic-ovate, ovate, or lanceolate, margin entire, serrate, or coarsely dentate, sometimes pinnatifid. Capitula solitary or in corymbiform or sometimes paniculiform synflorescences, radiate, rarely discoid. Involucres hemispheric, campanulate, or obconic; phyllaries 2–5-seriate, imbricate or equal, linear-lanceolate, herbaceous or membranous, margin scarious (at least inner), apex sometimes purplish. Receptacles flat or convex to conic, alveolate, sometimes lacerate, epaleate. Ray florets female, fertile or rarely sterile, 1- or 2-seriate, rarely absent, white, pink, purple, or blue, apex inconspicuously 2- or 3-denticulate; disk florets numerous, bisexual, fertile, yellow or purple-brown, limb campanulate, 5-lobed, lobes equal or unequal (1 lobe deeper and corolla zygomorphic). Anther base obtuse; style branch tip lanceolate or triangular. Achenes oblong, obovoid, or oblanceoloid, compressed or subconvex, rarely 3- or 4-angled, margin 2(–6)-ribbed, glabrous or strigose, eglandular or glandular. Pappus 1–4-seriate, persistent or rarely caducous, sometimes absent, white, brownish, or reddish, outer series of short slender bristles or scales, inner series of numerous subequal, barbellate or barbellulate bristles, apex acute or sometimes innermost clavate, sometimes of free short bristles or scales or connate scales and inner bristles absent, sometimes ray pappus absent and disk present.

About 152 species: Asia, Europe, North America; 123 species (82 endemic) in China.

The circumscription of *Aster* adopted here corresponds to that used in recent Asian floras (Ito & Soejima in Iwatsuki et al., Fl. Japan 3b: 59–73. 1995; Soejima & C. I Peng, Fl. Taiwan, ed. 2, 4: 848–868. 1998), which excludes North American segregates such as *Doellingeria* Nees, s.s., *Eurybia*, and *Symphotrichum* (Nesom, Phytologia 77: 141–297. 1994; Semple & Chmielewski, Fl. N. Amer. 20: 43–46. 2006; Brouillet, Fl. N. Amer. 20: 365–382. 2006; Brouillet et al., Fl. N. Amer. 20: 465–539. 2006), while including genera such as the Asian members of *Doellingeria* (sensu Nesom, loc. cit.) (*A. sect. Teretiachaenium*), *Kalimeris* (*A. sect. Asteromoea*), *Heteropappus* (*A. sect. Pseudocalimeris*), and *Miyamayomena* and *Rhynchospermum* (both included within *A. sect. Aster*). Such delimitation is supported by recent molecular phylogenetic analyses of tribe Astereae, summarized in Brouillet et al. (in Funk et al., Syst. Evol. Biogeogr. Compositae, 589–629. 2009). Other genera that might probably be considered part of *Aster* are *Sheareria*, which Gao et al. (Taxon 58: 769–780. 2009) placed close to *Kalimeris* and *Heteropappus* but those were placed within the *Aster* complex as described here in a more recent analysis of Iranian Astereae involving more members of the genus (F. Jafari, pers. comm.), and *Rhinactinidia*, a possible sister of *A. sect. Pseudocalimeris* (F. Jafari, pers. comm.). This last relationship would be supported by the fact that these two groups share unequal disk corolla lobes, a rare feature in the tribe. Other genera may be involved here, but this is still unclear. The current concept excludes African *Aster* species, which belong to a distinct, African clade (Brouillet et al., loc. cit. 2009)

An alternate classification that would retain all segregate genera as distinct would recognize *Heteropappus*, *Kalimeris*, *Rhinactinidia* (though one could defend including them in *Heteropappus*), *Sheareria*, and *Aster* s.s. (still including *Miyamayomena* and *Rhynchospermum*) and would impose the creation of new genera for *A. sect. Teretiachaenium* and *A. sect. Ageratoides* (unless one prefers a strongly paraphyletic, not to say polyphyletic, *Aster*).

Nesom (loc. cit.) underlined the distinction of the shrubby species of *Aster* ser. *Albescentes* Y. Ling, noting their isolation among Old World asters. He concluded that the segregation of the series at generic rank would be justifiable. Two of us (Brouillet and Semple) agree with this hypothesis, but, currently, phylogenetic data are insufficient to place this group within the phylogeny of the tribe Astereae. Therefore, we treat it here as an incertae sedis group within *Aster* for the time being. One of us (Chen) considers that *A. ser. Albescentes* should be recognized as a section; however, the combination at that rank is not formally proposed here because not all the present authors agree.

Aster filipes J. Q. Fu (Bull. Bot. Res., Harbin 3(1): 118. 1983), described from Gansu, and *A. langaoensis* J. Q. Fu (loc. cit.), described from Shaanxi, could not be treated here because no material was seen by the present authors.

- 1a. Shrubs, many branched; leaves cauline, margins revolute or flat; phyllaries keeled 1. Incertae sedis group
- 1b. Herbs perennial, rarely annual or biennial, sometimes subshrubs (rarely becoming shrubs), simple or ± branched; leaves basal (withered or present at anthesis) and cauline (sometimes reduced), margins flat; phyllaries usually not keeled.
 - 2a. Ray florets 5–9, white; achenes obovoid, terete or slightly compressed 2. *A. sect. Teretiachaenium*
 - 2b. Ray florets 10–40, white, pink, blue, or purple; achenes obovoid, oblong, or oblanceoloid, compressed or flattened, sometimes 3- or 4-angled.
 - 3a. Leaves 3-veined basally or below middle, margins coarsely serrate to serrate, sometimes serrulate; capitula campanulate; pappus of numerous bristles, outer series of short bristles 3. *A. sect. Ageratoides*
 - 3b. Leaves usually 1-veined, margins entire, serrate, or dentate, sometimes pinnatifid or pinnatilobate; capitula hemispheric, campanulate, obconic, or cylindrical; pappus of few to many bristles, inner bristles sometimes absent, outer series of short bristles or scales, sometimes pappus absent.
 - 4a. Pappus 1-seriate, of few (outer) short bristles or scales, persistent or deciduous, sometimes absent; achenes compressed or sometimes triangular; leaf margins entire, dentate, or serrate, or pinnatifid or pinnatilobate 4. *A. sect. Asteromoea*
 - 4b. Pappus 1–4-seriate, usually of few to numerous long bristles and outer short bristles or scales, rarely deciduous or absent; achenes compressed; leaf margins entire, crenate, or serrate.
 - 5a. Disk corolla lobes unequal (1 lobe more deeply cut); herbs perennial, biennial, or annual; synflorescences corymbose-paniculiform or solitary at ends of branches; achenes compressed or flattened; ray pappus of few short bristles or scales, sometimes absent, disk pappus present, of long bristles and outer short bristles or scales 5. *A. sect. Pseudocalimeris*
 - 5b. Disk corolla lobes equal; herbs perennial; synflorescences corymbiform or solitary at ends of stems, rarely solitary at ends of branches; achenes ± compressed, sometimes 3- or 4-angled; ray and disk pappus present, sometimes absent in both or deciduous, outer series of short bristles, rarely of scales.
 - 6a. Basal leaves usually withered at anthesis, cauline leaves developed; capitula corymbiform, numerous, rarely few, rarely solitary at ends of branches or in axils, rarely terminal; phyllaries unequal, sometimes subequal, membranous, upper part sometimes leaflike; herbs erect, sometimes branched, sometimes subshrubs 6. *A. sect. Aster*
 - 6b. Basal leaves persistent at anthesis, usually in rosette, cauline reduced; capitula solitary, terminal, or 2 or 3 in corymbiform synflorescences; phyllaries subequal, leaflike or upper part leaflike; herbs usually scapiform 7. *A. sect. Alpigeni*

1. *Incertae sedis* group

Shrubs, erect, procumbent or ascending, many branched. Leaves cauline; blade ovate, ovate-lanceolate, elliptic, or oblong-lanceolate to oblanceolate, 1- or 3-veined, margin revolute or flat, entire or minutely to coarsely serrate. Capitula radiate, terminal or axillary on short branches, in corymbiform synflorescences or solitary at ends of stems or branches. Involucres campanulate; phyllaries 3–5-seriate, unequal, membranous or subleathery, tip sometimes leaflike, keeled, margin narrowly scarious. Receptacles flat or convex. Ray florets 1-seriate, 10–30, white, pink, or purple; disk floret limb narrowly campanulate, lobes equal. Achenes obovoid, oblong, or cylindrical, ± compressed, 2–8-veined or -ribbed. Pappus of ray and disk florets 3-seriate, of numerous persistent, free bristles, innermost series clavate, outermost series of short bristles or scales.

Eight species: Asia; eight species (seven endemic) in China.

- 1a. Capitula on short axillary branches.
 2a. Capitula 3–10, in corymbiform synflorescences; leaves ovate to elliptic-lanceolate, triplinerved 2. *A. nitidus*
 2b. Capitula solitary at ends of second-year axillary branches; leaves oblanceolate, pinnately veined 1. *A. hersileoides*
- 1b. Capitula terminal at ends of stems and lateral branches.
 3a. Leaves linear 8. *A. lavandulifolius*
 3b. Leaves ovate, ovate-lanceolate, elliptic, oblong, oblong-lanceolate, or oblanceolate.
 4a. Capitula in corymbiform synflorescences or solitary at ends of lateral branches.
 5a. Leaves adaxially arachnoid or glabrate, abaxially white tomentose, margin entire or 1- or 2-serrate-spinose; capitula 1–3 on branches 6. *A. hypoleucus*
 5b. Leaves adaxially verruculose, abaxially with white arachnoid hairs, margin entire; capitula 3–20 in corymbiform synflorescences 7. *A. polius*
 4b. Capitula in terminal compound corymbiform synflorescences.
 6a. Pappus straw-colored, sometimes purplish; leaf margin entire or remotely serrulate to coarsely serrate, adaxial surface eglandular or rarely sparsely glandular 3. *A. albescens*
 6b. Pappus dirty white; leaf margin entire, adaxial surface ± glandular.
 7a. Leaves (4–)6–9 cm, both surfaces sparsely strigillose, glabrate, or glabrous, abaxially glossy between minor veins 4. *A. fulgidulus*
 7b. Leaves 1–4 cm, adaxially moderately scabridulous, abaxially gray-white arachnoid-tomentose or cottony 5. *A. argyropholis*

1. *Aster hersileoides* C. K. Schneider in Sargent, Pl. Wilson. 3: 460. 1917.

横斜紫菀 *heng xie zi wan*

Shrubs, 60–120 cm tall. Stems many branched; old branches erect, procumbent or ascending, bark gray-brown, branched, striate; second-year branches yellow-brown, leaf scars and axillary buds prominent; current-year branches densely leafy, purple-red, slender, young branches hairy in decurrent lines below leaves. Leaves sessile, green, oblanceolate, 1–3 × 0.2–0.7 cm, thin, glabrous except midvein hairy, more densely so adaxially, midvein abaxially prominent, venation pinnate, base attenuate, margin entire, flat, strigose-ciliate, apex obtuse or rounded to acute, mucronulate. Capitula at ends of second-year axillary branches, solitary, 2.5–3 cm in diam.; peduncles slender, 4–5.5 cm, distally hairy, subtended by small leaves; bracts scattered, linear. Involucres campanulate, 5–6 mm; phyllaries 3-seriate, unequal, distally green, linear-lanceolate, midvein distally swollen and translucent, apex acuminate; outer series of phyllaries 2–3 × ca. 0.6 mm, margin narrowly scarious, glabrous or sparsely hairy; inner 2 series of phyllaries subequal, 4–5.5 × ca. 1 mm, margin scarious, erose, ciliate, sometimes tips purplish, midvein translucent, dark bordered. Ray florets 25–30, green-purple, lamina 9–10 × 2–2.5 mm, glabrous, eglandular; disk florets yellow, ca. 5 mm, limb narrowly campanulate, ca. 3.5 mm, proximally sparsely hairy, eglandular, lobes spreading to recurved, triangular, ca. 1 mm. Achenes

obovoid, 2–3 mm, densely strigillose, 2–4-veined, veins concolorous. Pappus 3-seriate, white; outer bristles slender, 0.5–1 mm; inner bristles unequal, 3.5–4 mm, acute or innermost ± clavate. Fl. and fr. Apr–Jul.

• Dry slopes on hills, rocky walls; 1300–2800 m. W Sichuan (Maowen).

2. *Aster nitidus* C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 47. 1935.

亮叶紫菀 *liang ye zi wan*

Shrubs, 50–150 cm tall. Stems many branched; old branches ascending, bark reddish- to gray-brown, branched, striate; second- and third-year branches purple-brown or ferruginous, leaf scars and axillary buds prominent; current-year branches densely leafy, reddish, moderately strigose. Leaves gradually smaller distally, shortly petiolate (petiole 1.5–3 mm); blade dark green, shiny (more so adaxially), ovate to elliptic-lanceolate, 2.5–7 × 0.5–1.6 cm, subleathery, glabrous except adaxial veins hispidulous proximally, midvein abaxially prominent, triplinerved, base cuneate, margin revolute, entire, strigose-ciliate, apex acute, mucronulate. Capitula at ends of second-year axillary branches, 3–10 in corymbiform synflorescences, 2.5–3 cm in diam.; peduncles slender, 2.5–4 cm, with small basal leaves and scattered, linear bracts, strigose (dark crosswalls), distally denser. Involucres campanulate, 6–7 × 7–8 mm; phyllaries 3-seriate, unequal, linear-lanceolate, midvein

distally not swollen, translucent, apex acuminate; outer phyllaries 4–5 × ca. 0.5 mm, distally green, sparsely hairy proximally, margin narrowly scarious; inner phyllaries subequal, 5–6 × ca. 1 mm, margin scarious, erose, distally green, sometimes tips purplish, midvein translucent, dark bordered. Ray florets 23–30, purple, tube sparsely hairy, lamina ca. 13 × 1–2 mm, glabrous, eglandular; disk florets yellow, 5–6 mm, tube apex and proximal limb sparsely hairy, limb narrowly campanulate, 3.5–4 mm, proximally hairy, eglandular, lobes spreading to recurved, triangular, ca. 1.5 mm. Achenes obovoid, 2–3 mm, sparsely strigillose, darkly 4-veined. Pappus 3-seriate, dirty white; outer slender bristles 0.5–1 mm; inner bristles unequal, 3.5–4 mm, acute or sometimes innermost ± clavate. Fl. Feb–May.

• Forests on hills, streamside rocks; 500–1100 m. Guizhou, Sichuan.

3. *Aster albescens* (Candolle) Wallich ex Handel-Mazzetti, *Acta Horti Gothob.* 12: 205. 1938.

小舌紫菀 xiao she zi wan

Amphirhapis albescens Candolle, *Prodr.* 5: 343. 1836; *Microglossa albescens* (Candolle) C. B. Clarke.

Shrubs, 30–400 cm tall. Stems many branched, erect; old branches brownish, ascending; current-year branches yellow-brown, densely or laxly leafy, sometimes villosulous to tomentulose, and sometimes sparsely, minutely stipitate glandular. Leaves reduced distally, sessile; blade narrowly to broadly lanceolate, ovate, elliptic, or oblong-lanceolate, (2–)3–17(–20) × (0.5–)1–3(–12.5) cm, abaxially glabrous or sparsely to densely appressed villosulous to tomentulose, eglandular or sometimes sparsely to densely minutely stipitate glandular, adaxially glabrous or scabridulous to scabrous, eglandular or rarely sparsely minutely stipitate glandular, veins (both surfaces) sparsely to moderately villosulous and usually sparsely minutely stipitate glandular, subpapery, midvein and pinnate lateral veins abaxially prominent, base cuneate or attenuate, margin flat to revolute, entire or remotely serrulate to coarsely serrate, teeth mucronulate, apex acute to acuminate, mucronulate. Capitula 5–50 (per branch) in terminal compound corymbiform synflorescences, ca. 0.7 cm in diam.; peduncles slender, 5–10 mm, bracts subulate, moderately villosulous to densely tomentulose (hairs white or light brown), sparsely to moderately minutely stipitate glandular. Involucre campanulate, 4–7 × 4–7 mm; phyllaries 4- or 5-seriate, unequal; outer phyllaries distally green, sometimes tip purplish, ovate to lanceolate, 1–2.5 mm, abaxially glabrous or sparsely villosulous to tomentulose, sometimes minutely stipitate glandular, margin narrowly scarious, erose, distally ciliate; inner phyllaries distally or only tip reddish purple, lanceolate to linear-lanceolate, 3–5 × 0.5–1 mm, margin broadly scarious, erose, distally ciliate, midvein distally swollen, translucent, apex acute. Ray florets 10–25, white, pink, or purple, tube hairy above, lamina 2–7 × 0.5–1.2 mm, glabrous, eglandular; disk florets yellow, sometimes becoming purplish, 4–6 mm, limb narrowly campanulate, 2.5–3.5 mm, base sparsely to moderately hairy, lobes spreading to reflexed, triangular, 1–2 mm, glabrous, eglandular or glandular. Achenes obovoid, 2–2.7 mm, sparsely to moderately strigillose, 4–8-veined. Pappus 3-

seriate, straw-colored, sometimes purplish; outer bristles slender, 0.2–1 mm; inner bristles 2–4.5 mm, acute; innermost bristles 3–6 mm, clavate. Fl. Jun–Sep, fr. Aug–Oct.

Margins of deciduous or coniferous forests and thickets, open or grazed meadows, shrublands, seepage or damp areas, streamsides, ditch or field margins, disturbed areas and cut or disturbed forests, hills to alpine regions; 500–4100 m. Gansu, Guizhou, Hubei, S Shaanxi, Sichuan, Xizang, Yunnan [Bhutan, N India, Kashmir, Myanmar, Nepal].

Leaf shape, size, and indumentum are variable in this species; thus, many ± distinct varieties were described, some of which do not appear to warrant recognition. Some varieties are said to be closer to or intermediate between other species. A biosystematic and molecular phylogenetic study of this complex is required. Although not formally recognized here, the varieties are listed below with their main features and comments.

Aster albescens* var. *albescens

小舌紫菀(原变种) xiao she zi wan (yuan bian zhong)

Aster cabulicus Lindley; *A. ferrugineus* Edgeworth (1846), not H. L. Wendland (1819); *A. ignoratus* Kunth & C. D. Bouché; *Homostylium cabulicum* (Lindley) Nees; *Microglossa cabulica* (Lindley) C. B. Clarke; *M. griffithii* C. B. Clarke; *M. salicifolia* Diels.

Leaf blade narrowly to broadly lanceolate, 5–12 × 1–12.5 cm, abaxially gray-white appressed tomentulose, margin flat, entire. Outer phyllaries ovate, abaxial surface sparsely hairy or glabrate.

500–3000 m. Gansu, Guizhou, W Hubei, S Sichuan, E and N Xizang, NW Yunnan [S and W Himalayan region].

This variety is common.

Aster albescens* var. *discolor Y. Ling, *Fl. Reipubl. Popularis Sin.* 74: 358. 1985.

白背小舌紫菀 bai bei xiao she zi wan

Leaves elliptic-lanceolate, 2–3.5 × 0.5–1 cm, abaxially white appressed tomentose, adaxially glabrous. Outer phyllaries ovate, puberulent or glabrate.

• About 2400 m. Sichuan (Songpan).

This variety is similar to *Aster argyropholis*. It may be intermediate between *A. argyropholis* and *A. polius*.

Aster albescens* var. *glabratus (Diels) Boufford & Y. S. Chen, *Harvard Pap. Bot.* 14: 43. 2009.

无毛小舌紫菀 wu mao xiao she zi wan

Aster harrowianus Diels var. *glabratus* Diels, *Notes Roy. Bot. Gard. Edinburgh* 5: 184. 1912; *A. albescens* var. *levissimus* Handel-Mazzetti.

Leaves narrowly to broadly lanceolate, 5–12 cm, both surfaces glabrous, sometimes young leaves abaxially sparsely tomentose on midvein only. Outer phyllaries ovate to lanceolate, glabrous.

• 800–3000 m. Hubei, W Sichuan, N Yunnan.

The leaves are similar in shape to those of *Aster albescens* var. *albescens* but are often shorter and narrower.

Aster albescens var. **glandulosus** Handel-Mazzetti, J. Bot. 76: 284. 1938.

腺点小舌紫菀 xian dian xiao she zi wan

Leaves ovate or ovate to oblong-lanceolate, 4–10 × 1–2.5 cm, abaxially brown hairy on veins, densely glandular.

1900–3900 m. SW and W Sichuan, E and S Xizang, NW Yunnan [India].

Aster albescens var. **gracilior** (Handel-Mazzetti) Handel-Mazzetti, Acta Horti Gothob. 12: 206. 1938.

狭叶小舌紫菀 xia ye xiao she zi wan

Aster limprichtii Diels var. *gracilior* Handel-Mazzetti, Symb. Sin. 7: 1093. 1936; *A. harrowianus* Diels.

Leaves elliptic-lanceolate, 7–20 × 1–5 cm, abaxially densely white or gray-white tomentose or cottony, base attenuate, apex acuminate. Outer phyllaries oblong or lanceolate.

• Gansu, S Shaanxi, S and W Sichuan, NW Yunnan.

Aster albescens var. **limprichtii** (Diels) Handel-Mazzetti, Acta Horti Gothob. 12: 206. 1938.

椭圆小舌紫菀 tuo ye xiao she zi wan

Aster limprichtii Diels, Repert. Spec. Nov. Regni Veg. Beih. 12: 503. 1922.

Leaves elliptic or oblong, 3–7 × 1–3 cm, abaxially densely white or gray-white tomentose or cottony, base broadly cuneate or rounded. Outer phyllaries ovate, sparsely tomentose.

• 2400–3100 m. W Gansu, NW and W Sichuan.

Aster albescens var. **megaphyllus** Y. Ling, Fl. Reipubl. Popularis Sin. 74: 358. 1985.

大叶小舌紫菀 da ye xiao she zi wan

Stems yellow-brown pilose and white arachnoid. Leaves elliptic or ovate-lanceolate, 10–15 × 5–7 cm, abaxially arachnoid pilose, reticulate veins prominent, adaxially sparsely pilose, midvein white villous, base rounded or broadly cuneate, margin subentire, apex acute or subrounded. Outer phyllaries ovate, sparsely puberulent.

• Sichuan (Maowen).

Aster albescens var. **pilosus** Handel-Mazzetti, Acta Horti Gothob. 12: 207. 1938.

长毛小舌紫菀 chang mao xiao she zi wan

Leaves oblong-lanceolate, 4–9 × 1–2 cm, abaxially on midvein or totally white pilose, adaxially sparsely hispidulous, flat. Outer phyllaries sparsely hairy. Achenes densely pilose.

• Common; 2800–4000 m. W Sichuan, E Xizang, NW Yunnan.

Aster albescens var. **rugosus** Y. Ling, Fl. Reipubl. Popularis Sin. 74: 358. 1985.

糙毛小舌紫菀 cao mao xiao she zi wan

Leaves oblong-lanceolate, adaxially hispidulous, reticulate veins prominent, areoles of reticulate veins with foamy process.

• W Sichuan, NW Yunnan.

Aster albescens var. **salignus** (Franchet) Handel-Mazzetti, Acta Horti Gothob. 12: 207. 1938.

柳叶小舌紫菀 liu ye xiao she zi wan

Inula cuspidata C. B. Clarke var. *saligna* Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 10: 37. 1887; *Aster harrowianus* Diels var. *glabratus* Diels, p.p.

Leaves elliptic-lanceolate, 7–17 × 1.5–4.5 cm, abaxially brown pubescent on veins or sometimes totally, glandular, base attenuate, apex acuminate. Outer phyllaries narrowly lanceolate, puberulent.

1900–3900 m. Sichuan, NW and W Yunnan [N India].

4. Aster fulgidulus Grierson, Notes Roy. Bot. Gard. Edinburgh 26: 110. 1964.

辉叶紫菀 hui ye zi wan

Shrubs, 1.2–2 m tall. Stems brown strigose-villous, stipitate glandular. Leaves: (basal leaves not seen); cauline leaves: petiole ca. 5 mm; blade ovate, (4–)6–9 × (2–)2.5–4.5 cm, abaxially sparsely strigillose, glossy between minor veins, sparsely minutely glandular, adaxially glabrous or glabrate, sparsely minutely glandular, midvein sparsely strigillose, pinnately veined, base rounded, margin entire, revolute, sparsely scabrous, apex acute, sometimes acuminate. Capitula numerous, in terminal corymbiform synflorescences, 0.7–0.8 cm. Phyllaries 3- or 4-seriate, unequal, 1.6–3.2 × 0.7–0.8 mm, membranous, slightly keeled, margin scarious, erose-fimbriate, viscid-glandular, apex acute or acuminate, purple, ciliate. Ray florets ca. 16, purplish, tube 2.4–3.5 mm, hairy above, lamina ca. 5 × 1.5–1.8 mm; disk florets yellow (but externally ± purplish), 4–5.2 mm, tube 1.4–1.8 mm, tube and limb base hairy, limb narrowly campanulate, lobes oblong-lanceolate, 0.8–1 mm. Achenes oblong, ± compressed, ca. 2.2 mm, 4-ribbed, strigose. Pappus 3-seriate, dirty white; outer bristles ca. 1 mm; inner bristles 3.5–3.7 mm, acute; innermost bristles 3.9–4.4 mm, clavate.

• 2200–3000 m. SE Xizang (Bomi).

According to one collector, the ray florets were stated as yellow but externally somewhat purple when dry, while another collector reported them as purplish.

5. Aster argyropholis Handel-Mazzetti, Acta Horti Gothob. 12: 208. 1938.

银鳞紫菀 yin lin zi wan

Shrubs, 100–200 cm tall. Stems multibranched; old branches gray-brown or reddish brown, shallowly striate, leaf scars and axillary buds prominent; current-year branches short, slender, densely leafy, white tomentose. Leaves petiolate (petiole 1–3 mm); blade abaxially ± white, adaxially green, elliptic, oblong, or lanceolate-ovate, 1–4 × 0.5–1.5 cm, subleathery, abaxially gray-white arachnoid-tomentose or cottony, adaxially moderately scabridulous, minutely glandular, resin-dotted, scabrous, midvein abaxially prominent, lateral veins apparent, pinnate, 4–6 pairs, base cuneate, margin revolute, entire, subundulate, apex acute to obtuse, mucronulate. Capitula 4–20, in corymbiform synflorescences terminal on axillary branches, 1.5–2 cm in diam.; peduncles slender, 0.5–5 mm, densely to-

mentose, minutely glandular; bracts linear. Involucres campanulate, 4–6 mm; phyllaries 4- or 5-seriate, unequal; outer phyllaries broadly lanceolate, 1.5–2 × ca. 0.5 mm, abaxially sparsely tomentulose proximally to glabrate, margin narrowly scarious, erose, ciliate, midvein pronounced, swollen; middle phyllaries lanceolate, 3.5–4 × 1–1.2 mm; inner phyllaries linear-lanceolate, 4–5 × 0.5–0.6 mm, margin scarious, erose, ciliate, apex acute, green or purple-red. Ray florets 15–20, white, tube sparsely hairy, lamina ca. 4 × 1.5 mm, glabrous, eglandular; disk florets yellow, 4.5–5 mm, tube sparsely hairy distally, limb narrowly campanulate, ca. 2.5 mm, sparsely glandular, lobes reflexed, triangular, 1–1.2 mm. Achenes reddish brown, cylindrical, 2–2.7 mm (?immature), strigillose, translucent 6-veined. Pappus 3-seriate, dirty white; outer bristles few, slender, 0.3–0.6 mm; inner bristles ca. 2.5 mm, acute; innermost bristles ca. 4.5 mm, clavate. Fl. May–Oct, fr. Aug–Oct.

• Alpine and subalpine slopes, forests, grasslands, riverbanks; 2000–2800 m. Sichuan, Xizang, NW Yunnan.

- 1a. Involucre 5–6 mm, phyllaries 5-seriate; leaves abaxially sparsely tomentose, secondary veins abaxially prominent ... 5c. var. *paradoxus*
- 1b. Involucre 4–5 mm, phyllaries 4-seriate; leaves abaxially densely tomentulose or cottony, secondary veins abaxially not prominent.
 - 2a. Leaf apex acute or abruptly acute, rarely rounded, abaxial surface and peduncles densely tomentulose 5a. var. *argyropholis*
 - 2b. Leaf apex obtuse or rounded, abaxial surface and peduncles densely white cottony 5b. var. *niveus*

5a. Aster argyropholis var. argyropholis

银鳞紫菀(原变种) yin lin zi wan (yuan bian zhong)

Leaves abaxially densely tomentulose, secondary veins abaxially not prominent, apex acute or abruptly acute, rarely rounded. Peduncles densely tomentulose. Involucres 4–5 mm; phyllaries 4-seriate.

- W Sichuan, Xizang.
- This variety is common.

5b. Aster argyropholis var. niveus Y. Ling, Fl. Reipubl. Popularis Sin. 74: 358. 1985.

白雪银鳞紫菀 bai xue yin lin zi wan

Leaves abaxially densely white cottony, secondary veins abaxially not prominent, apex obtuse or rounded. Peduncles densely white cottony. Involucres 4–5 mm; phyllaries 4-seriate.

- SW Sichuan (Yanyuan), NW Yunnan (Lijiang).

5c. Aster argyropholis var. paradoxus Y. Ling, Fl. Reipubl. Popularis Sin. 74: 358. 1985 [“*paradoxa*”].

奇形银鳞紫菀 qi xing yin lin zi wan

Leaves abaxially sparsely tomentose, secondary veins abaxially prominent. Involucre 5–6 mm; phyllaries 5-seriate.

- NC Sichuan (Barkam).

6. Aster hypoleucus Handel-Mazzetti, J. Bot. 76: 285. 1938.

白背紫菀 bai bei zi wan

Shrubs, ca. 15 cm tall; stems fascicled. Stems numerous, densely branched; current-year branches simple or divaricately branched, erect, slender, strict, angled, white tomentose, densely leafy, terminal branches and peduncles hard and persistent by anthesis. Leaves suberect, shortly petiolate; blade adaxially dark green, elliptic or oblanceolate, 5–15 × 2–3.5 mm, leathery, abaxially white tomentose, adaxially arachnoid or glabrate, base attenuate, margin strongly revolute, entire or 1- or 2-serrate-spinose, apex acute or obtuse, spinose. Capitula 1–3 terminal on lateral branches; peduncles 2–3 cm; bracts minute, linear-lanceolate, membranous. Involucres campanulate, 4–5 mm in diam.; phyllaries 4-seriate, imbricate, subleathery, apex reddish purple; outer phyllaries lanceolate-ovate, short, apex acute; inner phyllaries linear-lanceolate, ca. 5 × 0.6 mm, 4–5 × as long as outer phyllaries, margin narrowly scarious, erose, villosulous-ciliate. Ray florets ca. 13, white when dry, tube ca. 2.2 mm, hairy, lamina ca. 4.5 × 1 mm; disk florets yellow, ca. 3.8 mm, tube 1–1.1 mm, limb narrowly funnellform, tube and limb base hairy, lobes lanceolate, ca. 1 mm, glabrous. Achenes tan, narrowly obovoid, slightly compressed, trigonous, ca. 1.6 mm (immature), silky, pale 3-ribbed. Pappus 3-seriate, whitish; outermost bristles ca. 0.5 mm; outer bristles slender, ca. 1.2 mm; inner bristles acute, 2.5–3.5 mm. Fl. Jul.

- 3000–3700 m. S Xizang (Zangbo valley).

7. Aster polius C. K. Schneider in Sargent, Pl. Wilson. 3: 459. 1917 [“*polia*”].

灰毛紫菀 hui mao zi wan

Shrubs, 0.6–1.2 m tall. Stems erect, multibranched; old branches erect, bark grayish brown, branched, striate; current- and second-year branches red-purple, leaf scars and axillary buds prominent, moderately to densely curly hairy, glabrescent. Leaves petiolate (petiole 1–2 mm); blade adaxially green, narrowly ovate to elliptic, 1.5–3.5 × 0.6–1.4 cm, subleathery, abaxially white tomentose, adaxially scabridulous, base cuneate, margin strongly revolute, entire, finely ciliate, apex obtuse or acute, mucronulate. Capitula terminal on current-year branches, 3–20 in corymbiform synflorescences, up to ca. 1.5 cm in diam.; peduncles slender, 5–11 mm; bracts linear, moderately tomentulose, sparsely minutely stipitate glandular. Involucres campanulate, 4–5 mm; phyllaries 3-seriate, unequal, apically green, abaxially glabrous, sparsely minutely stipitate glandular, midvein slightly swollen, distally translucent, apex acute, purplish tipped; outer phyllaries ovate, ca. 1 mm, margin narrowly scarious, erose, ciliate; inner phyllaries unequal, lanceolate, 3–4 × ca. 1 mm, margin scarious, erose, sometimes ciliate. Ray florets 8–10, white, tinged red, tube sparsely hairy, lamina 4–5 × ca. 1.5 mm, glabrous, eglandular; disk florets yellow, ca. 3.5 mm, limb narrowly campanulate, 1.5–2 mm, sparsely minutely hairy basally, eglandular, lobes spreading or recurved, narrowly triangular, 1–1.2 mm. Achenes obovoid, (immature) ca. 2 mm, sparsely strigillose, darkly 2–6-veined. Pappus 3-seriate, straw-colored; outer series of scales 0.5–0.7 mm; inner bristles ca. 2.5 mm, acute; innermost bristles 3–3.5 mm, clavate. Fl. Jul.

- Open shrubs; 2000–2700 m. W Sichuan (Maowen, Xiaojin).

8. *Aster lavandulifolius* Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 609. 1937.

线叶紫菀 xian ye zi wan

Shrubs, 60–100 cm tall. Stems multibranched, old branches ascending, bark brown, branched, shallowly striate, leaf scars and axillary buds prominent; current-year branches slender, yellow-brown, densely leafy, white tomentulose. Leaves sessile, adaxially green, linear, 1–4(–5) × 0.1–0.3(–0.5) cm, subleathery, abaxially gray-white tomentose, adaxially rugose, very sparsely scabrous, resinous, midvein pronounced, venation pinnate, base long cuneate, margin entire, strongly recurved, apex acute, mucronulate; upper leaves smaller. Capitula 3–50 or more in ± densely corymbiform synflorescences, terminal on current-year branches or 3–5 at ends of lateral branches, ca. 8 mm in diam.; peduncles slender, 2–6 mm, tomentulose; bracts subulate. Involucres narrowly campanulate, 5–6 mm; phyllaries 4- or 5-seriate, unequal; outer phyllaries ovate, 1–2 mm, sparsely tomentose, resinous, margin narrowly scarious, keeled, midvein apically swollen, translucent, apex acute; inner phyllaries lan-

ceolate, 4–5 × 0.7–0.9 mm, margin narrowly scarious, erose, ciliate, midvein apically very swollen, apex obtuse to acute. Ray florets 5–7, white, tube sparsely hairy distally, lamina 2.5–3 × 0.5–0.8 mm, glabrous, eglandular; disk florets yellow, 3.5–4 mm, limb narrowly campanulate, ca. 3 mm, very sparsely hairy proximally, lobes spreading, narrowly triangular, 1.2–1.5 mm. Achenes cylindrical, ca. 2.5 mm, moderately strigose, yellowish 6–8-ribbed. Pappus 3-seriate, straw-colored, of sparsely barbellulate bristles; outer bristles 0.5–0.7 mm; inner bristles 2–3 mm, acute; innermost bristles ca. 4 mm, clavate. Fl. Jun, fr. Jun–Sep.

• Subalpine stony slopes or riverbanks; 2000–2900 m. SW and W Sichuan, Yunnan.

Aster lavandulifolius differs from other *Aster* species by its linear leaves and cylindrical achenes.

Aster motuoensis Y. L. Chen (Bull. Bot. Res., Harbin 8(3): 12. 1988), described from SE Xizang (Médog) as being close to *A. lavandulifolius*, differs from the latter in its notably reticulately veined, oblong to oblong-lanceolate leaves, narrowly cylindrical involucres, and 4–6 ray florets. Further study is required to ascertain its status.

2. *Aster* sect. *Teretiachaenium* Kitamura, Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 8: 357. 1937.

东风菜组 dong feng cai zu

Herbs, perennial, usually simple, erect. Leaves basal (withered at anthesis) and cauline; blade ovate or elliptic-ovate, margin flat, serrate, rarely subentire, 1-veined. Capitula radiate, terminal, corymbiform or paniculiform. Involucres campanulate to broadly campanulate; phyllaries 3-seriate, unequal or subequal, not keeled, margin scarious. Receptacles flat or convex. Ray florets 1-seriate, 4–9, white; disk floret limb campanulate, lobes equal. Achenes obovoid, ± compressed, 2–7-ribbed. Pappus of ray and disk florets 3- or 4-seriate, of numerous persistent, free bristles, innermost ± clavate, outermost of short bristles.

Seven species: E Asia; two species (one endemic) in China.

- 1a. Phyllaries unequal, narrowly herbaceous on back, margin broadly membranous; pappus of many bristles as long as disk florets; achenes glabrous 9. *A. scaber*
 1b. Phyllaries subequal, sometimes outer series herbaceous and green, inner series with membranous margins only; pappus of few bristles much shorter than corolla tube; achenes sparsely strigose 10. *A. marchandii*

9. *Aster scaber* Thunberg in Murray, Syst. Veg., ed. 14, 763. 1784.

东风菜 dong feng cai

Aster komarovii H. Léveillé; *Biotia corymbosa* (Aiton) Candolle var. *discolor* (Maximowicz) Regel; *B. discolor* Maximowicz; *Doellingeria scabra* (Thunberg) Nees.

Herbs, perennial, 70–150 cm tall; rhizome short, thickened. Stems erect, glabrous. Leaves reduced upward, abaxially pale green, flat, 3- or 5-veined, margin and both surfaces scabrous, abaxially less so, eglandular; basal leaves withered by anthesis, petiole 10–15 cm, blade ovate, 9–15 × 6–15 cm, base cordate, margin serrate, teeth mucronate, apex acute; middle cauline leaves shortly petiolate, petiole broadly winged; blade ovate to narrowly ovate, base truncate to rounded; upper cauline leaves broadly winged shortly petiolate to sessile, lanceolate. Capitula in corymbiform synflorescences, 1.8–2.4 cm in diam.; peduncles 6–30 mm, sparsely to moderately scabridulous, eglandular or stipitate glandular, bracts linear. Involucre campanulate, 5–6 mm in diam.; phyllaries 3-seriate, strongly unequal, green area narrow; outer phyllaries ca. 1.5 × 1–1.5 mm, abaxially glabrous, base of outer thickened, margin broadly scarious, sometimes purplish apically, ciliate, apex ob-

tuse, sometimes acute. Ray florets 4–9, white, 6–10 mm, tube 3–3.5 mm, lamina abaxially glabrous, eglandular; disk florets 4.5–5 mm, limb abruptly enlarged, campanulate, ca. 3 mm, sparsely shortly hairy at tube-limb junction, lobes spreading, triangular, 1.5–2 mm. Achenes obovoid, sometimes slightly compressed, 3–4 mm, glabrous, 3–7-ribbed. Pappus of many sordid-white, barbellate bristles, 3.5–4.2 mm (slightly shorter than disk florets); outer bristles short (50% or less of inner length), slender; inner bristles length 80–90% of innermost bristles, tapering; innermost bristles longest, clavate. Fl. Jun–Oct, fr. Aug–Oct. $2n = 18$.

Open slopes in valleys, grasslands, thickets, very common; below 2000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Zhejiang [Japan, Korea, Russia (Far East)].

This plant is used medicinally for treating bites from venomous snakes.

10. *Aster marchandii* H. Léveillé, Repert. Spec. Nov. Regni Veg. 11: 306. 1912.

短冠东风菜 duan guan dong feng cai

Herbs, perennial, 0.6–2 m tall; rhizomes robust. Stems erect, sparsely to moderately puberulent. Leaves reduced upward, abaxially pale green, both surfaces scabrous, eglandular, slightly rugose, 3- or 5-veined, margin scabrous; basal leaves withered by anthesis, petiole 9–17 cm, blade ovate, 7–13 × 7–11.5 cm, base cordate, margin serrate, teeth mucronate, apex acute to subrounded; middle cauline leaves narrowly winged petiolate, broadly ovate to ovate, base truncate; upper cauline leaves winged shortly petiolate, ovate, base cuneate, decurrent. Capitula in corymbiform synflorescences, 2.5–4 cm in diam.; peduncles 10–50 mm, glabrate to densely puberulent, eglandular or stipitate glandular; bracts linear. Involucre broadly campanulate, 6–8 mm in diam.; phyllaries 3-seriate, subequal, lanceolate-oblong; outer phyllaries 3–3.5 × 1–1.5 mm, abaxially glabrous or glabrate, apex rounded or obtuse, rarely margin ciliate; outer phyllaries green, herbaceous, base thickened,

margin very narrowly scarious; inner phyllaries herbaceous, margin narrowly scarious; innermost phyllaries scarious. Ray florets 9–19, white, 5–7 mm, tube ca. 3 mm, lamina oblong-linear, abaxially glabrous, eglandular; disk florets 4.5–5 mm, limb abruptly enlarged, campanulate, ca. 2.5 mm, lobes spreading, triangular, ca. 2 mm, glabrous, eglandular. Achenes obovoid, slightly compressed, 2.5–3 mm, sparsely strigose to glabrate, 2–6-ribbed. Pappus 3-seriate, of few bristles, sordid white, 0.3–1.5 mm; outer bristles few, short, slender; inner bristles unequal, tapering; innermost bristles longest, sometimes weakly clavate. Fl. Aug–Sep, fr. Sep–Oct.

• Valleys, streamsides, fields, roadsides; 300–1400 m. Fujian, Guangdong, Guangxi, Guizhou, Hubei, Jiangxi, Sichuan, Zhejiang.

The roots, leaves, and flowering capitula of *Aster marchandii* are used medicinally.

3. *Aster* sect. *Ageratoides* (Kitamura) G. L. Nesom, *Phytologia* 77: 247. 1994.

三脉叶紫菀组 *san mai ye zi wan zu*

Aster subsect. *Ageratoides* Kitamura, *J. Jap. Bot.* 12: 535. 1936.

Herbs, perennial, usually simple, erect. Leaves basal (withered at anthesis) and cauline; blade spatulate or ovate to narrowly ovate or lanceolate, margin flat, coarsely serrate to serrate, sometimes serrulate, 3-veined at base or below middle. Capitula radiate, terminal, paniculate-corymbiform to corymbiform. Involucre campanulate; phyllaries 3- or 4-seriate, unequal, not keeled, margin scarious. Receptacles flat or ± convex. Ray florets 1-seriate, 10–20, pale purple, lavender, or white; disk floret limb campanulate, lobes equal. Achenes obovoid to oblanceoloid, ± compressed, 3- or 4-ribbed (ray) or 2- or 3-ribbed (disk). Pappus of ray and disk florets 3-seriate, of numerous persistent, free bristles, innermost series clavate, outermost series of short bristles.

About eight species: E Asia; one species in China.

11. *Aster trinervius* Roxburgh ex D. Don, *Prodr. Fl. Nepal.* 177. 1825.

三基脉紫菀 *san ji mai zi wan*

Herbs, perennial, 25–205 cm tall; rhizomes thick. Stems erect, simple or sometimes branched, reddish striate, glabrous or villosulous to strigillose, sometimes glabrescent, eglandular or minutely stipitate glandular. Leaves cauline; middle cauline leaves usually largest, abaxially pale green, adaxially green, sometimes shiny, thinly or thickly papery to subleathery, abaxially villosulous, sparsely scabridulous, or glabrous, minutely stipitate glandular or eglandular, veins densely villosulous to sparsely strigose or glabrate, adaxially ± densely scabridulous, eglandular or sometimes ± minutely stipitate glandular, resinous, margin serrate to coarsely serrate, sometimes serrulate, ciliate, often prominently abaxially 3-veined at base or above (triplinerved), apex obtuse to acute or acuminate, mucronate; lowest leaves withered by anthesis, long narrowly winged petiolate (petiole to 6 cm); blade spatulate or ovate to narrowly lanceolate, 0.5–15(–17) × 0.3–5.5 cm, base attenuate; lower to upper cauline leaves shortly petiolate, ovate- or lanceolate-pan-durate to lanceolate, 4.5–15 × 1.2–5 cm, base attenuate to rounded; synflorescence leaves shortly petiolate, ovate to linear-lanceolate, 1–8 × 0.2–3 cm, base cuneate to ± rounded. Capitula 7–100 or more florets in terminal paniculate-corymbiform to corymbiform synflorescences, 1.5–2 cm in diam.; peduncles 5–30 mm, strigillose, minutely stipitate glandular; bracts linear to lanceolate, entire. Involucre campanulate, 3–7

× 4–15 mm; phyllaries 3- or 4-seriate, unequal, apically green, sometimes ± purplish, abaxially glabrate to villosulous (on green part), apically sometimes minutely stipitate glandular, base hardened, margin scarious, erose, sometimes purplish, ciliate, midvein more pronounced distally, ± translucent, apex rounded to acute, erose, ciliate; outer phyllaries ovate to lanceolate, 2–2.5 × 0.5–1 mm, leaflike or distally leaflike; inner phyllaries oblong, 3–6 mm. Ray florets 6–15, purple, lavender, reddish, or white, tube ca. 2 mm, lamina 7–11 × 1.5–3 mm, glabrous, eglandular; disk florets yellow, 4–6.5 mm, tube base flared, limb campanulate, 2.2–4 mm, base sparsely strigillose, lobes spreading, narrowly triangular, 1.3–2 mm, glabrous, sparsely to moderately minutely stipitate glandular. Achenes gray-brown, oblanceolate to obovoid, slightly compressed, 2–2.5 mm, sparsely to moderately strigillose, minutely stipitate glandular or eglandular, 2- or 3-ribbed. Pappus 3-seriate, whitish or ± reddish, of slender, barbellate bristles; outermost bristles few, 0.2–0.3 mm; inner bristles 3–5 mm, tapering; innermost bristles 4.5–6 mm, clavate. Fl. and fr. Jul–Dec.

Forests, forest margins, thickets, wet places in valleys; 100–3400 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, NE India, Japan, Korea, N Myanmar, Nepal, E Russia, N Thailand, Vietnam].

Y. Ling and Y. L. Chen (in *FRPS* 74: 159–167. 1985) segregated *Aster trinervius* from *A. ageratoides* (see key to subspecies below). Grierson (*Notes Roy. Bot. Gard. Edinburgh* 26: 67–163. 1964), how-

ever, mentioning that there are intermediate forms between the two taxa, treated *A. ageratoides* as a subspecies of *A. trinervius*. Although the name of the former has been used in E Asia for a long time and there are many described varieties, differences between the two species do not appear to warrant species-level segregation at the present time.

Aster trinervius subsp. *ageratoides* is widely distributed and polymorphic. Kitamura (Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 13: 327–377. 1937) and Handel-Mazzetti (Acta Horti Gothob. 12: 203–226. 1938) divided it into many varieties or subspecies (of *A. ageratoides*). The indumentum, leaf shape, capitula, and shape and size of the involucre are variable and often overlapping, however, and differences between some varieties are not clear. A thorough biosystematic and molecular phylogenetic investigation of the whole complex in Asia would be needed to identify entities that are worth recognition, as was done for Japanese members of the complex (e.g., Ito & Soejima in Iwatsuki et al., Fl. Japan 3b: 59–73. 1995), particularly in view of the possibility of hybridization among entities and with species of *A. sect. Pseudocalimeris*. Therefore, varieties usually recognized under *A. ageratoides* are here listed under *A. trinervius* subsp. *ageratoides*, with their main characteristics. It should be noted that some taxa listed here as varieties are recognized as species by Ito and Soejima (loc. cit.).

- 1a. Leaves subleathery (thick), 3-veined at base, base subrounded; involucre 8–15 mm in diam. 11a. subsp. *trinervius*
 1b. Leaves papery (thin), sometimes rather thick, 3-veined above base (triplinerved), base attenuate; involucre 4–10 mm in diam. 11b. subsp. *ageratoides*

11a. *Aster trinervius* subsp. *trinervius*

三基脉紫菀(原亚种) san ji mai zi wan (yuan ya zhong)

Aster ageratoides Turczaninow subsp. *trinervius* (Roxburgh ex D. Don) Kitamura; *A. ageratoides* var. *trinervius* (Roxburgh ex D. Don) Handel-Mazzetti; *A. scabridus* C. B. Clarke; *Diplopappus asperrimus* (Nees) Candolle; *Galatella asperrima* Nees.

Stems erect, 60–205 cm tall, thick, branched, strigose. Leaves subleathery (thick), sometimes thin; blade ovate-lanceolate, abaxially strigillose or glabrate, glandular, adaxially strigose, 3-veined at base, conspicuously reticulate veined, base subrounded. Involucre 8–15 mm in diam.; phyllary apex green, sometimes tinged red. Ray florets white.

Pinus forests; ca. 3100 m. S Xizang [Bhutan, NE India, N Myanmar, Nepal, N Thailand].

Under *Aster trinervius* subsp. *trinervius* only var. *trinervius* occurs in China.

11b. *Aster trinervius* subsp. *ageratoides* (Turczaninow) Grierson, Notes Roy. Bot. Gard. Edinburgh 26: 102. 1964.

三脉紫菀 san mai zi wan

Aster ageratoides Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 10(7): 154. 1837.

Stems erect, 40–100 cm tall, slender or thick, branched, strigose. Leaves papery (thin, sometimes rather thick); blade broadly ovate, elliptic, or oblong-lanceolate, abaxially puberulent, veins strigose, adaxially strigose, often glandular, or both surfaces tomentulose, 3-veined above base (triplinerved), base

attenuate. Involucre 4–10 mm in diam.; phyllary apex green or purple-brown. Ray florets purple, reddish, or white.

Forests, forest margins, thickets, wet places in valleys; 100–3400 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, NE India, Japan, Korea, N Myanmar, Nepal, E Russia, N Thailand, Vietnam].

Some of the varieties listed here under *Aster trinervius* subsp. *ageratoides* have available names under *A. trinervius*, while others do not. In view of the fact that all of the varieties have names under *A. ageratoides*, those names are used here in preference to publishing new combinations, pending the necessary thorough investigation mentioned above.

Aster ageratoides var. *ageratoides*

三脉紫菀(原变种) san mai zi wan (yuan bian zhong)

Aster adustus (Maximowicz) Koidzumi ex Nakai; *A. ageratoides* f. *adustus* (Maximowicz) Zdorovjeva; *A. ageratoides* var. *adustus* Maximowicz; *A. quelpaertensis* H. Léveillé & Vaniot; *A. trinervius* Roxburgh ex D. Don var. *adustus* (Maximowicz) Franchet & Savatier; *A. trinervius* var. *potaninii* Diels; *A. trinervius* var. *rosthornii* Diels.

Leaves oblong-lanceolate or narrowly lanceolate, thin, adaxially densely strigose, abaxially sparsely hairy or glabrous, veins ± hairy, slightly glandular, margin coarsely serrate. Involucre 5–7 × 6–10 mm, apex purple-brown. Ray florets purple or red.

S Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, E Qinghai, Shaanxi, Shandong, Shanxi, W Sichuan, NW Yunnan [Korea, Russia (E Siberia)].

Aster ageratoides* var. *firmus (Diels) Handel-Mazzetti, Acta Horti Gothob. 12: 215. 1938.

坚叶三脉紫菀 jian ye san mai zi wan

Aster trinervius var. *firmus* Diels, Bot. Jahrb. Syst. 29: 610. 1901 [*“firma”*].

Leaves ovate or oblong-lanceolate, thickly papery, abaxially long rough hairy on veins, veins conspicuously reticulate, adaxially densely strigose, glabrescent, often lucid, areoles foamy. Ray florets white or tinged red.

N Anhui, W Hunan, S Shaanxi, Sichuan, N Yunnan [S Himalayan region].

Aster ageratoides* var. *gerlachii (Hance) C. C. Chang ex Y. Ling, Fl. Reipubl. Popularis Sin. 74: 163. 1985.

狭叶三脉紫菀 xia ye san mai zi wan

Aster gerlachii Hance, J. Bot. 18: 262. 1880; *A. curvatus* Vaniot.

Stems strigose in upper part. Leaves linear-lanceolate, 5–8 × 0.7–1 cm, abaxially subglabrous, adaxially sparsely rough hairy, base attenuate, margin shallowly serrate, apex acuminate. Phyllary apex green. Ray florets white. $2n = 36^*$.

• Guangdong, Guizhou, Hubei.

Aster ageratoides var. **holophyllus** Maximowicz, Mém. Acad. Imp. Sci. St.-Petersbourg Divers Savans 9: 144. 1859.

异叶三脉紫菀 yi ye san mai zi wan

Aster nigrescens Vaniot.

Stems multibranched. Middle leaves oblong-lanceolate, margin roughly serrate, upper leaves smaller, margin often entire. Phyllaries narrow, apex green, often ?brown mucronate.

• S Gansu, Hebei, NW Hubei, Shaanxi, Shanxi, Sichuan, N Yunnan.

Aster ageratoides var. **lasiocladus** (Hayata) Handel-Mazzetti, Acta Horti Gothob. 12: 215. 1938.

毛枝三脉紫菀 mao zhi san mai zi wan

Aster lasiocladus Hayata, Icon. Pl. Formosan. 8: 49. 1919; *A. ageratoides* subsp. *lasiocladus* (Hayata) Kitamura; *A. trinervius* var. *lasiocladus* (Hayata) Yamamoto.

Stems yellow-brown or gray tomentose. Leaves oblong-lanceolate, often smaller, 4–8 × 1–3 cm, thick, adaxially densely strigose, or densely tomentose, veins often rough hairy, margin shallowly dentate, apex obtuse or acute. Phyllaries thick, densely tomentose. Ray florets white.

• Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Taiwan, SE Yunnan.

This variety is easy to distinguish from other varieties of *Aster trinervius* subsp. *ageratoides* and appears closer to *A. trinervius* subsp. *trinervius*, but the latter has thicker leaves and is more densely tomentose.

This plant is used medicinally for treating common colds and headaches, osteodynia, and snakebites.

Aster ageratoides var. **laticorymbus** (Vaniot) Handel-Mazzetti, Acta Horti Gothob. 12: 214. 1938.

宽伞三脉紫菀 kuan san san mai zi wan

Aster laticorymbus Vaniot, Bull. Acad. Int. Géogr. Bot. 12: 494. 1903.

Stems multibranched. Middle leaves oblong-lanceolate or ovate-lanceolate, abaxially often glabrescent, base attenuate, margin with 7- or 8-paired serrae, upper leaves ovate or lanceolate, small, margin entire or toothed. Phyllaries narrow, apex green. Ray florets often white. $2n = 18^*$, 36^* , 54^* .

• Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan.

Aster ageratoides var. **leiophyllus** (Franchet & Savatier) Y. Ling, Fl. Reipubl. Popularis Sin. 74: 164. 1985.

光叶三脉紫菀 guang ye san mai zi wan

Aster leiophyllus Franchet & Savatier, Enum. Pl. Jap. 1: 223. 1875; *A. ageratoides* f. *leucanthus* Kitamura; *A. ageratoides* subsp. *leiophyllus* (Franchet & Savatier) Kitamura.

Leaves oblong-lanceolate, abaxially with short rough hairs on veins, adaxially ± strigose, base abruptly narrowed, sessile or shortly petiolate, margin densely acute-serrate, apex long

acuminate. Capitula small, slender pedunculate. Involucre obconic when dry, ca. 4 × 5–6 mm; phyllary apex obtuse, apically brown. Ray florets white. Pappus white or red-brown. $2n = 18$, $18+1-3B$, 27 , 34 , $36+0-4B$, 37 , 54 , 81 .

Taiwan [Japan].

Aster ageratoides var. **micranthus** Y. Ling, Fl. Reipubl. Popularis Sin. 74: 356. 1985.

小花三脉紫菀 xiao hua san mai zi wan

Stems 60–100 cm tall, slender, multibranched. Leaves linear-lanceolate, thinly papery, subglabrous on both surfaces, areoles adaxially ± foamy; middle leaves 6–17 × 0.4–1.5 cm, margin sparsely shallowly toothed or subentire. Capitula small, in axillary and terminal corymbs; peduncle slender. Involucre 3–4 × 4–5 mm; phyllaries thin, apex purple-brown or green. Ray florets white, linear, 4–5 mm; disk florets and pappus ca. 4 mm. $2n = 18^*$.

• Forests, thickets. Sichuan.

Aster ageratoides var. **oophyllus** Y. Ling, Fl. Reipubl. Popularis Sin. 74: 161. 1985.

卵叶三脉紫菀 luan ye san mai zi wan

Aster blinii H. Léveillé, Repert. Spec. Nov. Regni Veg. 13: 344. 1914.

Leaves ovate and ovate-lanceolate, rather thick, abaxially sparsely hairy, adaxially strigose, margin shallowly serrate. Phyllaries reddish at apex. Ray florets reddish or white.

• Hubei, Shaanxi, Sichuan, Yunnan; rarely seen in N China.

Y. Ling published *Aster ageratoides* var. *oophyllus* as a “nom. nov.” based on *A. ageratoides* var. *ovatus* (Franchet & Savatier) Handel-Mazzetti, but he explicitly excluded the basionym (and thereby the type) of the latter name, i.e., *A. trinervius* var. *ovatus* Franchet & Savatier. Ling did not indicate a type for *A. ageratoides* var. *oophyllus*, which cannot, therefore, be validly published as the name of a new taxon; however, he cited *A. blinii* in synonymy with a full and direct reference to its author and place of valid publication, hence var. *oophyllus* was validly published as a replacement name based on *A. blinii*.

Aster ageratoides var. **pendulus** W. P. Li & G. X. Chen, Acta Phytotax. Sin. 44: 349. 2006.

垂茎三脉紫菀 chui jing san mai zi wan

Stems pendent, multibranched. Basal and lower cauline leaves abaxially very often purple. Cauline leaves linear-lanceolate, adaxially often hispid, base attenuate, margin with ca. 4-paired serrae. Phyllaries 1.25–1.75 mm wide, apex green. Ray florets white. $2n = 60-92^*$.

• N Hunan (Shimen: Huping Shan).

Aster ageratoides var. **pilosus** (Diels) Handel-Mazzetti, Acta Horti Gothob. 12: 214. 1938.

长毛三脉紫菀 chang mao san mai zi wan

Aster trinervius var. *pilosus* Diels, Bot. Jahrb. Syst. 29: 610. 1901 [“*pilosa*”].

Leaves ovate or oblong-lanceolate, rather thick, abaxially densely shortly hairy, glandular, adaxially shortly strigillose, adaxially on veins and stems spreading white or gray long hairy, hairs ca. 1 mm, base gradually or abruptly attenuate, margin shallowly serrate. Phyllaries purple-brown at apex.

- W Hubei, S Shaanxi, C and E Sichuan.

Aster ageratoides var. **scaberulus** (Miquel) Y. Ling, Fl. Reipubl. Popularis Sin. 74: 162. 1985.

微糙三脉紫菀 wei cao san mai zi wan

Aster scaberulus Miquel, J. Bot. Néerl. 1: 100. 1861; *A. trinervius* f. *pubescens* Kuntze.

Leaves usually ovate or ovate-lanceolate, thicker, abaxially densely puberulent, densely glandular, veins often villous, or glabrescent, adaxially densely strigose, base gradually or abruptly attenuate into narrowly winged or unwinged short petiole, margin shallowly 6–9-serrate. Involucres 5–7 × 6–10 mm; phyllary apex green. Ray florets white or tinged red.

Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, E Sichuan, Yunnan, Zhejiang [Vietnam].

4. **Aster** sect. **Asteromoea** (Blume) Makino, Bot. Mag. (Tokyo) 12: 60. 1898.

马兰组 ma lan zu

Asteromoea Blume, Bijdr. 901. 1826; *Aster* subg. *Kalimeris* Cassini; *Hisutsua* Candolle; *Kalimeris* (Cassini) Cassini; *Martinia* Vaniot (1903), not Crié (1889) [fossil].

Herbs, perennial, usually simple, erect. Leaves basal (withered at anthesis) and cauline; blade cordate, broadly ovate, ovate, oblanceolate to oblong, or linear, margin flat, entire, dentate, serrate, or pinnatifid, sometimes pinnatilobate, 1-veined. Capitula radiate, terminal, in corymbiform synflorescences or solitary at ends of branches. Involucres hemispheric; phyllaries 3- or 4-seriate, unequal, not keeled, margin scarious. Receptacles ± conic or ± convex. Ray florets 1-seriate, 10–27, purple, lilac, blue, pink, or white; disk floret limb campanulate, lobes equal. Achenes obovoid to cylindrical, ± compressed or sometimes triangular, 2–4-ribbed. Pappus of ray and disk florets 1-seriate, of persistent or deciduous, free (or rarely basally connate) short bristles or scales.

About ten species: C, E, and SE Asia, Himalayan region, E Russia; seven species (three endemic) in China.

The taxonomy of this group generally follows Gu and Hoch (Ann. Missouri Bot. Gard. 84: 762–814. 1997), except for treating the species in *Aster* sect. *Asteromoea* instead of *Kalimeris*.

- 1a. Leaves broadly ovate to cordate, margin dentate 18. *A. longipetiolatus*
- 1b. Leaves oblong, ovate, or linear, margin entire, dentate, or pinnatifid.
 - 2a. Phyllaries subleathery, with scarious margins, apically rounded or obtuse, green or reddish purple; achenes 2.5–3.5 mm, sparsely long hairy; pappus 0.7–1.5(–2) mm.
 - 3a. Involucre 10–12 mm in diam., phyllaries narrow and small, 4–5 mm; leaves incised-dentate or sometimes pinnatifid 15. *A. incisus*
 - 3b. Involucre 10–15 mm in diam., phyllaries broader, 5–7 × 2–3 mm.
 - 4a. Leaves entire or pinnatifid, or shallowly dentate, leathery 16. *A. lautureanus*
 - 4b. Leaves pinnatilobate, submembranous 17. *A. mongolicus*
 - 2b. Phyllaries herbaceous in upper part, apically slightly acute; achenes 1.5–2.5 mm, glandular and puberulent in upper part; pappus 0.1–0.8 mm.
 - 5a. Leaves linear-lanceolate, oblong, or lanceolate, entire or minutely 1–3-denticulate 14. *A. pekinensis*
 - 5b. Leaves obovate-oblong or oblanceolate, dentate or pinnately lobed, often entire in upper part.
 - 6a. Leaves thinner, sparsely puberulent or subglabrous; achenes 1.5–2 mm; pappus 0.1–0.3 mm; leaf margin more variable 12. *A. indicus*
 - 6b. Leaves thicker, densely velutinous; achenes 2.5–2.7 mm; pappus ca. 0.3 mm; leaf margin toothed in 1 or 2 pairs or subentire 13. *A. shimadae*

12. **Aster indicus** Linnaeus, Sp. Pl. 2: 876. 1753.

马兰 ma lan

Herbs, perennial, 30–70 cm tall; rhizome stoloniferous, sometimes with vertical roots. Stems erect, puberulent above, branched from upper or lower part. Basal leaves withered by anthesis; cauline leaves long winged petiolate, obovate or oblanceolate to obovate-oblong or oblong, 3–6(–10) × 0.8–2(–5) cm, sparsely to densely puberulent or glabrous, sometimes sparsely glandular, base attenuate, margin serrate or pinnately lobed, apex obtuse or acute; upper leaves sessile, small, slightly thin, base abruptly attenuate, margin entire and hispidulous, midvein abaxially prominent. Capitula 8–120 in corymbiform synflorescences. Involucres hemispheric, 0.4–0.5 × 0.6–0.9 cm;

phyllaries 3- or 4-seriate, unequal; outer phyllaries oblanceolate, 1.6–3.7(–4) mm; inner phyllaries oblong to obovate or spatulate, 2.5–7.5 mm, abaxially sparsely puberulent, leaflike above, margin scarious, ciliate, apex obtuse or sometimes acute. Receptacle conic. Ray florets 1-seriate, 15–20, tube 1.5–1.7 mm, lamina purplish, ca. 10 × 1.5–2 mm; disk florets ca. 3.5 mm, tube ca. 1.5 mm, densely puberulent. Achenes brown, obovoid-oblong, compressed, 1.5–2 × ca. 1 mm, marginally thickly ribbed, apically glandular and puberulent. Pappus 0.1–0.8 mm, subequal, easily deciduous. Fl. and fr. May–Nov.

Forest margins, grasslands, riverbanks, field margins, roadsides, protected shaded habitats; sea level to 3900 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan,

Yunnan, Zhejiang [India, Japan, Korea, ?Laos, Malaysia, N Myanmar, E Russia, N Thailand, N Vietnam].

Aster indicus has been referred to the American genus *Boltonia* L'Héritier, but it differs from it in having achenes without long hairs at the top of the marginal ribs and ray floret achenes often thickly 3-ribbed and triangular.

This species is used medicinally to promote digestion and relieve dyspepsia, promote diuresis, dissipate blood stasis, eliminate toxins, and stop bleeding. The young leaves are usually used as a vegetable in the East.

- 1a. Leaf surfaces glabrous or sparsely puberulent, eglandular 12a. var. *indicus*
 1b. Leaf surfaces sparsely to densely puberulent, sparsely glandular.
 2a. Cauline leaves lanceolate to oblong, sparsely puberulent; rhizomes 0.5–1(–3.5) cm 12b. var. *stenolepis*
 2b. Cauline leaves obovate to oblong, densely puberulent; rhizomes 5–15 cm 12c. var. *collinus*

12a. *Aster indicus* var. *indicus*

马兰(原变种) ma lan (yuan bian zhong)

Aster cantoniensis (Loureiro) Courtois; *A. ursinus* H. Léveillé (1913), not E. S. Burgess (1903); *A. yangtzensis* Migo; *Asteromoea cantoniensis* (Loureiro) Matsumura; *A. indica* (Linnaeus) Blume; *Boltonia cantoniensis* (Loureiro) Franchet & Savatier; *B. indica* (Linnaeus) Benth; *B. indica* var. *rivularis* Hance; *Hisutsua cantoniensis* (Loureiro) Candolle; *H. serrata* Hooker & Arnott; *Kalimeris indica* (Linnaeus) Schultz Bipontinus; *K. indica* var. *polymorpha* (Vaniot) Kitamura; *K. indica* var. *stenophylla* Kitamura; *K. lancifolia* J. Q. Fu; *Martinia polymorpha* Vaniot; *Matricaria cantoniensis* Loureiro.

Rhizomes 0.5–18 cm. Cauline leaves oblong, oblanceolate, elliptic, or obovate, glabrous or sparsely puberulent, eglandular. Phyllaries obovate-oblong. Fl. Jun–Nov.

Forest margins, grasslands, riverbanks, field margins, roadsides, very common; sea level to 3900 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [India, S Japan, Korea, ?Laos, Malaysia, N Myanmar, E Russia, N Thailand, N Vietnam].

The young rosettes are used in salads; the leaves are used as folk medicine.

12b. *Aster indicus* var. *stenolepis* (Handel-Mazzetti) Soejima & Igari, Acta Phytotax. Geobot. 58: 98. 2007.

狭苞马兰 xia bao ma lan

Asteromoea indica var. *stenolepis* Handel-Mazzetti, Acta Horti Gothob. 12: 225. 1938; *Kalimeris indica* subsp. *stenolepis* (Handel-Mazzetti) H. Y. Gu; *K. indica* var. *stenolepis* (Handel-Mazzetti) Kitamura.

Rhizomes 0.5–1(–3.5) cm. Cauline leaves lanceolate to oblong, sparsely puberulent, sparsely glandular.

- Protected shaded habitats; 200–3000 m. Anhui, Fujian, Gansu,

Guangdong, Henan, Hubei, Hunan, Jiangsu, Jiangxi, SW Shaanxi, E Sichuan, Zhejiang.

12c. *Aster indicus* var. *collinus* (Hance) Soejima & Igari, Acta Phytotax. Geobot. 58: 98. 2007.

丘陵马兰 qiu ling ma lan

Boltonia indica var. *collina* Hance, Ann. Sci. Nat., Bot., sér. 5, 5: 219. 1866; *Kalimeris indica* subsp. *collina* (Hance) H. Y. Gu; *K. indica* var. *collina* (Hance) Kitamura.

Rhizomes 5–15 cm. Cauline leaves obovate to oblong, densely puberulent, sparsely glandular. Fl. May–Nov.

- Roadsides, crop field margins; 200–1700 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Yunnan.

13. *Aster shimadae* (Kitamura) Nemoto, Fl. Jap. Suppl. 740. 1936 [“*shimadai*”].

毡毛马兰 zhan mao ma lan

Asteromoea shimadae Kitamura, Acta Phytotax. Geobot. 2: 37. 1933 [“*Shimadai*”]; *Aster indicus* Linnaeus var. *lautureanus* (Yamamoto) Yamamoto; *Asteromoea indica* (Linnaeus) Blume var. *lautureana* Yamamoto; *Kalimeris shimadae* (Kitamura) Kitamura.

Herbs, perennial, (30–)60–200 cm tall, rhizomatous. Stems erect, much branched, densely hispidulous. Leaves thick, densely velutinous, adaxial veins densely hispidulous, margin densely hispidulous-ciliate, 3-veined; lower cauline leaves withered by anthesis; middle cauline leaves subsessile, obovate, oblanceolate, or elliptic, 2.5–4 × 1.2–2 cm, base gradually attenuate, margin shallowly 1- or 2-toothed or entire; upper leaves gradually smaller, oblanceolate or linear. Capitula 20–85 in loose corymbiform synflorescences, 2–2.5 cm in diam. Involucres hemispheric, 6–7 × 8–10 mm; phyllaries 3-seriate, unequal, abaxially densely hairy; outer phyllaries narrowly oblong, 2–3 mm; inner phyllaries oblanceolate-oblong, ca. 5 mm, margin scarious, ciliate, apex leaflike. Ray florets ca. 10, purplish, tube ca. 1.5 mm, hairy, lamina 11–12 × 2–3 mm; disk florets 4–4.5 mm, tube ca. 1.5 mm, hairy. Achenes gray-brown, obovoid, compressed, 2.5–2.7 mm, strigillose, 2-ribbed. Pappus scaly, ferruginous, ca. 0.3 mm, persistent. Fl. and fr. Jun–Nov.

- Forest margins, grassy slopes, dry stony areas, riverbanks; sea level to 2800 m. Anhui, Fujian, Gansu, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Zhejiang.

14. *Aster pekinensis* (Hance) F. H. Chen, Bull. Fan Mem. Inst. Biol., Bot. 5: 41. 1934.

全叶马兰 quan ye ma lan

Asteromoea pekinensis Hance, Ann. Sci. Nat., Bot., sér. 4, 15: 225. 1861; *Aster franchetianus* H. Léveillé; *A. holophyllus* Hemsley, nom. illeg. superfl.; *A. integrifolius* (Turczaninow ex Candolle) Franchet (1884), not Nuttall (1840); *Asteromoea integrifolia* (Turczaninow ex Candolle) Loesener; *Boltonia integrifolia* (Turczaninow ex Candolle) Benth & J. D. Hooker; *B. pekinensis* (Hance) Hance; *Kalimeris integrifolia* Turczaninow ex Candolle.

Herbs, perennial, (10–)30–140 cm tall; roots erect, fusiform. Stems erect, solitary or several fascicled, hispidulous, fas-

tigately branched from middle part. Leaves gray-green, puberulent-tomentulose, midvein adaxially prominent; lower cauline leaves withered by anthesis; middle leaves dense, sessile, linear-lanceolate, oblanceolate, or oblong, 2.5–4 × 0.4–0.6 cm, base gradually attenuate, margin revolute, entire, apex obtuse or acuminate, mucronate; upper leaves small, linear. Capitula in loose corymbiform synflorescences. Involucres hemispheric, ca. 4 × 7–8 mm; phyllaries 3-seriate, imbricate, abaxially densely hispidulous, densely glandular; outer phyllaries linear, ca. 1.5 mm; inner phyllaries oblong-lanceolate, ca. 4 mm, acute, leaflike distally. Ray florets 19–29, pale lilac to pale purple, tube ca. 1 mm, hairy, lamina (5.2–)6–13.5(–15) × ca. 2.5 mm; disk florets 2.1–3.4 mm, tube ca. 1 mm, hairy, lobes unequal. Achenes brownish, obovoid, compressed or sometimes trigonous, 1.8–2 × ca. 1.5 mm, apically puberulent and glandular, 2–4-ribbed. Pappus easily deciduous, brownish, fragile, 0.3–0.5 mm, unequal, sometimes absent. Fl. May–Oct, fr. Jul–Nov.

Forest margins, thickets, mountain slopes, riverbanks, roadsides; sea level to 1600 m. Anhui, Gansu, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan, Zhejiang [Korea, E Russia].

15. *Aster incisus* Fischer, Mém. Soc. Imp. Naturalistes Moscou 3: 76. 1812.

裂叶马兰 lie ye ma lan

Aster incisus var. *australis* Kitagawa; *A. pinnatifidus* Makino f. *robustus* Makino; *Asteromoea incisus* (Fischer) Koidzumi; *Boltonia incisus* (Fischer) Benth; *Grindelia incisus* (Fischer) Sprengel; *Kalimeris incisus* (Fischer) Candolle; *K. incisus* var. *australis* (Kitagawa) Kitagawa; *K. platycephala* Cassini.

Herbs, perennial, 30–120 cm tall, rhizomatous. Stems erect, branched in upper part, sulcate, glabrous or sparsely strigose. Leaves thin; lower cauline leaves withered by anthesis; middle leaves sessile, elliptic-lanceolate or lanceolate, 6–10(–15) × 1.2–2.5(–4.5) cm, abaxially strigose to glabrate, adaxially glabrous or glabrate, base gradually attenuate, margin incised-serrate, sometimes pinnatifid, rarely entire, scabrous, veins prominent, apex acuminate; upper leaves reduced, linear-lanceolate, entire. Capitula 10–55 in open corymbiform synflorescences, 2.5–3.5 cm in diam. Involucres hemispheric, 5–7.5 × 7–12 mm; phyllaries 3-seriate, imbricate, oblong-lanceolate, abaxially sparsely strigillose, margin ciliate; outer phyllaries 3–4 mm, acute; inner phyllaries 4–5 mm, margin scarious, purplish, apex obtuse. Ray florets (13–)16–27(–29), pale lilac to bluish purple, tube 1–1.5 mm, lamina 1.5–1.8 × 0.2–0.25 cm; disk florets yellow, 3–4 mm, tube 1–1.3 mm, limb campanulate, hairy, lobes triangular, ca. 0.6 mm, glabrous. Achenes brownish, obovoid, compressed, 3–3.5 mm, strigose, margin pale 2-ribbed or sometimes 3-ribbed. Pappus reddish, 0.5–1.2 mm. Fl. and fr. Jun–Oct. $2n = 18$.

Grasslands on slopes, thickets, open places between forests, semi-open second-growth forests, wet grasslands, sometimes roadsides; 400–1000 m. Heilongjiang, Jilin, Liaoning, E Nei Mongol [Japan, Korea, E Russia].

Only *Aster incisus* var. *incisus* occurs in China. The second variety, *A. incisus* var. *macrodon* (Vaniot & H. Léveillé) Soejima & Igari (*A.*

macrodon Vaniot & H. Léveillé; *Kalimeris incisus* subsp. *macrodon* (Vaniot & H. Léveillé) H. Y. Gu), is known only from Korea (Cheju Island).

16. *Aster lautureanus* (Debeaux) Franchet, Mém. Soc. Sci. Nat. Cherbourg 24: 224. 1884.

山马兰 shan ma lan

Herbs, perennial, 50–100 cm tall. Stems erect, solitary or 2- or 3-fascicled, sulcate, branched in upper part, scabrous. Leaves thick or subleathery, sparsely scabrous or glabrous, margin revolute, scabrous; lower cauline leaves withered by anthesis; middle leaves sessile, oblong to broadly oblong or sometimes oblanceolate, 3–6(–9) × 0.5–2.4 cm, base gradually attenuate, margin remotely serrate to pinnatifid, sometimes entire, apex acute to obtuse; synflorescence leaves linear-lanceolate to linear, margin entire. Capitula 19–90 in corymbiform synflorescences, 2–3.5 cm in diam. Involucres hemispheric, 10–14 mm in diam.; phyllaries 3-seriate, unequal, apically green, glabrous, margin scabrous; outer phyllaries elliptic, 2.3–4.5 mm, apex acute; inner phyllaries oblanceolate-elliptic, 4.7–6.5(–7.6) × 1.8–3.2 mm, obtuse, margin scarious, erose-fimbriate, purplish. Ray florets 13–22, bluish, tube 1.2–1.4 mm, lamina 1.5–2 × 0.2–0.3 cm; disk florets yellow, 4–5.8 mm, tube 0.7–1.3 mm, upper tube and limb hairy, limb campanulate, lobes lanceolate, 0.5–1.1(–1.5) mm, glabrous. Achenes brownish, obovoid, compressed or sometimes trigonous, 3(–4) × ca. 2 mm, sparsely strigillose, pale 2- or 3-ribbed. Pappus straw-colored or brownish, 0.4–1 mm. Fl. and fr. Jun–Oct.

• Meadows, thickets, mountain slopes, stream banks, ditches, dry roadsides; 100–2200 m. Gansu, Hebei, Heilongjiang, Henan, Jiangsu, Jilin, Liaoning, Ningxia, Shaanxi, Shandong, Shanxi, Zhejiang.

- 1a. Leaves oblong to oblanceolate, 0.5–2 cm wide; disk floret corolla 4.5–5.1 mm 16a. var. *lautureanus*
 1b. Leaves broadly oblong, 1.5–2.4 cm wide; disk floret corolla 5–5.8 mm 16b. var. *mangtaoensis*

16a. *Aster lautureanus* var. *lautureanus*

山马兰(原变种) shan ma lan (yuan bian zhong)

Boltonia lautureana Debeaux, Actes Soc. Linn. Bordeaux 31: 215. 1877; *Asteromoea lautureana* (Debeaux) Handel-Mazzetti; *Kalimeris lautureana* (Debeaux) Kitamura.

Leaves oblong to oblanceolate, 0.5–2 cm wide. Disk floret corolla 4.5–5.1 mm. Fl. and fr. Jun–Oct.

• Meadows, thickets, mountain slopes, stream banks, ditches, dry roadsides; 100–2200 m. Gansu, Hebei, Heilongjiang, Henan, Jiangsu, Jilin, Liaoning, Ningxia, Shaanxi, Shandong, Shanxi, Zhejiang.

16b. *Aster lautureanus* var. *mangtaoensis* (Kitagawa) Kitagawa, J. Jap. Bot. 13: 554. 1937.

小龙山马兰 xiao long shan ma lan

Aster mangtaoensis Kitagawa, J. Jap. Bot. 9: 109. 1933; *Kalimeris lautureana* subsp. *mangtaoensis* (Kitagawa) H. Y. Gu; *K. mangtaoensis* (Kitagawa) Kitamura.

Leaves broadly oblong, 1.5–2.4 cm wide. Disk floret corolla 5–5.8 mm. Fl. and fr. Jul–Aug.

- Liaoning (Xiaolongshan Dao).

17. *Aster mongolicus* Franchet, *Nouv. Arch. Mus. Hist. Nat.*, sér. 2, 6: 41. 1883.

蒙古马兰 meng gu ma lan

Aster associatus Kitagawa; *A. associatus* var. *stenolobus* Kitagawa; *A. lautureanus* (Debeaux) Franchet var. *holophyllus* (Maximowicz) F. H. Chen; *A. lautureanus* var. *mongolicus* (Franchet) Kitagawa; *Asteromoea mongolica* (Franchet) Kitamura; *Kalimeris associata* (Kitagawa) Kitagawa; *K. incisa* (Fischer) Candolle var. *holophylla* Maximowicz; *K. mongolica* (Franchet) Kitamura.

Herbs, perennial, 50–122 cm tall. Stems erect, sulcate upward, strigose, branched in upper part. Leaves submembranous; lowermost cauline leaves withered by anthesis; lower and middle leaves: blade oblanceolate to narrowly oblong, 5–9 × 2–4 cm, sparsely hispidulous or glabrate, margin pinnatifid, densely hispidulous; lobes linear-oblong, margin entire, apex obtuse; uppermost leaves linear-lanceolate, 1–2 cm. Capitula 12–45 in corymbiform synflorescences, 2.5–3.5 cm in diam. Involucre hemispheric, 1–1.5 cm in diam.; phyllaries 3- or 4-seriate, unequal, apically green, elliptic to obovate, 5–7 × 3–4 mm, glabrous, margin scarious, white or purplish, lacerate, apex obtuse. Ray florets (11–)14–25, bluish purple, bluish, or white, tube ca. 2 mm, lamina 13.5–25.5 × 2.7–4.8(–5.2) mm; disk florets yellow, 3.5–4.9 mm, tube 0.8–1.6(–1.8) mm, lobes unequal, 0.8–2.1 mm. Achenes straw-colored or brownish, obovoid, compressed or sometimes trigonous, ca. 3.5 × 2.5 mm, sparsely strigillose, rarely apically glandular, yellowish 2- or 3-ribbed. Pappus brownish, unequal, 0.3–1.2 mm. Fl. and fr. Jun–Oct.

5. *Aster* sect. *Pseudocalimeris* Kitamura, *Mem. Coll. Sci. Kyoto Imp. Univ.*, Ser. B, Biol. 13: 363. 1937.

假马兰组 jia ma lan zu

Heteropappus Lessing.

Herbs, perennial, biennial, or annual, simple or branched, erect, ascending, or decumbent. Leaves basal (withered at anthesis) and cauline; blade linear, oblong-lanceolate, oblanceolate, or spatulate-oblong to spatulate, margin flat, entire or remotely serrate or crenate, 1-veined. Capitula radiate, sometimes discoid, terminal, corymbose-paniculiform or solitary at ends of branches or stems. Involucres hemispheric or patelliform; phyllaries 2- or 3-seriate, subequal (outer sometimes shorter), not keeled, margin sometimes scarious. Receptacles flat. Ray florets 1-seriate, sometimes absent, 15–40, purple, lilac, blue, pink, or white; disk floret limb campanulate, narrowly campanulate, or funnelform, lobes unequal (1 lobe deeper). Achenes obovate or obovoid to obovate-oblong, compressed to flattened, 2-ribbed. Pappus of ray florets sometimes absent or few, short, of disk florets present, 1–3-seriate, persistent or deciduous, inner bristles acute (when present), outer series of free (rarely connate) short scales or bristles.

About 17 species: C and E Asia, E Europe; 12 species (three endemic) in China.

1a. Perennial herbs, rarely biennial; pappus of ray and disk florets identical.

- 2a. Capitula discoid 23. *A. eligulatus*
- 2b. Capitula radiate.
 - 3a. Plants 2.5–7 cm, thickly taprooted 22. *A. boweri*
 - 3b. Plants (3.5–)5–60(–100) cm, not taprooted.
 - 4a. Phyllary margin herbaceous or narrowly scarious 20. *A. asagravi*
 - 4b. Phyllary margin ± broadly scarious (at least inner series).
 - 5a. Phyllary margin broadly scarious; stems erect; ray florets ca. 20 19. *A. altaicus*
 - 5b. Phyllary margin broadly scarious in inner series; stems decumbent to ascending; ray florets (20–)25–35 21. *A. semiprostratus*

Mountain slopes, thickets, semi-open secondary forests, margins of coniferous forests, mixed broad-leaved forests, field margins; sea level to 1300 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol [Korea, E Russia].

18. *Aster longipetiolatus* C. C. Chang, *Sunyatsenia* 6: 22. 1941.

长柄马兰 chang bing ma lan

Aster trichanthus Handel-Mazzetti; *Kalimeris longipetiolata* (C. C. Chang) Y. Ling.

Herbs, perennial, 50–70 cm tall, rhizomatous. Stems erect, simple, slender, villous. Leaves remote, thin, sparsely hairy, margin, adaxially along veins, and petiole densely villous, basally palmately veined, lateral veins 2- or 3-paired, reticulate veins ± conspicuous; basal leaves withered by anthesis or rarely persistent; lower cauline leaves long petiolate; petiole slender, 12–16 cm; blade broadly ovate, 6–7 × 4–6 cm, base truncate or shallowly cordate, margin coarsely serrate (teeth mucronulate), apex acute or cuspidate; middle leaves shortly petiolate; blade cordate, margin coarsely crenate; upper leaves gradually reduced, small, subentire, grading into linear-lanceolate bracts. Capitula 1 or 2, 3.5–4.5 cm. Phyllaries 2- or 3-seriate, equal, linear-oblanceolate, 5–6 mm, leaflike, apex acuminate, subulate-mucronate; inner phyllaries leaflike in upper part, hairy, margin scarious, erose. Ray florets ca. 30, bluish, tube ca. 2 mm, sparsely hairy near base, lamina linear, ca. 20 × 1–1.3 mm; disk florets yellow, ca. 3 mm, tube short, glabrous. Achenes (not seen; ovary) cylindrical, ± compressed. Pappus dirty white, of scalelike bristles, 0.3–1 mm, unequal. Fl. Jul.

- Brooklet banks, valleys; ca. 2500 m. W Sichuan.

Aster longipetiolatus was not included in the revision of *Kalimeris* by Gu and Hoch (*Ann. Missouri Bot. Gard.* 84: 762–814. 1997); its affinities require investigation. Specimens were not seen by one of us (Brouillet).

- 1b. Annual or biennial herbs, sometimes also perennial (*A. arenarius*); pappus of ray florets usually short, sometimes absent or equaling that of disk.
- 6a. Leaves glabrous or glabrate (margin conspicuously ciliate).
- 7a. Stems erect; cauline leaves glabrate 28. *A. oldhamii*
- 7b. Stems procumbent; cauline leaves glabrous or sometimes sparsely strigose 27. *A. arenarius*
- 6b. Leaves hairy.
- 8a. Plants 8–30 cm tall, branched from base, branches decumbent to ascending 30. *A. gouldii*
- 8b. Plants 10–50(–150) cm tall, branched from middle, branches ascending.
- 9a. Pappus of ray florets long 26. *A. neobiennis*
- 9b. Pappus of ray florets absent or of short bristles (shorter than on disk florets); ray achene narrow, sterile.
- 10a. Capitula 30–50 mm in diam.; middle cauline leaf margin coarsely serrate in upper part or entire 25. *A. meyerdorffii*
- 10b. Capitula 10–25 mm in diam.; middle cauline leaf margin entire or crenate.
- 11a. Ray pappus a crown of scales; cauline leaves oblong-lanceolate or linear, margin entire 24. *A. hispidus*
- 11b. Ray pappus a few short bristles or equaling that of disk; cauline leaves spatulate-oblong, margin crenate 29. *A. crenatifolius*

19. *Aster altaicus* Willdenow, Enum. Pl. 2: 881. 1809.

阿尔泰狗娃花 a er tai gou wa hua

Herbs perennial, roots procumbent or vertical, not tap-rooted. Stems usually many, erect, 10–60(–100) cm, covered with closely-set thin hairs directed upward and often glandular in upper part, branched. Basal leaves withered by anthesis, lower linear or oblong-lanceolate, oblanceolate or subspatulate, 2.5–6(–10) × 0.7–1.5 cm, margin entire or remotely shallowly toothed, upper gradually diminished, both surfaces pubescent, densely minutely glandular, midvein abaxially slightly convex. Capitula radiate, numerous, 2–3.5(–4) cm in diam., solitary and terminal or in corymbose-paniculiform synflorescences. Involucres hemispheric, 0.8–1.8 cm in diam.; phyllaries 2- or 3-seriate, subequal or outer series short, oblong-lanceolate or linear, 4–8 × 0.5–1.8 mm, abaxially or all outer series leaflike, shortly rough pilose, short-stipitate glandular, acuminate, outermost linear and shorter than inner, margin ± broadly scarious. Ray florets ca. 20, bluish purple or lilac, tube 1.5–2.8 mm, hairy, lamina oblong-linear, 10–15 × 1.5–2.5 mm; disk florets yellow, 5–6 mm, tube 1.5–2.2 mm, lobes unequal, 0.6–1 × 1–1.4 mm, hairy. Achenes obovate-oblong, compressed, 2–3 mm, strigose, glandular. Pappus of ray and disk florets identical, sordid white or pale brown, of subequal bristles, 4–6 mm. Fl. and fr. Jul–Sep.

Steppes, meadows, salt marshes, grasslands, open slopes, stony slopes, rock outcrops, seashores, roadsides, sandy places by riverbanks; sea level to 4000 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, W Sichuan, Taiwan, Xinjiang, Xizang, NW Yunnan, Zhejiang [Afghanistan, NW India, Kashmir, Kazakhstan, Korea, Mongolia, Nepal, Pakistan, Russia (Siberia), Turkmenistan, Uzbekistan; SW Asia (Iran)].

- 1a. Inner phyllary margin narrowly scarious 19f. var. *taitoensis*
- 1b. Inner phyllary margin narrowly or broadly scarious.
- 2a. Stems and leaves spreading and coarsely white hairy 19e. var. *hirsutus*
- 2b. Stems and leaves strigose.
- 3a. Plants often gray-white, virgately branched; leaves,

especially upper, adnate to stems or peduncles 19b. var. *canescens*

- 3b. Plants green, procumbent-branched; leaves not always appressed to stems.
- 4a. Stems 10–30 cm tall, usually branched from base, ascending, ± procumbent at base; capitula solitary at ends of branches 19a. var. *altaicus*
- 4b. Stems 20–60 cm tall, branched in upper part or multibranched and short, subequal; capitula in few to multibranched synflorescences.
- 5a. Leaves lanceolate; synflorescences few branched; stems erect 19c. var. *scaber*
- 5b. Leaves linear-lanceolate, narrow; synflorescences multibranched; stems erect or ascending 19d. var. *millefolius*

19a. *Aster altaicus* var. *altaicus*

阿尔泰狗娃花(原变种) a er tai gou wa hua (yuan bian zhong)

Aster gmelinii Tausch; *Heteropappus altaicus* (Willdenow) Novopokrovsky; *Kalimeris altaica* (Willdenow) Nees; *K. altaica* var. *subincana* Avé-Lallemant.

Plants green. Stems ascending or erect, 10–30 cm tall, covered with upwardly curved appressed short hairs, branched from base, with few branches. Leaves spreading, linear-lanceolate or spatulate, 3–7(–10) × 0.2–0.7 cm. Capitula solitary, terminal on branches. Involucres 5–15 mm in diam.; phyllaries with outer margin narrowly scarious, inner margin broadly scarious, glandular, hairy.

Steppes, meadows, salt marshes, stony slopes of lower hills, roadsides, roadsides by riverbanks. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong,

Shanxi, NW Sichuan, Xinjiang, Xizang [Kashmir, Kazakhstan, Mongolia, Russia (Siberia)].

"*Aster angustifolius*" (Royle, Ill. Bot. Himal. Mts. 251, t. 58, f. 1. 1835) belongs here but is a nomen nudum and was therefore not validly published (*Vienna Code*, Art. 32.1(d)).

19b. *Aster altaicus* var. *canescens* (Nees) Sergievskaya in Krylov, Fl. Zapadnoi Sibiri 11: 2664. 1949.

灰白阿尔泰狗娃花 hui bai a er tai gou wa hua

Kalimeris canescens Nees, Gen. Sp. Aster. 229. 1832; *Aster canescens* (Nees) Fisjun (1965), not Pursh (1813); *A. pyropappus* Boissier; *A. spatioides* C. B. Clarke; *Heteropappus alberti* (Regel) Novopokrovsky; *H. altaicus* var. *canescens* (Nees) Koroljuk; *H. canescens* (Nees) Novopokrovsky; *K. alberti* Regel.

Plants gray-white. Stems erect or ascending, 30–60 cm tall, strigillose, glandular, branched from base, virgately branched in upper part. Leaves broadly subspatulate, 0.5–0.6 cm; upper adnate to branches and peduncles, linear, ca. 1 × 0.1–0.2 cm, or oblong-linear. Involucres 0.9–1.1 cm in diam.; outer phyllaries leaflike, inner phyllaries with membranous margin, glandular, puberulent.

Dry stony mountains. N Xinjiang [Afghanistan, NW India, Kazakhstan, Mongolia, Pakistan, Russia (W Siberia), Turkmenistan, Uzbekistan; SW Asia (Iran)].

19c. *Aster altaicus* var. *scaber* (Avé-Lallemant) Handel-Mazzetti, Acta Horti Gothob. 12: 220. 1938.

粗糙阿尔泰狗娃花 cu cao a er tai gou wa hua

Kalimeris altaica var. *scabra* Fischer, C. A. Meyer & Avé-Lallemant, Index Sem. Hort. Petrop. 8: 53. 1842; *Heteropappus altaicus* var. *scaber* (Avé-Lallemant) Wang.

Plants green. Stems erect, 20–60 cm, usually branched from middle, sparsely strigillose. Leaves remote, lanceolate, ca. 3 × 0.4 cm. Capitula in few branched synflorescence.

- Liaoning, Shanxi.

19d. *Aster altaicus* var. *millefolius* (Vaniot) Handel-Mazzetti, Acta Horti Gothob. 12: 220. 1938.

千叶阿尔泰狗娃花 qian ye a er tai gou wa hua

Aster millefolius Vaniot, Bull. Acad. Int. Géogr. Bot. 12: 496. 1903; *Heteropappus altaicus* var. *millefolius* (Vaniot) Grierson & Lauener.

Plants green. Stems erect or ascending, covered with upwardly curved appressed short hairs, glandular, with many subequal and spreading branches. Leaves spreading, linear or linear-lanceolate, 1–2 × 0.1–0.25 cm. Capitula in multibranching, densely leafy synflorescences. Involucres 0.5–8 mm in diam.; phyllaries with narrow or broad margins; outer phyllaries leaflike, hairy or glabrate, glandular. Ray florets 5–6 mm.

- Stony or soil-covered slopes, roadsides, very common. Gansu, Hebei, Heilongjiang, Liaoning, Nei Mongol, Shaanxi, Shanxi.

The stems with many subequal long branches, smaller leaves, and smaller capitula differ significantly from other varieties.

19e. *Aster altaicus* var. *hirsutus* Handel-Mazzetti, Acta Horti Gothob. 12: 221. 1938.

糙毛阿尔泰狗娃花 cao mao a er tai gou wa hua

Heteropappus altaicus var. *hirsutus* (Handel-Mazzetti) Y. Ling.

Plants green. Stems ascending or erect, densely spreading and coarsely white hairy, especially upper part, hairs ca. 1 mm or more, few branched from base. Leaves linear-lanceolate or spatulate, spreading coarsely white hairy. Capitula solitary, terminal on branches. Involucres 5–15 mm in diam.; outer phyllaries with narrowly scarios margin; inner with broadly scarios margin, glandular, coarsely white hairy.

- Grasslands, open slopes; 2200–3500 m. W Sichuan (Garzê, Jinchuan, Kangding), NW Yunnan.

This variety is similar to *Aster altaicus* var. *altaicus* but differs in having stems white hirsute.

19f. *Aster altaicus* var. *taitoensis* Kitamura, Acta Phytotax. Geobot. 1: 289. 1932.

台东阿尔泰狗娃花 tai dong a er tai gou wa hua

Heteropappus altaicus var. *taitoensis* (Kitamura) Y. Ling.

Plants green, ca. 50 cm tall. Stems branched from base, densely spreading and ascending appressed hairy. Lower leaves withered by anthesis, oblanceolate-linear or linear, 3–6 × 0.1–0.2(–0.4) mm, margin entire or remotely toothed; middle leaves 2–3 × ca. 0.1 cm; upper leaves small, similar to phyllaries. Involucres 1.5–1.8 cm in diam.; outer phyllaries leaflike, inner phyllaries with narrowly scarios margin, densely hairy.

- Sandy places by riverbanks. Taiwan (Taidong).

20. *Aster asagrayi* Makino, Bot. Mag. (Tokyo) 22: 157. 1908.

华南狗娃花 hua nan gou wa hua

Kalimeris ciliata A. Gray, Mem. Amer. Acad. Arts, n.s., 6: 394. 1858; *Aster ciliatus* (Turczaninow) Handel-Mazzetti (1937), not Kitamura (1934); *Heteropappus ciliatus* (Turczaninow) Y. Ling; *K. ciliosa* Turczaninow.

Herbs, perennial, 15–35 cm tall, taprooted. Stems ascending or decumbent, few branched in upper part, sterile stems short, sparsely to moderately strigose or glabrate, sometimes minutely short-stipitate glandular. Leaves sessile, glabrous or adaxial veins sparsely strigose, eglandular, margin entire, strigose-ciliate, midvein abaxially slightly prominent; lower cauline leaves withered by anthesis; middle leaves narrowly oblanceolate to oblanceolate or spatulate-oblong, 1.5–2.5 × 0.15–0.4 cm, base gradually attenuate, apex rounded; upper leaves smaller, similar to phyllaries, sparsely scabrous; leaves of sterile stems spatulate, 1–1.5 × 0.3–0.4 cm. Capitula solitary at ends of branches or sometimes in corymbiform synflorescences, 2–2.5 cm in diam. Involucres hemispheric, 0.8–1.2 cm in diam.; phyllaries green, 2-seriate, equal or outer phyllaries shorter, lanceolate to linear-lanceolate, 4–5 × 0.5–0.7 mm, abaxially scabrous, margin herbaceous or narrowly (rarely broadly) scarios, erose, scabrous-ciliate, apex acuminate. Ray florets 1-seriate, 15–20, white or pink, tube 2–2.5 mm, sparsely hairy, lamina 8–10.1 × 0.8–1.2 mm; disk florets yellow, 3.3–4 mm, tube 1–1.7 mm, sparsely hairy, limb campanulate, lobes unequal, 1 deep, 0.7–

1.2 mm, hairy. Achenes brownish, obovate, flattened, 2–2.7 mm, scabrous, apically glandular, 2-ribbed. Pappus ca. 2-seriate, reddish or reddish brown, of unequal bristles 2.5–3.3 mm, acute. Fl. and fr. Jul–Sep. $2n = 18$.

Sandy areas by seashores, sandy meadows, grasslands by riversides; sea level to 100 m. Fujian, Guangdong, Hainan [Japan].

21. *Aster semiprostratus* (Grierson) H. Ikeda, Fl. Mustang [Nepal] 351. 2008.

半卧狗娃花 *ban wo gou wa hua*

Heteropappus semiprostratus Grierson, Notes Roy. Bot. Gard. Edinburgh 26: 151. 1964.

Herbs, perennial, (3.5–)5–15 cm tall, caespitose; rhizome short. Stems and branches decumbent or ascending, branched from base, sometimes with densely leafy undeveloped branches in leaf axils, reddish, long white strigose, sparsely short-stipitate glandular (particularly upward). Leaves linear-oblongate or oblanceolate to spatulate, 1–3.2 × 0.2–0.4 cm, ± densely strigose, with sessile glands, or adaxially sparsely strigose, base attenuate, margin entire, strigose-ciliate, midvein abaxially convex, slightly concave adaxially, sometimes basally 3-veined, apex obtuse to acute, mucronate. Capitula radiate, solitary at ends of stems or branches, or sometimes 2 or 3 in corymbiform synflorescences, 1.5–3 cm in diam. Involucres hemispheric, 1–1.5 cm in diam.; phyllaries 3-seriate, green, lanceolate, 6–8 × 0.8–1.8 mm, abaxially strigose, short-stipitate glandular, outer margin leaflike or narrowly scarious, inner phyllaries ± broadly scarious, erose, scabrous- or glandular ciliate, apex acuminate, often purplish. Ray florets (20–)25–35, blue or purplish, tube 2–2.9 mm, hairy, lamina 1.2–1.5 × 0.1–0.2 cm; disk florets yellow, 4–6.3 mm, tube 1.5–2.3 mm, tube and limb sparsely hairy, limb narrowly campanulate, lobes unequal, 1 deep, 5–7.5 mm, hairy. Achenes straw-colored, becoming black mottled or nearly black, obovate, flattened, 1.8–2.5 mm, strigose, apically with sessile glands, margin faintly 2-ribbed, long strigose. Pappus 2- or 3-seriate, reddish to reddish brown, unequal, 4–5 mm. Fl. Jun–Aug.

Dry open stony, gravelly, or sandy slopes, gravelly and sandy open or shrubby floodplains, alpine meadows, rock outcrops; 3200–4600 m. Qinghai, Xizang [Kashmir, Nepal].

22. *Aster boweri* Hemsley, J. Linn. Soc., Bot. 30: 113. 1894 [*“Bowerii”*].

青藏狗娃花 *qing zang gou wa hua*

Aster boweri f. *annuus* Onno; *Heteropappus boweri* (Hemsley) Grierson.

Herbs, biennial or perennial, 2.5–7 cm tall, from caudex, thickly taprooted, sometimes clad with marcescent leaf bases. Stems solitary or 3–6, simple or branched near base, decumbent or ascending, slender, moderately to densely white hispid, more densely so upward, ± densely stipitate glandular below capitula. Leaves ± densely strigose or adaxially glabrate, margin entire, strigose-ciliate, basally crowded, shortly winged petiolate or sessile, narrowly oblanceolate to spatulate, 1–3 × 0.2–0.4 cm, base clasping, apex acute to obtuse; upper cauline leaves lanceolate to linear, 0.5–0.8 × ca. 0.2 cm. Capitula terminal,

solitary, 25–30 mm in diam. Involucres hemispheric, 1–1.5(–2) cm in diam.; phyllaries 2- or 3-seriate, subequal, linear to linear-lanceolate, abaxially ± densely strigose to villous-strigose, herbaceous, margin strigose, of inner phyllaries scarious, erose. Ray florets ca. 40, purple, tube 2–3 mm, lamina 9–13 × 1.5–1.7 mm; disk florets yellow, 4.5–5 mm, tube ca. 1.5 mm, lobes triangular, hairy, unequal, 4 short, 0.5–0.6 mm, 1 long, 1–1.2 mm. Achenes pale brown and blackish streaked, narrowly obovoid, 2.8–3 mm, sparsely strigose. Pappus brownish, 2- or 3-seriate; outer bristles short, 0.5–0.9 mm; inner bristles 4–5.5 mm. Fl. and fr. Jul–Aug.

• Alpine stony and sandy grounds, alpine meadows, montane river floodplains, field margins; 2200–5200 m. W Gansu, Qinghai, Xizang, Yunnan.

23. *Aster eligulatus* (Y. Ling ex Y. L. Chen, S. Yun Liang & K. Y. Pan) Brouillet, Semple & Y. L. Chen, **comb. nov.**

无舌狗娃花 *wu she gou wa hua*

Basionym: *Heteropappus eligulatus* Y. Ling ex Y. L. Chen, S. Yun Liang & K. Y. Pan, Acta Phytotax. Sin. 19: 85. 1981.

Herbs, perennial, 5–15 cm tall; caudex short, from woody taproot. Stems procumbent to ascending, many branched, rigid, green or purple tinged, usually branched from base, white strigose. Leaves sessile, linear, 0.4–2 × 0.1–0.2(–0.4) cm, strigose, midvein slightly raised abaxially, margin entire, strigose, apex obtuse, mucronulate; uppermost leaves small. Capitula discoid, terminal, solitary, 8–13 mm in diam.; phyllaries 2- or 3-seriate, green or purple tinged, lanceolate, 5.5–6.5 × 1.2–2 mm, strigose, margin scarious, apex acuminate. Ray florets absent; disk florets yellow, 4.3–5 mm, tube 1–1.3 mm, limb funnelform, glabrous, lobes triangular to lanceolate, unequal, 0.8–1.2 mm, hairy. Achenes pale yellow-brown, obovoid, compressed, ca. 2 × 1 mm, sericeous, margin 2-ribbed. Pappus pale yellow-brown, 2-seriate, of 35–45 unequal bristles 3–3.5 mm. Fl. and fr. Jul–Sep.

• Stony grounds; 3200–3900 m. Xizang.

Aster eligulatus is similar to *Heteropappus holohermaphroditus* Grierson, described from India, Kashmir, and Pakistan, but differs in having stems branched from the base and capitula terminal, solitary. The differences noted above, however, might stem from phenotypic plasticity: the plants from south of the Himalaya being taller (15–45 cm) and the capitula numerous, borne at the ends of long peduncles. More material and a morphometric study are needed to resolve this issue.

24. *Aster hispidus* Thunberg, Nova Acta Regiae Soc. Sci. Upsal. 4: 39. 1783.

狗娃花 *gou wa hua*

Aster batakenis Hayata; *A. fusanensis* H. Léveillé & Vaniot; *A. hispidus* var. *decipiens* (Maximowicz) Y. Ling; *A. hispidus* var. *heterochaeta* Franchet & Savatier; *A. hispidus* var. *mesochaeta* Franchet & Savatier; *A. hispidus* var. *microphyllus* Pampanini; *A. oldhamii* Hemsley var. *batakenis* (Hayata) Sasaki; *A. omerophyllus* Hayata; *A. rufopappus* Hayata; *Heteropappus decipiens* Maximowicz; *H. hispidus* (Thunberg) Lessing; *H. hispidus* f. *decipiens* (Maximowicz) Komarov; *H. hispidus* var. *decipiens* (Maximowicz) Voroschilov; *H. incisus* Sie-

bold & Zuccarini; *H. pinetorum* Komarov; *Kalimeris hispida* (Thunberg) Nees.

Herbs, annual or biennial, 30–50(–150) cm tall; taproot vertical, fusiform. Stems solitary or sometimes several fascicled, branched, strigose or hispid, glabrescent in lower part. Leaves thin, sparsely strigose or glabrous, margin ciliate, midvein and secondary veins prominent; basal and lower cauline leaves withered by anthesis, long petiolate; blade obovate, 4–13 × 0.5–1.5 cm, attenuate, margin entire or remotely serrate, apex obtuse or rounded; middle leaves oblong-lanceolate or linear, 3–7 × 0.3–1.5 cm, margin often entire; upper leaves reduced in size, linear. Capitula radiate, in broad corymbiform synflorescences, 3–5 cm in diam., long pedunculate. Involucres hemispheric, 7–8 × 10–20 mm; phyllaries 2-seriate, subequal, abaxially strigose, often glandular; outer phyllaries linear-lanceolate, ca. 1 mm wide, leaflike; inner phyllaries rhombic-lanceolate, margin scarious, strigose. Ray florets ca. 30, reddish or white, tube ca. 2 mm, lamina linear-oblong, 12–20 × 2.5–4 mm; disk florets 5–7 mm, tube 1.5–2 mm, lobes unequal, 1–1.5 mm. Achenes obovoid, compressed, 2.5–3 × ca. 1.5 mm, strigose, marginally finely 2-ribbed. Pappus of ray florets a crown of scales ca. 0.5 mm, of disk florets white, later red tinged, bristles nearly equaling corolla. Fl. Jul–Sep, fr. Aug–Oct.

Forest margins, grasslands, roadsides; sea level to 2400 m. Anhui, Fujian, Gansu, Hebei, Heilongjiang, Hubei, Jiangsu, Jiangxi, Jilin, Nei Mongol, Shaanxi, Shandong, Shanxi, N, NE, and NW Sichuan, Taiwan, Zhejiang [Japan, Korea, Mongolia, E Russia].

25. *Aster meyerendorffii* (Regel & Maack) Voss, Vilm. Blumen-gärtn., ed. 3, 469. 1894.

砂狗娃花 sha gou wa hua

Galatella meyerendorffii Regel & Maack, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 4: 81. 1861; *Aster ciliosus* Kitamura; *A. depauperatus* H. Léveillé & Vaniot (1909), not Fernald (1908); *Heteropappus hispidus* (Thunberg) Lessing var. *longiradiatus* Komarov; *H. magnicalathinus* J. Q. Fu; *H. meyerendorffii* (Regel & Maack) Komarov & Alissova-Klobukova; *H. meyerendorffii* var. *hirsutus* Y. Ling & W. Wang; *H. tataricus* (Lindley ex Candolle) Tamamschjan var. *hirsutus* (Y. Ling & W. Wang) H. C. Fu.

Herbs, annual, 35–50 cm tall. Stems erect, striate, ± densely strigose or hispid, strigillose, usually branched from middle, branches ascending. Leaves: basal and lower cauline withered by anthesis, long petiolate, ovate or obovate-oblong, 5–6 × 2.5–3.5 cm, 3-veined, base attenuate, margin roughly crenate, apex obtuse or acute; middle cauline leaves sessile, abaxially pale green, adaxially green, narrowly oblong, 6–8 × 1–2 cm, strigose or adaxially glabrate, abaxial veins strigose, midvein and lateral veins slightly conspicuous on both surfaces, base gradually attenuate, margin coarsely serrate in upper part or entire, strigose-ciliate, apex obtuse or acute; upper leaves gradually smaller, lanceolate to linear-lanceolate, 1–1.5 × ca. 0.3 cm, margin entire, 1-veined. Capitula terminal, solitary on branches, 30–50 mm in diam. Involucres hemispheric, 13–18 mm in diam.; phyllaries 2- or 3-seriate, leaflike, linear-lanceolate, 7–8 mm, apex acuminate, hispid, glandular, inner margin scarious in lower part. Ray florets blue-purple, tube ca. 1.8 mm,

lamina linear-oblong, 14–17(–27) × 2–2.5 mm, apex 3-toothed or entire; disk florets yellow, ca. 5 mm, tube 1–1.5 mm, sparsely hairy, lobes unequal, 0.8–1.2 mm. Achenes of ray florets narrow, sterile, of disk oblong-obovate, compressed, densely silky. Pappus of ray florets few, short or sometimes absent, of disk florets reddish to reddish brown, of 25–35 bristles, 2–4.45 mm, unequal. Fl. Aug–Sep.

Sandy riverbanks, sandy hillside forest understories, grasslands on slopes; above 800 m. NE Gansu, Hebei, Heilongjiang, Jilin, Nei Mongol, Shaanxi, Shanxi [Japan, Korea, E Russia].

This species is very decorative due to the presence of numerous large capitula.

26. *Aster neobiennis* Brouillet, Semple & Y. L. Chen, **nom. nov.**

鞑靼狗娃花 da da gou wa hua

Replaced synonym: *Callistephus biennis* Lindley ex Candolle, Prodr. 5: 275. 1836, not *Aster biennis* Nuttall, Gen. N. Amer. Pl. 2: 155. 1818, nom. illeg. superfl. [*Aster canescens* Pursh, Fl. Amer. Sept. 2: 547. 1813]; *A. hispidus* Thunberg var. *sibiricus* (Komarov) Y. Ling; *Heteropappus hispidus* (Thunberg) Lessing var. *sibiricus* Komarov; *H. meyerendorffii* (Regel & Maack) Komarov & Alissova-Klobukova var. *tataricus* (Lindley ex Candolle) Y. Ling & W. Wang; *H. tataricus* (Lindley ex Candolle) Tamamschjan; *Kalimeris biennis* (Lindley ex Candolle) Ledebour (1845), not Nees (1832); *K. tatarica* Lindley ex Candolle (1836), not *Aster tataricus* Linnaeus f. (1782).

Herbs, biennial, 20–40 cm tall. Stems erect, usually solitary, rarely 2- or 3-fascicled, branched in upper part, branches ascending, purplish or reddish, strigose to hirsute, glandular or not. Lower cauline leaves deciduous by anthesis; middle leaves lanceolate to linear-lanceolate, sometimes linear, 2–5 × 0.2–0.5 cm, strigose, eglandular or sparsely minutely glandular, margin long strigose-ciliate, apex acuminate; uppermost leaves reduced. Capitula terminal, solitary on branches, forming open corymbiform synflorescences, 25–40 mm in diam. Involucres hemispheric, 1.2–2 cm in diam.; phyllaries linear-lanceolate to lanceolate, 8–11 mm, abaxially strigose, inconspicuously glandular in lower half, margin scarious, ciliate, apex acuminate. Ray florets blue or blue-lilac, tube 2.5–3 mm, sparsely hairy, lamina 14–28 × 2–2.2 mm; disk florets yellow, sparsely hairy (tube and limb), 3.7–5 mm, tube 1.2–1.8 mm, limb narrowly campanulate, lobes lanceolate, unequal, 0.6–0.8(–1.5) mm. Achenes obovoid, (immature) ca. 2 mm, strigillose. Pappus reddish brown to yellowish, of ray and disk florets ± equal, 3–3.5 mm. Fl. Jul–Aug.

Forest understories on sandy hills, sandy riverbanks. Hebei, Nei Mongol, Shanxi [Mongolia, E Russia (E European part, Siberia)].

“*Aster biennis* Ledebour” (in Weinmann, Bot. Gart. Dorpat, Suppl. I, [1]. 1811; Franchet, Mém. Soc. Sci. Nat. Math. Cherbourg 24: 224. 1884) belongs here but is a nomen nudum and was therefore not validly published (*Vienna Code*, Art. 32.1(d)).

27. *Aster arenarius* (Kitamura) Nemoto, Fl. Jap. Suppl. 736. 1937.

普陀狗娃花 pu tuo gou wa hua

Heteropappus arenarius Kitamura, Acta Phytotax. Geobot. 2: 43. 1933; *H. hispidus* (Thunberg) Lessing subsp. *arenarius* (Kitamura) Kitamura.

Herbs, biennial or perennial, 15–70 cm tall; taproot woody. Stems procumbent or ascending, branched from base, sparsely to moderately strigose or glabrate. Leaves: basal petiole 1.5–3 cm; blade spatulate, 3–6 × 1–1.5 cm, thick, glabrate or sparsely villous, base cuneate to attenuate, margin entire or sometimes remotely serrate, scabrous-ciliate, apex rounded to acute; lower and basal cauline leaves withered by anthesis; middle and upper leaves oblanceolate-oblong, 1–2.5 × 0.2–0.6 cm, glabrous or sometimes sparsely strigose, base attenuate, margin scabrous-ciliate, apex rounded to acute. Capitula solitary at ends of branches, 25–30 mm in diam., peduncle apex dilated; bracts leaflike, surrounding capitulum. Involucres patelliform, 1.2–1.5 cm in diam.; phyllaries 2-seriate, lanceolate, 7–8 × 1–1.5 mm, sparsely scabrous or glabrous, margin scabrous-ciliate, apex acuminate. Ray florets bluish or whitish, tube ca. 1.5 mm, lamina linear-oblong, ca. 1.2 × 0.25 cm; disk florets yellow, 4–5 mm, tube 1.3–1.5 mm, limb funnelform, enlarged, sparsely hairy at base, lobes unequal, triangular, ca. 0.7 mm. Achenes yellowish brown, obovoid, compressed, 2.5–3 mm, strigose, 2- or 3-ribbed. Pappus 1-seriate, of ray florets sordid, basally connate scales ca. 1 mm, of disk florets brownish, numerous, rigid bristles 3–4.2 mm.

Sandy seashores; near sea level. Zhejiang (Putuo) [Japan].

28. *Aster oldhamii* Hemsley, J. Linn. Soc., Bot. 23: 414. 1888 [*“Oldhami”*].

台北狗娃花 tai bei gou wa hua

Heteropappus hispidus (Thunberg) Lessing subsp. *oldhamii* (Hemsley) Kitamura; *H. oldhamii* (Hemsley) Kitamura.

Herbs, biennial, 50–60 cm tall, taprooted. Stems erect, sometimes decumbent, branched from lower part; branches ascending, sparsely to moderately (upward) villous-strigose, strigillose, with sessile glands upward. Leaves thick, margin entire, strigose-ciliate; basal leaves rosulate, withered by anthesis; blade spatulate-oblong, 8–15 × 3–6 cm, glabrous or glabrate, base attenuate, apex rounded; cauline leaves spatulate-oblong or narrowly obovate to oblong, 2.5–4.5 × 0.8–1.7 cm, glabrate, base cuneate, margin entire, strigose-ciliate, apex rounded; uppermost leaves remote, oblanceolate, gradually reduced, 0.5–1.2 × 0.2–0.4 cm. Capitula radiate or sometimes discoid, terminal, solitary on branches, forming open paniculate-corymbiform synflorescences, ca. 25 mm in diam. Involucres hemispheric, 0.6–1 cm in diam.; phyllaries 2-seriate, subequal, lanceolate to spatulate or oblanceolate (inner), 5–6 mm, ± strigose, margin sometimes partly scariosus, strigose-ciliate, apex acute to acuminate. Ray florets sometimes absent, whitish, ca. 10 × 1.3–3 mm, tube 1–1.7 mm, sparsely hairy; disk florets 3–4.5 mm, tube 0.8–1.5 mm, tube and limb hairy, limb narrowly campanulate to campanulate, lobes unequal, 1 longer, 0.4–0.6(–1.3) mm, minutely with sessile glands and/or strigose-hairy. Achenes obovoid to broadly obovoid, compressed, 1.8–2.5 mm, strigose. Pappus of ray florets whitish, lacerate scales 0.4–1(–1.5) mm, of disk florets reddish, stout bristles 1.8–2.5(–3.5) mm.

• Rocky seashores; sea level. N Taiwan (Taibei).

Some individuals of *Aster oldhamii* are without ray florets (capitula discoid) and have been called *Heteropappus oldhamii* f. *discoidus* Kitamura (Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 13: 321. 1937; 盘状台北狗娃花 pan zhuang tai bei gou wa hua).

29. *Aster crenatifolius* Handel-Mazzetti, Symb. Sin. 7: 1092. 1936.

圆齿狗娃花 yuan chi gou wa hua

Aster crenatifolius var. *subracemosus* Handel-Mazzetti; *Heteropappus crenatifolius* (Handel-Mazzetti) Grierson.

Herbs, annual or biennial, 10–60 cm tall, taprooted. Stems erect, solitary, branched only above, sparsely to densely strigose, stipitate glandular upward. Leaves strigose, with sessile glands; basal leaves rosulate, withered by anthesis; cauline leaves remote; lower cauline leaves shortly winged petiolate; blade oblanceolate, oblong, or spatulate, 2–10 × 0.5–1.6 cm, base attenuate to cuneate, margin entire or ± crenate, apex obtuse or rounded; middle leaves sessile, smaller, base sometimes ± rounded, margin often entire; upper leaves small, linear-oblanceolate or -oblong. Capitula solitary, terminal on branches, sometimes forming ± corymbiform synflorescences, 20–25 mm in diam. Involucres hemispheric, 1–1.5 cm in diam.; phyllaries 3-seriate, sometimes purplish tinged, subequal, linear or linear-lanceolate, 5–8 × 0.6–1.5 mm, abaxially sometimes scabrous or sparsely villous, ± stipitate glandular, margin scabrous-ciliate or glandular, outer phyllaries leaflike, inner phyllaries margin scariosus. Ray florets 35–40, mauve or blue, tube 1.2–1.8 mm, glabrous or hairy, lamina 8–12 × 1.6–2.4 mm; disk florets yellow, 4.2–4.8 mm, tube 1–2 mm, glabrous or hairy, limb ± narrowly campanulate, lobes lanceolate, unequal, 0.5–1.5 mm, hairy. Achenes pale greenish brown to pale brownish mottled black or black mottled to black, obovoid, 2–2.8 mm, 2-ribbed marginally, sparsely strigose, sparsely apically glandular. Pappus of ray florets often few and short, sometimes absent or equaling that of disk, of disk 2-seriate, straw-colored or brownish, of unequal bristles 2.9–4.2 mm. Fl. and fr. May–Oct.

Open disturbed slopes, pebbly-sandy river floodplains, riverbanks, alpine or montane meadows, *Juniperus* slopes, montane woodlands, fields, roadsides; 1200–4100 m. Gansu, Hebei, Ningxia, Qinghai, Shaanxi, Sichuan, E Xizang, NW Yunnan [Nepal].

30. *Aster gouldii* C. E. C. Fischer, Bull. Misc. Inform. Kew 1938: 286. 1938.

拉萨狗娃花 la sa gou wa hua

Aster crenatifolius Handel-Mazzetti, p.p. quod syn.; *Heteropappus gouldii* (C. E. C. Fischer) Grierson.

Herbs, annual, 8–30 cm tall, spreading, taprooted. Stems branched from base; branches decumbent to ascending, ± densely strigose, stipitate glandular, especially above. Basal leaves withered by anthesis, winged petiolate, base of petiole clasping, blade oblanceolate, base gradually attenuate; cauline leaves sessile or indistinctly petiolate; blade linear, oblong, oblanceolate, or spatulate, 0.7–3.5 × 0.2–0.5 cm, strigose, stipitate glandular, base attenuate, margin entire, strigose-ciliate, apex obtuse or acute. Capitula solitary or few at ends of branches,

1.5–2.5 cm in diam. Involucres hemispheric, 1–1.5 cm in diam.; phyllaries 2- or 3-seriate, green, subequal, linear-lanceolate to lanceolate, 5–7 × 0.8–1.8 mm, herbaceous, abaxially stipitate glandular, sparsely villous-strigose, acuminate, margin glandular, of inner phyllaries scarious, erose. Ray florets 25–40, purplish or bluish, tube 1.5–2.1 mm, tube and lamina base sparsely hairy, lamina 10–11 × 1.2–2 mm; disk florets yellow, 3.5–4 mm, tube 1–1.2 mm, sparsely hairy, limb campanulate, lobes unequal, 4 short, 0.6–0.9 mm, 1 long, 1.1–1.3 mm, glabrous. Achenes of ray florets pale olive green and black mottled to

black, obovoid, ± compressed, 2–2.5 × 1–1.2 mm, strigose, sparsely glandular apically, faintly 2- or 3-ribbed; of disk florets straw-colored, ± black mottled, obovate to oblanceolate, flattened, 2.2–2.3 mm, strigose, markedly 2-ribbed. Pappus of ray florets 1-seriate, scales 0.3–0.5 mm; of disk florets 2-seriate, reddish; outer bristles ca. 0.5 mm; inner bristles ± stiff, 3.3–3.7 mm. Fl. and fr. Jun–Sep.

Open grassy slopes, disturbed open or bare slopes in alpine meadows, sometimes sandy soils and riverbanks, field margins; 2900–5600 m. Qinghai, Xizang [Bhutan, India (Sikkim)].

6. *Aster* sect. *Aster*

紫菀组 *zi wan zu*

Gymnaster Kitamura (1937), not F. Schütt (1891) [Algae]; *Kitamuraea* Rauschert; *Kitamuraaster* Soják; *Leptocoma* Lessing; *Miyamayomena* Kitamura; *Rhynchospermum* Reinwardt; *Zollingeria* Schultz Bipontinus.

Herbs, perennial, usually simple, sometimes branched, erect. Leaves basal (withered at anthesis) and cauline; blade spatulate or ovate to narrowly ovate or lanceolate, sometimes pandurate, margin flat, entire or serrate to coarsely serrate, 1-veined (rarely 3-veined). Capitula radiate, rarely discoid, terminal, numerous, in corymbiform synflorescences, rarely few, rarely solitary at ends of branches or in leaf axils. Involucres hemispheric, campanulate, or obconic, to cylindric-campanulate; phyllaries 3–7-seriate, unequal or sometimes subequal, membranous (upper part sometimes leaflike) or outer leaflike, not keeled, margin scarious. Receptacles flat or ± convex, rarely conic. Ray florets 1(or 2)-seriate, 10–40, purple, blue, lavender, pink, or white; disk floret limb campanulate or sometimes funnellform, lobes equal. Achenes obovoid or oblong to oblanceoloid, ± compressed, 2–6-ribbed. Pappus of ray and disk florets 1–4-seriate, of persistent, rarely caducous, numerous free bristles, innermost series clavate, outermost series of short bristles, rarely of scales, sometimes absent in ray and/or disk florets.

About 60 species: Asia, Europe; 49 species (40 endemic) in China.

As circumscribed here, *Aster* sect. *Aster* is paraphyletic to *A. sect. Alpigeni* (Brouillet et al. in Funk et al., Syst. Evol. Biogeogr. Compositae, 589–629. 2009). The separation of *A. sect. Aster* and *A. sect. Orthomeris* Torrey & A. Gray (Y. Ling & Y. L. Chen, FRPS 74: 134, 157. 1985) is unclear, and data supporting the segregation of monophyletic groups within the section are insufficient at the present time. Removal of the shrubby species of *A. ser. Albescentes* (Incertae sedis group above) renders the group more natural. Furthermore, the name *A. sect. Orthomeris* belongs to the North American *Oclemena* Greene (Brouillet, Fl. N. Amer. 20: 78–81. 2006) and would be inappropriate in *Aster* s.s.

A hitherto unrecognized group of species within *Aster* sect. *Aster* (formerly part of *A. sect. Orthomeris*, see Y. Ling & Y. L. Chen, loc. cit.) was identified in molecular phylogenies (Brouillet et al., loc. cit.), where it appeared to be sister to members of *A. sect. Alpigeni*. The group also includes *Miyamayomena* and *Rhynchospermum*. Morphologically, it is characterized by distally unreduced or slightly reduced cauline leaves that are abaxially pale and often appearing spongy on the surface; some species are glabrous, but most are hairy with minutely stipitate glands that are often (but not always) found in shallow pits and produce an abundance of resin, making the surface or parts of the surface vernicose. Some members of the group have a caducous pappus (*Rhynchospermum*) or have lost the pappus of ray and/or disk achenes (*Miyamayomena*). Further phylogenetic work is necessary to determine the monophyly and limits of this group.

- 1a. Leaf surfaces (both) glabrous (sometimes abaxial veins sparsely strigillose), eglandular; leaves thick, margin revolute.
 - 2a. Capitula solitary in leaf axils or terminal, overall forming a paniculose-corymbiform synflorescence; pappus dirty white 65. *A. hunanensis*
 - 2b. Capitula in corymbiform synflorescences; pappus reddish or yellowish.
 - 3a. Leaves abaxially with 3 or 4 pairs of lateral veins joining to form a raised submarginal vein on each side; achenes 4-ribbed; pappus reddish 49. *A. dolichophyllus*
 - 3b. Leaves with lateral veins 2- or 3-paired; achenes 2-ribbed; pappus yellowish 50. *A. moupinensis*
- 1b. Leaf abaxial and/or adaxial surfaces hairy or glandular; leaves thick or thin, margin flat or revolute.
 - 4a. Abaxial leaf surface minutely stipitate glandular in pits.
 - 5a. Pappus absent in all achenes, or absent in ray and of scales in disk achenes.
 - 6a. Disk pappus of short scales 58. *A. piccolii*
 - 6b. Disk pappus absent.
 - 7a. Ray achenes long beaked 64. *A. verticillatus*
 - 7b. Ray achenes not beaked.
 - 8a. Achenes inconspicuously ribbed; leaf margin entire.
 - 9a. Stems and leaves hispidulous-villous; middle leaves oblong-lanceolate or subelliptic, 1.5–2.5(–4) × 0.3–0.6(–0.9) cm; ray florets ca. 16 mm 60. *A. pseudosimplex*

- 9b. Stems hirsutulous, leaves strigose; middle leaves lanceolate-ovate to narrowly oblong or linear, 1–3 × 0.1–0.6 cm; ray florets 5–7 mm 61. *A. lixianensis*
- 8b. Achenes 2–4- to multiribbed; leaf margin ± serrate or crenate.
- 10a. Leaf margin coarsely serrate to serrate 59. *A. yuanqunensis*
- 10b. Leaf margin remotely serrate, serrulate, or obscurely repand-crenate.
- 11a. Middle leaf blades oblanceolate to narrowly lanceolate, margin remotely serrate to serrulate 62. *A. sinoangustifolius*
- 11b. Middle leaf blades ovate, broadly elliptic, or obovate, margin obscurely repand-crenate 63. *A. lushiensis*
- 5b. Pappus present in all achenes.
- 12a. Ray achenes long beaked 64. *A. verticillatus*
- 12b. Ray achenes not beaked.
- 13a. Phyllary abaxially with midvein plus 3–7 dark green striae; peduncle bracts crowded below head, often grading into phyllaries 73. *A. falcifolius*
- 13b. Phyllary without dark green striae; peduncle bracts not grading into phyllaries.
- 14a. Capitula terminal, solitary (rarely 2) on branches 69. *A. molliusculus*
- 14b. Capitula few to many (rarely 1) in terminal corymbiform synflorescences.
- 15a. Involucres cylindric-campanulate.
- 16a. Ray florets purple 55. *A. alatipes*
- 16b. Ray florets white.
- 17a. Phyllaries 3- or 4-seriate; leaf blade ovate, base cordate 48. *A. formosanus*
- 17b. Phyllaries 5–7-seriate; leaf blade obovate to oblanceolate, base attenuate 51. *A. taiwanensis*
- 15b. Involucres campanulate to hemispheric.
- 18a. Phyllaries 3- or 4-seriate, unequal.
- 19a. Ray florets purple 36. *A. veitchianus*
- 19b. Ray florets white.
- 20a. Lower leaf margin coarsely 3- or 4-serrate distally, teeth pointing forward 53. *A. taoyuenensis*
- 20b. Lower leaf margin crenate-serrate 57. *A. morrisonensis*
- 18b. Phyllaries 2- or 3-seriate, subequal.
- 21a. Ray florets 10–14; capitula 1–10 54. *A. homochlamydeus*
- 21b. Ray florets 25–35(–60); capitula 10 to numerous.
- 22a. Ray florets 30–35(–60); achenes 4-ribbed 70. *A. sikkimensis*
- 22b. Ray florets 25–30; achenes 2-ribbed 72. *A. nigromontanus*
- 4b. Abaxial leaf surface eglandular or glandular (but not in pits).
- 23a. Subshrubs or woody perennial herbs.
- 24a. Phyllaries 3-seriate, unequal to subequal; leaf blades lanceolate, 4–7.5[–10] cm; ray florets 21–25 46. *A. smithianus*
- 24b. Phyllaries 4- or 5-seriate, unequal; leaf blades linear-oblong, oblong, or oblong-lanceolate to elliptic, 0.5–2.5(–3) cm; ray florets 10–20.
- 25a. Leaf and phyllary surfaces strigose, villous; involucres cylindric-campanulate; phyllaries ± leaflike 42. *A. poliothamnus*
- 25b. Leaf and phyllary surfaces densely velutinous; involucres hemispheric; phyllaries membranous 43. *A. sikuensis*
- 23b. Herbs perennial.
- 26a. Phyllaries 2- or 3-seriate, subequal, outer usually leaflike (if sometimes unequal then outer leaflike).
- 27a. Ray florets purple, mauve, pink, or blue; achenes obovoid.
- 28a. Involucres hemispheric; ray florets 50–60 44. *A. taliangshanensis*
- 28b. Involucres campanulate to broadly campanulate; ray florets 13–30.
- 29a. Leaf blade broadly ovate or oblong to lanceolate, base cordate or rounded, margin coarsely serrate to serrate; achenes 4-ribbed, pappus red-brown; disk corolla limb funnelform 34. *A. fuscescens*
- 29b. Leaf blade oblanceolate, base attenuate to cuneate or rounded, margin entire or serrulate to serrate or coarsely serrate; achenes 2-ribbed, pappus dirty white or straw-colored; disk corolla limb campanulate.
- 30a. Ray florets mauve or pink; pappus dirty white; leaf surfaces scabridulous 31. *A. indamellus*
- 30b. Ray florets blue; pappus straw-colored; leaf abaxially villosulous, adaxially strigillose 39. *A. trichoneurus*
- 27b. Ray florets white; achenes oblong or oblanceoloid, rarely obovoid.
- 31a. Herbs scapiform; leaves basal, rosulate; capitula 1 or 2, terminal 68. *A. itsunboshi*
- 31b. Herbs erect; leaves cauline; capitula 2 to numerous in terminal corymbiform synflorescences (rarely solitary).
- 32a. Middle leaf base auriculate, clasping; ray florets 18–30 35. *A. auriculatus*
- 32b. Middle leaf base cuneate, rounded, or attenuate; ray florets 10–20.
- 33a. Leaf base cuneate to rounded, apex obtuse or rounded, margin revolute, entire 40. *A. mangshanensis*

- 33b. Leaf base attenuate, apex acute to acuminate, margin flat, ± serrate or entire.
- 34a. Leaf blade ovate to ovate-lanceolate, midvein prominent 45. *A. procerus*
- 34b. Leaf blade oblong-lanceolate, triplinerved 66. *A. menelii*
- 26b. Phyllaries 3–7-seriate, unequal, leaflike in upper part or not leaflike (notably if subequal).
- 35a. Leaf margin revolute, entire or ± serrate.
- 36a. Pappus white or dirty white (innermost reddish).
- 37a. Middle leaf blade oblanceolate to ovate, base cuneate-rounded to rounded; ray florets white; pappus dirty white (innermost reddish) 52. *A. chingshuiensis*
- 37b. Middle leaf blade narrowly lanceolate to linear-lanceolate, base attenuate; ray florets blue-purple; pappus white 67. *A. gracilicaulis*
- 36b. Pappus reddish brown or orangish.
- 38a. Middle leaf abaxial surface tomentose; phyllaries 3-seriate 41. *A. vestitus*
- 38b. Middle leaf abaxial surface velutinous or moderately scabridulous, strigose; phyllaries 4–6-seriate.
- 39a. Middle leaves sessile or shortly petiolate, blade lanceolate, abaxially velutinous 77. *A. velutinosus*
- 39b. Middle leaves winged petiolate, blade ovate to linear-obovate, abaxially moderately scabridulous, strigose, minutely stipitate glandular 79. *A. sampsonii*
- 35b. Leaf margin flat, coarsely serrate or serrate to serrulate or entire.
- 40a. Ray florets white.
- 41a. Abaxial leaf surface moderately scabrous or moderately strigose, adaxial surface scabrous, margin serrate or serrulate; phyllaries 5–7-seriate.
- 42a. Middle leaf blade pandurate or ovate to ovate-lanceolate, base truncate or rounded to auriculate-clasping; capitula 1–10 in racemiform synflorescences; involucre 10–12 mm 74. *A. turbinatus*
- 42b. Middle leaf blade narrowly ovate to lanceolate, base attenuate to rounded; capitula numerous in corymbiform to paniculiform synflorescences; involucre 6–7 mm 75. *A. baccharoides*
- 41b. Abaxial leaf surface ± hispidulous, adaxial surface sparsely puberulent or hispidulous, margin entire to subentire or sparsely serrate; phyllaries 4- or 5-seriate.
- 43a. Middle leaf blade oblong or oblong-elliptic, base attenuate 76. *A. sinianus*
- 43b. Middle leaf blade ovate, base rounded 78. *A. ovalifolius*
- 40b. Ray florets purple.
- 44a. Middle leaf blade cordate, reniform, or subrounded, cordate-ovate 56. *A. limosus*
- 44b. Middle leaf blade pandurate or ovate to ovate-lanceolate, lanceolate, or linear-lanceolate.
- 45a. Middle and upper leaves petiolate; disk corolla limb funnelform, lobes lanceolate; achenes lanceoloid 71. *A. pycnophyllus*
- 45b. Middle and upper leaves winged petiolate or sessile; disk corolla limb campanulate, lobes narrowly triangular; achenes obovoid.
- 46a. Phyllaries 5- or 6-seriate; involucre 10–12 mm 74. *A. turbinatus*
- 46b. Phyllaries 3- or 4-seriate; involucre 4–10(–12) mm.
- 47a. Involucre 7–10(–12) mm.
- 48a. Middle leaf blade ovate or pandurate to lanceolate-pandurate, base attenuate or auriculate, clasping 37. *A. sphaerotus*
- 48b. Middle leaf blade oblanceolate to ovate or lanceolate, base attenuate.
- 49a. Leaf midvein prominent; phyllary apex acute or acuminate; ray florets 14–30; achenes 4–6-ribbed 32. *A. tataricus*
- 49b. Leaf 3-veined; phyllary apex obtuse to rounded; ray florets 30–40; achenes 2-ribbed 33. *A. maackii*
- 47b. Involucre 4–6 mm.
- 50a. Middle leaves sessile, blade lanceolate to linear-lanceolate, apex acuminate; pappus white 47. *A. dolichopodus*
- 50b. Middle leaves winged petiolate or sessile, blade ovate or pandurate to lanceolate-pandurate or elliptic to oblanceolate, apex obtuse or acute; pappus reddish.
- 51a. Middle leaf blade ovate or pandurate to lanceolate-pandurate 38. *A. panduratus*
- 51b. Middle leaf blade ovate to elliptic or oblanceolate 41. *A. vestitus*

31. Aster indamellus Grierson, Notes Roy. Bot. Gard. Edinburgh 26: 87. 1964.

叶苞紫菀 ye bao zi wan

Aster pseudamellus J. D. Hooker, Fl. Brit. India 3: 249. 1881, not Wenderoth (1831).

Herbs, perennial, 11–50 cm tall, from woody caudices, rhizomatous. Stems erect or ascending, simple, reddish strigillose, minutely stipitate glandular. Leaves cauline, gradually increased in size upward; lowest leaves withered by anthesis, sessile, oblanceolate, scabridulous, minutely stipitate glandular, (sometimes glabrous), margin entire or 1–7-serrulate to coarsely ser-

rate, scabridulous-ciliate, midvein slightly prominent adaxially, apex acute, mucronulate; middle to upper leaves oblanceolate, 1.6–4(–6) × 0.4–1.7(–2) cm, base attenuate to cuneate; synflorescence leaves oblanceolate, 1.4–1.6 × 0.2–0.4 cm. Capitula 1–20 in terminal, corymbiform to paniculate-corymbiform synflorescences, rarely solitary; peduncles 30–70 mm, strigillose; bracts oblanceolate, entire, upper bracts closely subtending capitula. Involucres campanulate, 5–7 mm; phyllaries 2- or 3-seriate, subequal, base hardened, margin erose, ciliate, green in distal 1/3, conspicuous midvein slightly translucent; outer phyllaries narrowly to broadly lanceolate, 5–6 × 1.5–2.5 mm, midvein sparsely to moderately strigillose, proximally minutely stipitate glandular, both surfaces densely so upward, leaflike distally, margin narrowly scarious, apex sometimes spreading, acute, ciliate; middle phyllaries oblong, 5–6 × 1.3–1.8 mm, abaxially proximally sparsely and distally densely minutely stipitate glandular, leaflike in distal 1/4 to only tip, margin ± broadly scarious, apex obtuse, mucronate, distal margin and apex purplish; inner phyllaries linear-oblong, 6–7 × 0.8–1 mm, scarious, apex sometimes purplish. Ray florets 25–30, blue, mauve, or pink, tube sparsely strigillose, lamina 13–16 × 1–2 mm, eglandular; disk florets yellow, 4.5–5 mm, tube apex and limb base sparsely strigillose, sparsely minutely stipitate glandular, limb campanulate, 2.5–3 mm, lobes erect, tip spreading, triangular to narrowly triangular, 1.2–1.5 mm, sparsely strigillose, eglandular. Achenes obovoid, ± compressed, 3–3.5 mm, sparsely to moderately strigillose, sparsely minutely stipitate glandular apically, 2-ribbed. Pappus 3-seriate, dirty white, of slender, barbellate bristles; outer bristles 0.3–1.1 mm; inner bristles 3–3.5 mm, tapering; innermost bristles 4.5–5 mm, tapering. Fl. and fr. Jul–Sep.

Alpine and subalpine open forests on grassy slopes, rock crevices, screes; 1900–4200 m. W Xizang (Yangsi) [Afghanistan, NW India, Kashmir, Nepal, Pakistan].

Aster indamellus is closely related to *A. amellus* Linnaeus but differs in having outer phyllaries leaflike, distinctly veined, acute at apex, with broader tips, and by often being glandular. Native to the area from Europe to W Siberia, *A. amellus* is sometimes cultivated in China.

32. *Aster tataricus* Linnaeus f., Suppl. Pl. 373. 1782.

紫菀 zi wan

Aster nakaii H. Léveillé & Vaniot; *A. tataricus* var. *nakaii* (H. Léveillé & Vaniot) Kitamura; *A. trinervius* Roxburgh ex D. Don var. *longifolius* Franchet & Savatier.

Herbs, perennial, 11–150 cm tall; rhizomes becoming woody; stemless rosettes often present. Stems erect, simple, ribbed, glabrate proximally to sparsely strigillose distally, minutely stipitate glandular below leaves. Leaves cauline, much reduced upward, scabrous, abaxially sparsely minutely stipitate glandular, margin scabrous-ciliate, midvein prominent abaxially, apex acuminate to acute or rounded, mucronate; lowest leaves withered by anthesis, long, slightly winged petiolate (petiole to 30 cm), petiole base sheathing; blade oblanceolate to ovate, (2.1–)30–50 × (0.9–)6–12 cm, base attenuate, margin undulate, coarsely serrate, veins pinnately 6–10-paired; lower to upper leaves shortly petiolate (base sheathing) or sessile, oblan-

ceolate to lanceolate, 2–18 × 0.6–5 cm, base attenuate, margin coarsely serrate to serrulate or entire; synflorescence leaves lanceolate, 1.3–7 × 0.2–1 cm. Capitula (2–)14–50 or more, in terminal corymbiform synflorescences; peduncles 25–65 mm, sparsely strigillose, moderately to densely minutely stipitate glandular; bracts linear-lanceolate, entire, sometimes grading into phyllaries. Involucres campanulate, 7–10(–12) mm; phyllaries 3-seriate, unequal, green along midvein, membranous, base ± hardened, margin erose, ciliate, midvein ± pronounced, slightly translucent; outer phyllaries narrowly lanceolate, 4–5 × 0.8–1 mm, sparsely strigillose, distally sparsely minutely stipitate glandular, sometimes ± leaflike, margin narrowly scarious, apex acute, ciliate, tip purplish; middle phyllaries oblong to lanceolate-oblong, 6–7 × ca. 1 mm, abaxially glabrous to sparsely strigillose distally or along midvein, eglandular or very sparsely glandular, margin scarious, apex acuminate, sometimes mucronate, distal margin and apex purplish; inner phyllaries linear-lanceolate to linear-oblong, 8–10 × 0.6–1 mm, glabrous, sparsely minutely stipitate glandular, margin scarious, apex acuminate, erose, purplish. Ray florets 14–30, blue or pale lavender or to purple, lamina 7–15 × 1.5–2.5 mm, glabrous, eglandular; disk florets yellow, 5–7 mm, limb campanulate, 3.5–4 mm, lobes erect, tip spreading, narrowly triangular, ca. 2 mm, glabrous, eglandular. Achenes dark, obovoid, slightly compressed, 2.5–3 mm, sparsely to moderately strigillose, sparsely minutely stipitate glandular apically, 4–6-ribbed. Pappus 4-seriate, reddish, of barbellate bristles; outermost bristles few, slender, 0.2–0.3 mm; outer bristles slender 1.5–2 mm; inner bristles 4.5–5 mm, tapering; innermost bristles 6–7 mm, slightly clavate. Fl. Jul–Sep, fr. Aug–Oct. $2n = 54$.

Shaded damp places, meadows, steppes, damp riverbanks; 400–3300 m. Anhui, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan [Japan, Korea, Mongolia, Russia].

The roots of *Aster tataricus* are used medicinally to relieve coughs and reduce sputum.

33. *Aster maackii* Regel, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 4: 81. 1861.

圓苞紫菀 yuan bao zi wan

Aster horridifolius H. Léveillé & Vaniot; *A. kodzumanus* Makino.

Herbs, perennial, 40–90 cm tall, rhizomatous. Stems erect, simple, reddish striate, sparsely scabridulous upward, sparsely minutely stipitate glandular below leaves, more so distally. Leaves cauline, gradually increased in size upward; lowest leaves withered by anthesis, sessile, (blade shape not observed), sparsely to densely scabridulous, minutely stipitate glandular, very sparsely so adaxially, margin serrate to serrulate, scabridulous-ciliate, 3-veined, midvein prominent adaxially, apex acute or sometimes obtuse, mucronulate; lower to upper leaves lanceolate, 4–11 × 0.7–2 cm, base attenuate; synflorescence leaves lanceolate, 2–6 × 0.5–1.5 cm, margin serrulate to entire. Capitula (1 or) 2–10 or more, in terminal corymbiform synflorescences, rarely solitary; peduncles 20–80 mm, moderately to densely scabridulous, minutely stipitate glandular; bracts nar-

rowly ovate, entire, upper bracts closely subtending capitula. Involucres broadly campanulate, 7–9 mm; phyllaries 3-seriate, unequal, base hardened, abaxially glabrous, eglandular or sparsely minutely stipitate glandular, margin scarious, erose, leaflike in distal 1/3, ciliate, midvein slightly translucent, apex obtuse to rounded, ciliate; outer phyllaries lanceolate to oblong, 2–4 × 0.9–1.1 mm, abaxially minutely stipitate glandular distally, midvein sparsely to moderately strigillose; middle phyllaries oblong, 6–7 × 1.2–1.3 mm, distal margin and apex purplish; inner phyllaries linear-oblong, 9.5–10 × 1–2 mm, scarious, apex purplish. Ray florets 30–40, purple, tube sparsely hairy, lamina 15–18 × ca. 1.5 mm, eglandular; disk florets yellow, ca. 7 mm, tube and limb base sparsely hairy, sparsely minutely stipitate glandular, limb campanulate, ca. 4 mm, lobes spreading, tip recurved, triangular to narrowly triangular, 1.2–1.5 mm, sparsely strigillose apically, eglandular. Achenes purple proximally to mottled purple distally, obovoid, compressed, 2.3–2.5 mm, moderately to densely strigillose, sparsely minutely stipitate glandular apically, 2-ribbed. Pappus 4-seriate, dirty white, of slender, barbellate bristles; outermost bristles 0–4, 0.2–0.6 mm; outer bristles absent or 1, ca. 2.8 mm; inner bristles 4.8–5.2 mm, tapering; innermost bristles 5.3–5.7 mm, tapering. Fl. and fr. Jul–Oct. $2n = 18$.

Damp forests, damp grasslands, mountain meadows; 400–1000 m. Heilongjiang, Jilin, Liaoning, Nei Mongol, S Ningxia [Japan, Korea, E Russia].

34. *Aster fuscescens* Bureau & Franchet, J. Bot. (Morot) 5: 49. 1891.

褐毛紫菀 he mao zi wan

Herbs, perennial, 15–120 cm tall; rhizomes long; adjacent rosettes often present. Stems erect to ascending, simple, striate, sometimes reddish, villosulous, minutely stipitate glandular, more densely so distally. Leaves cauline, usually gradually decreasing upward, abaxially pale green or silvery green, adaxially dark green, abaxially strigillose, adaxially glabrous or glabrate, or both surfaces strigillose, villosulous on veins, abaxially sparsely to densely minutely stipitate glandular, adaxially more abundantly so marginally, margin coarsely serrate to serrate (teeth mucronate), villosulous-ciliate, veins prominent abaxially or on both surfaces, apex mucronate; lowest leaves withered by anthesis or often present, long petiolate (petiole to 20 cm); blade broadly ovate or oblong to lanceolate, 4.5–12 × (2.5–)3.8–7(–10) cm, base cordate or rounded (or attenuate), apex rounded to obtuse; lower to upper leaves long to shortly petiolate; blade broadly to narrowly ovate or lanceolate, (3–)4–11 × (1.5–)3.2–11 cm, base rounded (or attenuate), apex obtuse to acute; synflorescence leaves shortly petiolate, narrowly ovate to lanceolate, 2.7–5.5 × 0.3–2.2 cm, base rounded (attenuate), margin serrulate to entire, apex acute. Capitula 7–36 in terminal corymbiform synflorescences, ca. 3 cm in diam.; peduncles 10–80 mm, glabrate to sparsely villosulous or strigillose, densely minutely stipitate glandular; bracts linear-lanceolate, entire. Involucres broadly campanulate, 5–11 × 10–15 mm; phyllaries 3-seriate, subequal, linear-lanceolate, 7–11 × 1.3–2.5 mm, abaxially sparsely villosulous along midvein to glabrous, moderately to densely minutely stipitate glandular or eglandular, base some-

times hardened, margin scarious (outer phyllaries narrowly scarious), erose, purplish, villosulous-ciliate, green, midvein slightly translucent, apex acuminate, tip purplish, ciliate. Ray florets 13–21(–25), lamina purple to bluish, 7.5–13 × 2.2–3 mm, glabrous, eglandular; disk florets yellow, 7.2–7.5 mm, tube green, sparsely strigillose, eglandular, limb funnelform, 7.2–7.5 mm, lobes spreading, sometimes tip recurved, narrowly triangular, 1.5–1.7 mm, purple tinged, glabrous or sparsely strigillose apically, sparsely glandular apically. Achenes obovoid, compressed, ca. 3.5 mm, sparsely strigillose, proximally sparsely to apically moderately to densely minutely stipitate glandular, 4-ribbed. Pappus 4-seriate, of red-brown, slender, barbellate bristles; outermost bristles 0–2, ca. 0.5 mm; outer bristles many, 1.2–4 mm; inner bristles 4–5.5 mm, tapering; innermost bristles 6–9, 7–8 mm, slightly clavate. Fl. Jul–Oct, fr. Aug–Dec.

Alpine and subalpine meadows and grassy slopes among shrubs, bamboo-*Rhododendron* thickets, bamboo thickets in disturbed deciduous forests, meadows in broad-leaved evergreen forests, rocky slopes; 2700–4200 m. Sichuan, Xizang, Yunnan [NE Myanmar].

Aster fuscescens is clearly divided into three varieties.

- 1a. Lower cauline leaves oblong to lanceolate, ± densely villous, glandular 34c. var. *oblongifolius*
- 1b. Lower cauline leaves broadly ovate, base cordate, glabrate or sparsely to moderately villous and glandular.
 - 2a. Leaves thin and soft, reticulate veins hardly prominent 34a. var. *fuscescens*
 - 2b. Leaves rough, reticulate veins prominent on both surfaces 34b. var. *scaberoides*

34a. *Aster fuscescens* var. *fuscescens*

褐毛紫菀(原变种) he mao zi wan (yuan bian zhong)

Aster doricifolius H. Léveillé.

Stems to 60 cm tall, robust, base 4–6 mm in diam., pubescent, glandular. Lower cauline leaves broadly ovate; lowermost leaves (withered by anthesis): petiole to 12 cm; blade 7–12 × 6.5–10 cm; middle leaves: petiole to 12 cm, smaller; uppermost leaves sessile, ovate-lanceolate, sparsely villous or glabrate, sparsely glandular, thin and soft, reticulate veins hardly prominent. Phyllaries villous, short-stipitate glandular.

W Sichuan, SE Xizang, NW Yunnan [NE Myanmar].

34b. *Aster fuscescens* var. *scaberoides* C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 46. 1935.

少毛褐毛紫菀 shao mao he mao zi wan

Stems to 45 cm tall, slender, base ca. 4 mm in diam., glabrescent below, brownish pubescent above, sometimes short-stipitate glandular. Lower cauline leaves: petiole to 15 cm; blade broadly ovate, 3–6.5 × 3–6 cm, base cordate; upper cauline leaves sessile, narrower, ovate or lanceolate, adaxially sparsely to moderately villous, sparsely to moderately glandular, reticulate veins prominent on both surfaces. Phyllaries glabrous.

- E Xizang, NW Yunnan.

34c. *Aster fuscescens* var. *oblongifolius* Grierson, Notes Roy. Bot. Gard. Edinburgh 26: 93. 1964.

长圆叶褐毛紫菀 *chang yuan ye he mao zi wan*

Stems to 35 cm tall, slender, base to 4 mm in diam., villous, glandular. Lower cauline leaves oblong to lanceolate, 5–8.5 × 2.5–3.5 cm, margin repand-dentate, teeth mucronate; upper leaves few, sessile, lanceolate, 3–7 × 1.5–3 cm, densely villous, short-stipitate glandular, reticulate veins hardly prominent on both surfaces. Phyllaries ± densely villous, densely stipitate glandular.

E Xizang (Qamdo) [N Myanmar].

35. *Aster auriculatus* Franchet, J. Bot. (Morot) 10: 376. 1896.

耳叶紫菀 *er ye zi wan*

Herbs, perennial, 23–90 cm tall, rarely caespitose; rhizomes ± woody. Stems erect, simple, ± striate, sparsely to densely villous, densely minutely stipitate glandular. Leaves cauline, somewhat reduced upward, base sometimes marcescent, both surfaces villosulous, sparsely to densely minutely stipitate glandular, margin serrate to serrulate, villosulous-ciliate, midvein prominent, more so abaxially, apex mucronate; lowest leaves withered by anthesis, broadly winged petiolate, petiole base auriculate; blade oblanceolate, obovate, or oblong, base attenuate, apex obtuse; lower to upper leaves sessile, obovate or oblong to oblanceolate, sometimes pandurate, 1.5–7 × 0.4–1.5 cm, base auriculate, clasping, apex obtuse to acute (upper leaves); synflorescence leaves narrowly ovate to lanceolate, 1–4.5 × 0.1–0.9 cm, margin serrulate to entire. Capitula 2–23, in terminal corymbiform synflorescences, rarely solitary; peduncles 10–30 mm, sparsely hispidulous to villosulous, densely minutely stipitate glandular; bracts linear, entire. Involucres campanulate, 6–7 mm; phyllaries 3-seriate, unequal (to nearly subequal), abaxially glabrous or strigose, sparsely to densely minutely stipitate glandular (middle and inner phyllaries base eglandular), base hardened, midvein slightly translucent; outer phyllaries lanceolate to linear-lanceolate, 2.5–6 × 0.5–0.8 mm, leaflike, margin barely to ± scarios, eciliate or sparsely ciliate, glandular, apex sometimes spreading or squarrose, acute, ciliate; middle phyllaries narrowly oblong to narrowly lanceolate, 5–6 × 0.7–1.5 mm, margin narrowly scarios, tip green, sometimes leaflike, apex acute to acuminate, distal margin and apex ± purplish; inner phyllaries distally green, linear-oblong, 6–7 × 0.7–1.3 mm, margin broadly scarios, erose, apex sometimes acuminate, erose, sometimes purplish. Ray florets 18–30, white, tube sparsely strigillose, lamina 6–9 × 1–2.5 mm, eglandular; disk florets yellow, 4.5–5 mm, limb campanulate, 3–3.5 mm, proximally glabrous and sparsely minutely stipitate glandular, lobes erect, tip sometimes spreading, narrowly triangular, 1–1.3 mm, glabrous, tip sparsely minutely stipitate glandular. Achenes lanceolate, compressed, 3–4 mm, sparsely strigillose, sparsely to moderately minutely stipitate glandular apically, 2-ribbed. Pappus 4-seriate, reddish, of slender barbellate bristles; outermost bristles absent or 1, 0.2–0.3 mm; outer bristles 0–3, 1.2–

2.5 mm; inner bristles 3.7–4 mm, tapering; innermost bristles 4–4.3 mm, barely clavate. Fl. and fr. Apr–Aug.

- Open forests, mixed forests, thickets, grasslands; 800–3000 m. Gansu, Guangxi, Guizhou, Hubei, Sichuan, Xizang (Zayü), Yunnan.

Aster auriculatus, especially the roots, is used medicinally to reduce phlegm and treat snakebites.

36. *Aster veitchianus* Hutchinson & J. R. Drummond ex Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 3: 214. 1935.

峨眉紫菀 *e mei zi wan*

Herbs, perennial, 6–40 cm tall; rhizomes long, thin. Stems erect, simple, slender, striate, sparsely villous (crosswalls brown), sparsely minutely stipitate glandular distally. Leaves cauline, abruptly reduced upward, abaxially pale green, adaxially green, abaxially sparsely pilose on midvein and distally, sparsely minutely stipitate glandular in shallow pits, adaxially moderately pilose, very sparsely minutely stipitate glandular, margin serrate to serrulate (teeth mucronulate), pilose-ciliate, midvein slightly prominent abaxially, apex mucronate; lowest leaves present and dominant at anthesis, long petiolate (petiole to 7 cm); blade spatulate or obovate to oblanceolate, 1.5–9 × 0.8–3.8 cm, base attenuate, apex rounded to obtuse; lower to middle leaves sessile, pandurate, 4–8.5 × 0.9–1.7 cm, base auriculate, clasping, margin entire; upper leaves sessile, lanceolate to linear-lanceolate, 2.5–4 × 0.3–1 cm, base auriculate, clasping; synflorescence leaves few, linear-lanceolate, 0.8–2 × 0.1–0.5 cm, base ± auriculate, margin entire. Capitula 1–10 in terminal corymbiform synflorescences, sometimes solitary; peduncles 3.5–10 cm, pilose, strigillose, sparsely to moderately minutely stipitate glandular; bracts linear, entire, upper bracts minutely stipitate glandular and grading into phyllaries. Involucres hemispheric, 6–8 mm; phyllaries 3-seriate, unequal, green apically, glabrous, base ± hardened, margin broadly scarios, erose, purplish, ciliate, midvein more pronounced distally, ± translucent, apex acuminate, sometimes erose, purplish, eciliate; outer phyllaries lanceolate, 3–4 × 0.6–1 mm, (outermost tip recurved, ciliate, minutely stipitate glandular); middle and inner phyllaries membranous, often multiveined; middle phyllaries oblanceolate, 5.5–6.5 × 1.2–1.3 mm; inner phyllaries lanceolate, 6.5–7 × ca. 1 mm. Ray florets 35–54, purple, tube hairy, lamina 9–10 × 1–1.5 mm, eglandular; disk florets yellow, 4.5–5.5 mm, tube base flared, tube apex and limb base strigillose, eglandular, limb campanulate, 2.8–3 mm, lobes spreading, narrowly triangular, 2.1–2.3 mm, glabrous, eglandular. Achenes oblong, slightly compressed, 2–2.5(–3) mm (immature), sparsely strigillose, minutely stipitate glandular, 2-ribbed. Pappus 3-seriate, ± reddish, of barbellate bristles; outermost series of white scales, 0.4–0.6 mm; inner bristles 4–4.6 mm, tapering; innermost bristles 5–5.2 mm, weakly clavate. Fl. May–Jun, fr. Jun–Aug.

- Shaded damp places, ravines, canal sides on slopes; 800–2400 m. C and W Sichuan.

37. *Aster sphaerotus* Y. Ling, Fl. Reipubl. Popularis Sin. 74: 145. 1985.

圆耳紫菀 *yuan er zi wan*

Erigeron panduratus C. C. Chang, Sunyatsenia 6: 17. 1941, not *Aster panduratus* Nees ex Walpers (1843).

Herbs, perennial, 30–40 cm tall, rhizomatous; stolons long, slender. Stems erect, simple, purplish striate, ± densely villous, very sparsely minutely stipitate glandular, more densely long-stipitate glandular under leaves. Leaves cauline, gradually reduced upward, petiole base and midvein marcescent, abaxially purplish, sparsely villous, veins sparsely minutely stipitate glandular (long stipitate at base and on petiole), adaxially villous to pilose, minutely stipitate glandular apically, margin serrate, ciliate, midvein prominent abaxially, apex obtuse to acute, mucronate; lowest leaves withered by anthesis, lower to upper leaves narrowly to broadly winged petiolate (petiole to 1.3 cm, petiole base auriculate-clasping, proximal margin villous) or sessile, ovate or pandurate to lanceolate-pandurate, 2.5–3.5 × 0.7–2 cm, base attenuate or auriculate, clasping; synflorescence leaves shortly petiolate, ovate to lanceolate, 1–2.3 × 0.4–1 cm. Capitula 3–5 in terminal, corymbiform synflorescences; peduncles 10–42 mm, villosulous, densely minutely long-stipitate glandular; bracts ovate to lanceolate, entire. Involucres hemispheric, 7–8(–10) mm; phyllaries 4-seriate, unequal, abaxially glabrous, densely minutely stipitate glandular, base usually hardened, midvein prominent, translucent; outer phyllaries bractlike, linear-lanceolate, 5–5.5 × 1–1.2 mm, distal 1/2 leaflike, margin not or ± narrowly scarious, ciliate, densely minutely stipitate glandular, apex spreading, sometimes squarrose, acute, sometimes mucronulate, purplish, middle and inner phyllaries with margin erose, ciliate, apex long acuminate, tip leaflike, purplish; middle phyllaries oblong, 6–8 × 1.3–1.5 mm, margin broadly scarious, ciliate; inner phyllaries linear-lanceolate, 8–8.5 × 1–1.2 mm, scarious. Ray florets 35–40, purplish to pink, tube sparsely hairy, lamina 7–9 × 1–1.2 mm, eglandular; disk florets yellow, ca. 4 mm, tube and limb base sparsely hairy, eglandular, limb campanulate, 2.2–2.5 mm, lobes erect to spreading, narrowly triangular, ca. 1 mm, glabrous, eglandular. Achenes (immature; shape unknown) ca. 2.7 mm or more, sparsely strigillose, minutely stipitate glandular, 2-ribbed. Pappus 3-seriate, reddish, of slender barbellate bristles; outermost bristles few, 1.3–1.6 mm; inner bristles 3.3–3.7 mm, tapering; innermost bristles 3.5–4 mm, long clavate. Fl. Jul–Aug, fr. Aug(to later).

- Mountain forests; ca. 2700 m. W Guangxi.

38. *Aster panduratus* Nees ex Walpers, Nov. Actorum Acad. Caes. Leop.-Carol. Nat. Cur. 19(Suppl. 1): 258. 1843.

琴叶紫菀 qin ye zi wan

Aster argyi H. Léveillé; *A. candelabrum* Vaniot.

Herbs, perennial, 14–100 cm tall, sometimes caespitose, rhizomatous, sometimes with next year's rosette. Stems erect, simple or branched upward, purplish striate, ± densely villous, ± densely minutely long-stipitate glandular. Leaves cauline, gradually reduced upward, abaxially villous to shortly villous (upper leaves), adaxially villous to strigose (upper leaves), veins villous, densely minutely long-stipitate glandular, margin coarsely serrate to serrulate or entire (upper leaves), villous to strigose-ciliate, midvein prominent abaxially, sometimes somewhat 3-veined, apex obtuse to acute, mucronulate; lowest

leaves withered by anthesis, (long) winged petiolate, ovate, base attenuate; lower to upper leaves sessile, ovate or pandurate to lanceolate-pandurate, 1.5–7(–9) × 0.4–1.8(–2.5) cm, base auriculate, clasping; synflorescence leaves oblong-ovate, 1–2.5 × 0.2–0.8 cm. Capitula 3–40, in terminal, laxly corymbiform synflorescences, rarely solitary; peduncles 5–50 mm, villosulous, densely minutely long-stipitate glandular; bracts lanceolate, entire, upper bracts grading into phyllaries. Involucres hemispheric to campanulate, ca. 5 mm; phyllaries 3-seriate, unequal, midvein thin; outer phyllaries linear-lanceolate, 3–3.5 × 0.5–0.7 mm, abaxially glabrous, densely minutely long-stipitate glandular, leaflike, margin not to ± narrowly scarious, ciliate, apex sometimes spreading, acute, sometimes mucronate, sometimes purplish, ciliate, middle and inner phyllaries green distally, base hardened, margin erose, ciliate; middle phyllaries oblanceolate, 3.8–4 × 1–1.3 mm, abaxially densely minutely long-stipitate glandular, margin broadly scarious, ciliate, apex acuminate; inner phyllaries linear-oblong, 4–4.5 × 0.8–1.1 mm, distally densely minutely long-stipitate glandular, scarious. Ray florets 15–25, purple to blue, or white tinged purplish, tube sparsely strigillose, lamina 5–7 × 1.5–2 mm, eglandular; disk florets yellow, 4.5–5 mm, tube and limb base sparsely strigillose, minutely stipitate glandular, limb campanulate, 2.5–3 mm, lobes erect to spreading, narrowly triangular, 1.5–1.7 mm, glabrous, sparsely minutely stipitate glandular. Achenes obovoid, slightly compressed, ca. 1.5 mm, sparsely strigillose, minutely stipitate glandular, 2-ribbed. Pappus 3- or 4-seriate, of few, reddish, slender barbellate bristles; outermost bristles few, ca. 0.5 mm; outer bristles absent or 1, ca. 2 mm; inner bristles 2.5–3 mm, tapering; innermost bristles 4–5 mm, weakly clavate. Fl. Feb–Sep, fr. Jun–Oct.

- Thickets, grasslands on slopes, canal sides, roadsides, field margins; 100–1400 m. Fujian, Guangdong, Guangxi, Guizhou, W Hubei, Hunan, Jiangsu, Jiangxi, W Sichuan, Zhejiang.

39. *Aster trichoneurus* Y. Ling, Fl. Reipubl. Popularis Sin. 74: 355. 1985.

毛脉紫菀 mao mai zi wan

Herbs, perennial, 30–50 cm tall; rhizomes thick. Stems erect, simple, densely villous, more sparsely so upward, densely minutely stipitate glandular. Leaves cauline, somewhat reduced upward, base sometimes marcescent, abaxially villosulous, adaxially strigillose, both surfaces minutely stipitate glandular, thin, margin serrulate to serrate, villosulous-ciliate, 3-veined, lower secondary veins prominent, apex obtuse to acute, mucronulate; lowest leaves withered by anthesis, long winged petiolate, petiole base auriculate; blade oblanceolate, base attenuate; lower to upper leaves shortly winged petiolate (base clasping) to sessile, oblanceolate to oblong, 3–8 × 0.7–1.8 cm, base rounded; synflorescence leaves lanceolate, 2–3.5 × 0.5–0.9 cm, base cuneate-rounded, margin entire. Capitula 3 or 4 or more (simple specimen) in terminal corymbiform synflorescences, rarely solitary, ca. 3 cm in diam.; peduncles 25–90 mm, strigillose to villosulous, densely minutely stipitate glandular; bracts lanceolate to linear-lanceolate, entire. Involucres broadly campanulate, 5–6(–7) × ca. 10 mm; phyllaries 3-seriate, nearly subequal, abaxially strigillose to villosulous, sparsely to densely minutely stipitate glandular, base hardened, midvein slightly

translucent, distal margin and apex \pm purplish; outer phyllaries linear-oblong, $4-4.6 \times 0.6-0.7$ mm, distal 1/2 leaflike, margin barely to \pm scarios, ciliate, glandular, apex sometimes spreading or squarrose, acute, mucronulate, ciliate; middle phyllaries linear-oblong to linear-lanceolate, $5-6 \times 1-1.2$ mm, margin narrowly scarios, tip green or sometimes leaflike, apex acute to acuminate; inner phyllaries linear-lanceolate, $5-5.5 \times$ ca. 1 mm, margin broadly scarios, erose, tip green, apex erose. Ray florets 23-27, blue, tube sparsely strigillose, lamina $7-9 \times 1.6-2$ mm, eglandular; disk florets yellow, ca. 4.5 mm, limb campanulate, ca. 3 mm, proximally sparsely strigillose and minutely stipitate glandular, lobes erect, tip sometimes spreading, narrowly triangular, ca. 1 mm, tip sparsely strigillose and minutely stipitate glandular. Achenes narrowly obovoid, \pm compressed, $2.5-2.8$ mm, densely strigillose, sparsely strigillose on ribs, minutely stipitate glandular apically, 2-ribbed. Pappus 3- or 4-seriate, straw-colored, of slender barbellate bristles; outermost bristles few, $0.2-0.5$ mm; outer bristles absent or 1, ca. 2 mm; inner bristles $3.5-3.7$ mm, tapering; innermost bristles $4.2-4.3$ mm, barely clavate. Fl. and fr. Sep.

- Ravines, mountain canals; ca. 2700 m. NW Yunnan (Dêqên).

Aster trichoneurus is similar to *A. auriculatus* but differs in its broader and larger, 3-veined leaves without clasping auricles, and narrow, sparsely hairy phyllaries.

40. *Aster mangshanensis* Y. Ling, Fl. Reipubl. Popularis Sin. 74: 355. 1985.

莽山紫菀 mang shan zi wan

Herbs, perennial, 17-30 cm tall; rhizomes \pm robust. Stems erect, \pm densely yellowish strigose, more so upward, stipitate glandular on peduncles. Leaves moderately to densely strigose, \pm with dense sessile glands, adaxially densely strigose, abaxially midvein slightly prominent, lateral veins 3- or 4-paired, obscure; lower leaves withered by anthesis; middle leaves sessile or shortly petiolate (petiole less than ca. 2 mm); blade oblong to obovate-oblong, $2.2-2.5 \times 0.3-1.1$ cm, base cuneate to rounded, margin entire, revolute, scabrous-ciliate, apex obtuse to rounded; upper leaves gradually reduced, $0.8-1 \times 0.4-0.6$ cm. Capitula in paniculate-corymbiform synflorescence, ca. 1.5 cm in diam.; peduncles 1-3 cm; bracts oblanceolate. Involucre hemispheric (broadly obconic), $4-5 \times$ ca. 7 mm; phyllaries 3-seriate, subequal, obovate-oblong, abaxially strigose, with sessile glands, margin strigose- to \pm villous-ciliate; outer phyllaries reflexed, ca. $4 \times 1-1.5$ mm, leaflike or distally leaflike, apex obtuse to acute; inner phyllaries $4-4.5 \times$ ca. 1 mm, acute, margin scarios, erose, ciliate. Ray florets 14-16, white, tube 1-1.3 mm, lamina $6-7 \times 1.5-1.8$ mm; disk florets $4-4.2$ mm, tube 1.1-1.5 mm, upper tube and limb base hairy, limb campanulate, lobes lanceolate, ca. 0.7 mm, recurved, glandular. Achenes greenish, oblanceolate, slightly compressed, slightly trigonous, $1.9-2.3$ mm, sparsely strigillose, with sparse sessile glands, pale 3-ribbed. Pappus 3-seriate, orangish; outer bristles ca. 0.4 mm; inner bristles ca. 5.6 mm; innermost bristles ca. 7.2 mm, barely clavate.

- S Hunan (Yizhang: Mang Shan).

41. *Aster vestitus* Franchet, J. Bot. (Morot) 10: 378. 1896.

密毛紫菀 mi mao zi wan

Aster mairei H. Léveillé; *A. sherriffianus* Handel-Mazzetti.

Herbs, perennial, 50-130 cm tall, rarely caespitose, rhizomatous. Stems erect-ascending, simple, reddish striate, villosulous, minutely long-stipitate glandular below leaves. Leaves cauline, gradually reduced upward, abaxially gray-green, adaxially green, abaxially tomentose, sometimes sparsely villous, densely minutely stipitate glandular, adaxially strigose, sparsely minutely stipitate glandular, margin serrate to serrulate, strigose-ciliate, midvein prominent abaxially, apex acute, mucronulate; lowest leaves withered by anthesis (unobserved); lower to upper leaves broadly and shortly petiolate (lower leaves) to sessile, ovate to elliptic or oblanceolate, $1.8-6 \times 0.5-1.7$ cm, base rounded or slightly auriculate to cuneate-rounded, sometimes subclasping; synflorescence leaf blade ovate to lanceolate, $1.3-2.5 \times 0.4-0.7$ cm, entire. Capitula 6-35 or more, in terminal corymbiform synflorescences; peduncles 10-35 mm, sparsely villosulous, densely minutely stipitate glandular (glands sometimes long stipitate); bracts absent or 1, oblanceolate, entire. Involucres broadly campanulate to hemispheric, 4-6 mm; phyllaries 3-seriate, unequal, distally green, distal margin and apex tip purple, abaxially glabrous, densely minutely stipitate glandular, base hardened, densely minutely stipitate glandular, midvein prominent, translucent; outer phyllaries linear-lanceolate, $3-4 \times$ ca. 0.8 mm, margin narrowly scarios, eciliate, apex acute, mucronulate, proximally strigillose, sparsely long-stipitate glandular; middle and inner phyllaries oblong to lanceolate-oblong, $4.5-5.5 \times 1.2-1.8$ mm, margin broadly scarios, erose, eciliate, apex acuminate, erose. Ray florets 18-30, white or pale purple, lamina $5-9 \times 1.5-2$ mm, glabrous, eglandular; disk florets yellow, ca. 4.5 mm, limb campanulate, ca. 2.5 mm, base sparsely strigillose, sometimes sparsely minutely stipitate glandular, lobes erect to spreading, narrowly triangular, ca. 1.2 mm, glabrous, sparsely minutely stipitate glandular. Achenes obovoid, compressed, $2.5-3$ mm, strigillose, sparsely minutely stipitate glandular, 2-ribbed. Pappus 3-seriate, reddish, of barbellate bristles; outermost bristles few, slender, $0.3-0.6$ mm; inner bristles $3-3.5$ mm, tapering; innermost bristles $4.2-4.7$ mm, slightly clavate. Fl. and fr. Sep-Dec.

Alpine and subalpine forest margins, grasses, slopes, riverbanks, sandy places; 2200-3200 m. SW Sichuan, S Xizang, N and NW Yunnan [Bhutan, India (Sikkim), N Myanmar].

42. *Aster poliothamnus* Diels, Repert. Spec. Nov. Regni Veg. Beih. 12: 503. 1922.

灰枝紫菀 hui zhi zi wan

Subshrubs, 15-100 cm tall, sometimes shrublike, caespitose, caudex woody. Stems branched, bark gray-brown, lacerate; branches erect, densely leafy, sparsely to densely villosulous, often in decurrent lines below leaves, minutely stipitate glandular. Leaves cauline, slightly reduced upward; lower leaves withered by anthesis, shortly petiolate; blade oblong or linear-oblong, sometimes conduplicate and arched, $0.5-2(-3) \times 0.1-0.5(-0.8)$ cm, abaxially densely strigillose, minutely gland-dotted, sometimes stipitate glandular on veins, adaxially strigose, base decurrent, attenuate to cuneate, margin entire, strigose-ciliate, midvein abaxially prominent, apex obtuse to acute,

mucronate. Capitula in corymbiform, sometimes paniculate-corymbiform, synflorescences, or solitary; peduncles 10–30 mm, strigillose, minutely short- to long-stipitate glandular; bracts remote, lanceolate to oblanceolate, 5–10 mm. Involucres cylindrical-campanulate, 5–8 mm; phyllaries 4–6-seriate, unequal, base hardened, \pm keeled, midvein translucent distally, apex acute; outer phyllaries lanceolate, $3-4 \times 0.1-0.7$ mm, abaxially sparsely to moderately strigillose distally (leaflike part), densely minutely stipitate glandular, leaflike to distally leaflike, margin broadly scarious, narrowly so distally or not (when leaflike), ciliate; middle phyllaries lanceolate to linear-lanceolate, $5-7 \times 0.5-0.7$ mm, margin narrowly to broadly scarious, ciliate, purplish (except leaflike ones), distal $1/10-1/4$ leaflike to green area purplish, sparsely strigillose or minutely stipitate glandular in leaflike part; inner phyllaries linear-lanceolate, $6-7 \times$ ca. 1 mm, scarious, tip purplish, sparsely minutely stipitate glandular. Ray florets 10–20, lavender or lilac to purple, tube distal $1/2$ and lamina base strigillose, sometimes sparsely stipitate glandular, lamina $7-10 \times 1.2-2$ mm; disk florets yellow, 5–6.5 mm, limb funnelliform, ca. 4 mm, lobes spreading, narrowly triangular, $0.7-1.2$ mm, tip glabrous, sparsely stipitate glandular. Achenes obovoid to elliptic, compressed, 3–3.5 mm, sparsely strigillose, minutely stipitate glandular, mostly on ribs, 2- or 3-ribbed. Pappus 4-seriate, straw-colored, of slender, barbellate bristles; outermost bristles few, very slender, 0.1–0.5 mm; outer bristles few, very slender, 2.5–3 mm; inner bristles 4.2–4.5 mm, tapering; innermost bristles 4.5–5 mm, tip flattened. Fl. Jun–Sep, fr. Aug–Oct.

• Dry slopes, rocky cliffs, stony places, *Artemisia-Stipa* formations, xerophytic shrublands, riverbanks, roadsides; 800–4200 m. S Gansu, E Qinghai, Shaanxi, W Sichuan, E Xizang.

43. *Aster sikuensis* W. W. Smith & Farrer, Notes Roy. Bot. Gard. Edinburgh 9: 80. 1916.

西固紫菀 xi gu zi wan

Subshrubs, 30–40 cm, caespitose. Stems numerous, erect or ascending, puberulent, branched above, densely leafy. Leaves cauline, thick, densely puberulent, abaxially gray-green, midvein and 3- or 4-pairs of lateral veins prominent, adaxially dark green; lower leaves withered by anthesis; middle leaves subsessile, oblong, elliptic, or oblong-lanceolate, $1.5-2.5 \times 0.5-0.8$ cm, base \pm rounded or broadly cuneate, margin entire, revolute, apex obtuse or rounded; upper leaves gradually reduced, $0.4-0.6 \times 0.2-0.3$ cm. Capitula ca. 1.5 cm in diam., solitary or in corymbiform synflorescences; peduncles to 3 cm. Involucres hemispheric, $1.5-5 \times 6-7$ mm; phyllaries 4-seriate, unequal, abaxially puberulent, membranous, margin villous-ciliate; outer phyllaries ovate-lanceolate, $1.5-2 \times$ ca. 0.8 mm, acute, sometimes somewhat purplish; inner phyllaries lanceolate, ca. 3×1 mm, acute; innermost phyllaries linear-lanceolate, $4.5-5 \times$ ca. 0.8 mm, margin narrowly scarious, acuminate. Ray florets 10–16, white or reddish, tube 2–2.4 mm, hairy, lamina linear-oblong, $8-10 \times 1.3-1.5$ mm; disk florets 4.8–5.2 mm, tube 1.8–2.1 mm, tube and limb sparsely hairy, lobes lanceolate, ca. 1.2 mm, tip glandular. Achenes lanceolate, slightly compressed, ca. 2 mm, strigose, 4-ribbed. Pappus 3-seriate, yellowish to reddish; outer bristles ca. 0.2 mm; inner bristles ca. 3 mm, acute; innermost bristles 4–4.5 mm, clavate. Fr. Oct.

• Dry slopes or stony places, dry roadsides; 800–2300 m. S Gansu (Xigu), NW Sichuan.

44. *Aster taliangshanensis* Y. Ling, Fl. Reipubl. Popularis Sin. 74: 356. 1985.

凉山紫菀 liang shan zi wan

Herbs, perennial, 50–80 cm; rhizome vertical or procumbent. Stems erect or ascending, thick, multibranched, finely sulcate, strigose and strigillose. Leaves cauline, abaxially strigose, veins with sparse sessile glands and sparsely villous-strigose, midvein and 5 or 6 pairs of lateral veins prominent, conspicuously reticulate, adaxially densely strigose; lower leaves withered by anthesis; middle leaves sessile or shortly petiolate; blade ovate to broadly lanceolate, $6-11 \times 1.5-2.5$ cm, base gradually or abruptly attenuate, rarely subrounded, subclaspig, margin serrate, teeth mucronulate, scarious, apex acute to acuminate; upper leaves lanceolate, $3-5 \times 0.5-1$ cm, margin entire or serrulate. Capitula in terminal, open corymbiform synflorescences, 3–4 cm in diam.; peduncles 2–10 cm; bract linear-lanceolate when present. Involucres hemispheric, 10–12 mm in diam.; phyllaries 3-seriate, subequal, $5-6 \times 1.5-1.8$ mm, abaxially villous-strigillose, margin scarious (outer phyllaries narrowly so), erose-fimbriate, purplish; outer phyllaries oblong to oblanceolate, leaflike, base hardened, apex acute to acuminate, sometimes recurved, glandular; inner phyllaries membranous, apex herbaceous. Ray florets 50–60, blue-purple, tube 0.7–1 mm, glabrous, lamina $8-15 \times 1.5-2$ mm; disk florets yellow, 3–4 mm, glabrous, tube ca. 1.1 mm, limb campanulate, lobes 1–1.1 mm. Achenes brown, obovoid, compressed, 2–2.5 mm, sparsely strigillose to glabrate, pale 2–4-ribbed. Pappus 3-seriate, dirty white or reddish brown, of barbellate bristles; outermost bristles slender, 0.4–0.9 mm; inner bristles ca. 3.8 mm, acute; innermost bristles 4–4.1 mm, slightly clavate. Fl. Jun–Aug, fr. Aug–Sep.

• Low mountains and alpine forests, grasslands, dry stony shrubby slopes, roadsides; 2500–3100 m. SW and W Sichuan.

The involucre and the number of ray florets of *Aster taliangshanensis* are distinctive.

45. *Aster procerus* Hemsley, J. Linn. Soc., Bot. 23: 415. 1888.

高茎紫菀 gao jing zi wan

Asteromoea procera (Hemsley) Y. Ling; *Kalimeris procera* (Hemsley) S. Y. Hu.

Herbs, perennial, 70–100 cm tall. Stems erect, thick, strigose or \pm glabrescent in lower part, stipitate glandular below capitula, spreading branched from middle. Leaves abaxially pale green, both surfaces scarious, thin, midvein abaxially prominent; (lower leaves not seen); middle leaves shortly petiolate; blade ovate to ovate-lanceolate, $7-11 \times 3-5.5$ cm, base attenuate, margin serrate, apex acute to acuminate; upper leaves sessile, small, finely serrate or subentire. Capitula solitary at ends of branches or long peduncles, in open corymbiform synflorescences, 3–4 cm in diam.; peduncles 3–4 cm; bracts densely scarious, glandular. Involucres hemispheric, 6–7 mm, 12–15 mm in diam.; phyllaries 2- or 3-seriate; outer phyllaries leaflike, subequal, shorter to slightly longer than inner phyllaries, ca. $5.1 \times 1-1.5$ mm, densely scarious, margin sca-

brous, apex acuminate; most inner phyllaries membranous, narrower, sparsely scabrous or glabrate, margin narrowly scarious. Ray florets 10–20, white, tube 0.7–1 mm, hairy (not seen), lamina oblong-linear, ca. $15 \times 2\text{--}2.5$ mm; disk florets ca. 3.7 mm, tube 1.1–1.5 mm, hairy, limb campanulate, lobes lanceolate, 1–1.2 mm, recurved. Achenes brown, obovoid, slightly compressed, trigonous, 3.5–4 mm, strigose, 3-ribbed. Pappus 1-seriate, dirty white, of unequal, rigid bristles 1–1.5(–2) mm. Fl. May–Sep, fr. Aug–Oct.

• Forest margins, mountain slopes; below 400 m. S Anhui, W Hubei, N Zhejiang.

46. *Aster smithianus* Handel-Mazzetti, *Acta Horti Gothob.* 12: 216. 1938.

甘川紫菀 gan chuan zi wan

Aster smithianus var. *pilosior* Handel-Mazzetti; *Kalimeris smithiana* (Handel-Mazzetti) S. Y. Hu.

Subshrubs or herbs (woody), perennial, 60–150 cm tall, rhizomatous. Stems erect, simple or branched, shallowly striate, villosulous, minutely stipitate glandular, resinous. Leaves cauline, gradually reduced upward, abaxially silvery green, adaxially green, abaxially villosulous-strigillose, veins villosulous, sparsely to moderately minutely stipitate glandular, adaxially scabridulous, resinous, base attenuate, margin entire, sometimes shortly serrate, strigose-ciliate, midvein prominent on both surfaces, apex acute; lowest leaves withered by anthesis, shortly and narrowly winged petiolate (blade not observed); lower to upper leaves lanceolate, $4\text{--}7.5(10) \times 1\text{--}2.3$ cm; synflorescence leaves lanceolate, sometimes falcate, $1.2\text{--}6 \times 0.3\text{--}1.8$ cm, mucronulate. Capitula 7 to numerous in terminal corymbiform synflorescences; peduncles 18–70 mm, sparsely to moderately strigillose-villosulous, sparsely to moderately stipitate glandular, resinous, more densely so below capitula; bracts oblanceolate, entire, grading into phyllaries. Involucres hemispheric, 2–3 mm; phyllaries 3-seriate, unequal to subequal, abaxially sparsely to densely villosulous, more densely villosulous distally, densely minutely stipitate glandular, resinous, base hardened, slightly keeled, membranous, margin narrowly scarious, erose, ciliate, green distally, midvein prominent, translucent, sometimes faintly multiveined, inner surface shiny, apex acute to obtuse, sometimes mucronulate; outer phyllaries lanceolate, $2\text{--}4 \times 0.8\text{--}1.5$ mm; middle phyllaries oblanceolate, $4\text{--}4.5 \times 1\text{--}1.3$ mm; inner phyllaries oblanceolate, $4\text{--}4.5 \times$ ca. 1 mm, tip sometimes purplish. Ray florets 21–25, white or light purple, tube apex and lamina base sparsely hairy, sometimes sparsely minutely stipitate glandular, lamina $6\text{--}10 \times 1.5\text{--}2$ mm; disk florets yellow, ca. 3 mm, tube apex and limb base sparsely hairy, sparsely minutely stipitate glandular, limb campanulate, ca. 2 mm, lobes spreading, narrowly triangular, ca. 0.7 mm, glabrous, eglandular. Achenes dark purple, broadly obovoid, \pm compressed to \pm trigonous, ca. 2 mm, strigillose, sparsely minutely stipitate glandular, 2- or 3-ribbed. Pappus 1–3-seriate, of few dirty white, basally flattened barbellate bristles; outermost series (always present) of scales ca. 0.1 mm; inner series of bristles ca. 0.5 mm; innermost bristles 1–1.5 mm; those of ray florets reduced in number. Fl. Aug–Oct, fr. Sep–Oct.

• Low mountains, subalpine grasslands, stony riverbanks; 1300–3400 m. S Gansu, W Sichuan, NW Yunnan.

47. *Aster dolichopodus* Y. Ling, *Fl. Reipubl. Popularis Sin.* 74: 356. 1985.

长梗紫菀 chang geng zi wan

Herbs, perennial, 38–90 cm tall, sometimes caespitose; rhizomes long, thin. Stems erect, simple, sometimes branched upward, reddish striate, villous, sparsely minutely stipitate glandular. Leaves cauline, gradually reduced upward; blade abaxially pale green, adaxially green, abaxially sparsely strigose, eglandular, adaxially scabridulous, base rounded (lower leaves) or auriculate, clasping, margin remotely serrate to entire, strigose-ciliate, midvein prominent on both surfaces, apex acuminate, often falcate, mucronulate; lowest leaves withered by anthesis (unobserved); lower to upper leaves shortly petiolate (lower leaves) or sessile, lanceolate to linear-lanceolate, $3.5\text{--}13 \times 0.3\text{--}1.8$ cm; synflorescence leaves lanceolate to linear-lanceolate, $1.5\text{--}5 \times 0.1\text{--}1$ cm. Capitula 1–16 in terminal corymbiform synflorescences, sometimes solitary; peduncles 25–150 mm, sparsely villosulous, sparsely stipitate glandular, more densely so below capitula; bracts linear-lanceolate, entire, sometimes falcate, sometimes subtending involucre. Involucres broadly campanulate, 5–6 mm; phyllaries 3- or 4-seriate, unequal, green distally, abaxially glabrous, densely minutely stipitate glandular, base hardened, membranous, margin narrowly scarious, erose, \pm purplish distally, glandular, midvein prominent, translucent, sometimes faintly multiveined, apex sometimes curved, acute, sometimes mucronulate, purplish; outer phyllaries oblong-lanceolate, $2.5\text{--}3 \times 0.6\text{--}0.8$ mm; middle phyllaries narrowly oblanceolate, $4\text{--}5 \times 1\text{--}1.2$ mm; inner phyllaries narrowly oblanceolate, $5\text{--}5.5 \times 0.8\text{--}1.1$ mm, scarious. Ray florets 19–26, light purple to purple, tube apex and lamina base sparsely hairy, sometimes sparsely minutely stipitate glandular, lamina $10\text{--}14 \times 1.5\text{--}2$ mm; disk florets yellow, sometimes becoming purplish, 4–4.5 mm, tube apex and limb base sparsely strigillose, sparsely minutely stipitate glandular, limb campanulate, 2.2–2.5 mm, lobes spreading, narrowly triangular, 1–1.2 mm, tip very sparsely strigillose, sparsely minutely stipitate glandular. Achenes dark purple, broadly obovoid, \pm compressed to \pm trigonous, 2.5–3 mm, sparsely strigillose, sparsely minutely stipitate glandular distally or eglandular, 2- or 3-ribbed. Pappus 4-seriate, dirty white, of few barbellate bristles; outermost series of narrow scales 0.2–0.4 mm; outer bristles slender, 0.8–1.5 mm; inner bristles ca. 2.5 mm, tapering; innermost bristles ca. 3 mm, clavate. Fl. and fr. Jul–Sep.

• Grasslands on slopes, *Quercus-Abies* scrub on dry slopes, scrub, thicket margins, dry stream banks, canal sides, roadsides; 2400–3500 m. Gansu, S Shaanxi, NW and W Sichuan.

48. *Aster formosanus* Hayata, *Icon. Pl. Formosan.* 8: 46. 1919.

台岩紫菀 tai yan zi wan

Herbs, perennial, 30–80 cm tall (specimens incomplete); rhizomes long, slender. Stems erect, simple, flexuous, sometimes branched in upper part, finely striate, purplish, glabrous, eglandular. Leaves cauline, gradually reduced upward, long

petiolate (petiole to 7 cm); petiole purple, base hyaline-auriculate, clasping; blade abaxially pale green, adaxially green, shiny, abaxially glabrous, minutely stipitate glandular in pits, adaxially scabridulous near margin, base cordate, margin coarsely serrate, sparsely ciliate, midvein and main lateral veins prominent abaxially, apex long acuminate, mucronate; lowest leaves (not seen) withered by anthesis, sometimes marcescent, blade oblong; lower to upper leaves ovate, 6–11(–16) × 2.5–7 cm; synflorescence leaves petiolate (petiole to 1 cm), lanceolate, 2–4 × 0.2–0.8 cm, base cuneate, margin serrulate or entire. Capitula to 130 or more, in terminal paniculiform-corymbiform synflorescences; peduncles 7–10 mm, sparsely to moderately strigillose, minutely stipitate glandular; bracts lanceolate, entire. Involucre cylindrical-campanulate, 3–5 mm; phyllaries 3- or 4-seriate, unequal, green, ca. 1 mm wide, glabrous, minutely stipitate glandular, resinous, margin narrowly to broadly scarious, erose, midvein pronounced, ± translucent, apex rounded to obtuse or acute, erose, purplish, ciliate; outer phyllaries ovate, 1.5–2 mm; middle phyllaries oblong, 2–3 mm, base hardened; inner phyllaries oblong, 4–5 mm. Ray florets 8–15, tube strigillose, lamina white, 4–5(–6.5) × 1–1.5 mm, eglandular; disk florets yellow, ca. 7 mm, tube base flared, tube apex and limb base strigillose, limb campanulate, ca. 3.5 mm, lobes spreading, recurved, narrowly triangular, ca. 3 mm, eglandular. Achenes (immature) oblong, slightly compressed, 2.5–3 mm, 4-ribbed, strigillose, eglandular. Pappus (immature) 3-seriate, straw-colored, of barbellate bristles; outer bristles few, slender, ca. 2 mm; inner bristles 3.5–4 mm, tapering; innermost bristles ca. 4.5 mm, weakly clavate. Fl. and fr. May–Dec.

• Roadsides, exposed and damp places in mixed broad-leaved and coniferous forests; 1400–2700 m. Taiwan, Zhejiang.

49. *Aster dolichophyllus* Y. Ling, Fl. Reipubl. Popularis Sin. 74: 357. 1985.

长叶紫菀 *chang ye zi wan*

Herbs, perennial, up to ca. 45 cm tall; rhizomes strong, branched. Stems ascending, densely leafy in lower part, more sparsely leafy in upper part, glabrous or strigose in upper part. Leaves ± thick, glabrous, eglandular, abaxially with 3 or 4 pairs of lateral veins joining to form a raised submarginal vein on each side, reticulate veins ± conspicuous; basal and lower leaves present at anthesis, long petiolate; petiole subclasping; blade oblanceolate, 10–17 × 1–2 cm, base gradually attenuate, margin distally sparsely crenate-serrulate, teeth mucronulate, apex falcate-acuminate or acuminate; middle leaves shortly petiolate, narrowly lanceolate, 5–9 × 0.5–0.8 cm, base attenuate, margin entire, rarely crenulate-serrulate; upper leaves sessile, reduced, linear-lanceolate. Capitula ca. 8 in open corymbiform synflorescences, ca. 2.5 cm in diam.; peduncles densely strigose; bracts linear. Involucre hemispheric, 6–7 × 6–7 mm; phyllaries 3-seriate, lanceolate, apex long acuminate; outer phyllaries ca. 2.5 mm, sparsely strigose, apex leaflike; inner phyllaries membranous, margin scarious, ciliate. Ray florets ca. 10, white, tube ca. 2 mm, densely hairy, lamina linear, up to 10 × 1 mm; disk florets 5–6 mm, tube 1.7–2.5 mm, densely hairy, limb funnel-form, lobes lanceolate, ca. 1.7 mm, glabrous. Achenes brown, narrowly oblanceolate, slightly compressed, ca. 4.8 mm, densely

strigose, pale 4-ribbed. Pappus reddish, 4-seriate; outermost series ca. 0.6 mm; outer series slender, ca. 2.8 mm; inner series ca. 5 mm, acute; innermost series ca. 5.7 mm, clavate. Fl. Oct.

• With mosses on rocks along riverbanks in forests. N Guangxi (Longsheng).

50. *Aster moupinensis* (Franchet) Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 613. 1937.

川鄂紫菀 *chuan e zi wan*

Erigeron moupinensis Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 10: 36. 1887; *Aster henryi* Hemsley.

Herbs, perennial, 12–40 cm tall, ± caespitose; rhizomes robust, ± woody. Stems erect, slender, branched in upper part, canaliculate, glabrous or sparsely strigillose in lower part, strigillose in upper part. Leaves glabrous, eglandular, thick, margin slightly revolute or flat, thickened, remotely, sparsely serrulate or serrate, teeth mucronulate, scabrous, midvein conspicuously raised, lateral veins 2- or 3-paired, subparallel to margin and inconspicuous; basal leaves present at anthesis, ± rosulate, long petiolate, narrowly oblanceolate to linear-oblanceolate, 4–12 × 0.2–0.7 cm, gradually attenuate, apex acute or acuminate, mucronate; lower and middle leaves linear-oblong to linear, 2–4 × 0.2–0.4 cm, ± erect; upper leaves small, linear, abaxially sparsely strigillose, 1-veined. Capitula in open corymbiform synflorescences, 3–4 cm in diam. Involucre hemispheric, 7–8 × 10–12 mm; phyllaries 3-seriate, narrowly oblong, acute, apex tinged purple, strigillose; outer phyllaries narrower, green, membranous, ca. 7 × 1.5 mm, margin ciliate, of inner phyllaries scarious, erose-fimbriate. Ray florets 16–20, white, tube ca. 3 mm, hairy, lamina narrowly elliptic, ca. 15 × 1.5 mm; disk florets yellow, ca. 6 mm, tube ca. 2.5 mm, tube and limb hairy, limb funnel-form, lobes ca. 1.5 mm, glabrous. Achenes tan to brown, oblong, compressed, ca. 3 mm, strigose, 2-ribbed. Pappus 3-seriate, yellowish; outer series ca. 0.3 mm; inner series ca. 4 mm, acute; innermost series ca. 5.5 mm, clavate. Fl. and fr. Jul–Sep.

• Riverbanks, grassy slopes, sandy areas, on rocks; 100–200 m. W Hubei, E Sichuan.

51. *Aster taiwanensis* Kitamura, Acta Phytotax. Geobot. 1: 145. 1932.

台湾紫菀 *tai wan zi wan*

Aster baccharoides (Bentham) Steetz var. *kanehirae* Yamamoto; *A. scaberrimus* Hayata; *A. trinervius* Roxburgh ex D. Don var. *hayatae* Yamamoto; *A. trinervius* var. *scandens* Hayata.

Herbs, perennial, 30–100(–300) cm tall; rhizomes long, slender. Stems erect, simple, sometimes branched in upper part, finely striate, glabrous or glabrate or sparsely strigillose proximally, strigillose distally, minutely stipitate glandular below leaves. Leaves cauline, gradually reduced upward, abaxially pale green, adaxially green, shiny, abaxially glabrous, minutely stipitate glandular in pits, veins sparsely strigillose, adaxially scabridulous, margin sparsely ciliate, midvein prominent abaxially, apex acuminate, mucronate; lowest leaves withered by anthesis, shortly winged petiolate; blade obovate to oblanceolate

late, 0.7–9 cm, base attenuate, margin serrulate to coarsely serrate; lower to upper leaves shortly petiolate (petiole 0.2–0.5 cm); blade oblanceolate to narrowly lanceolate, 3–14 × 0.5–3 cm, base cuneate-rounded to rounded, margin serrate; synflorescence leaves shortly petiolate, lanceolate, 1.5–6 × 0.3–1.2 cm, base rounded, margin 1–5-serrate. Capitula 17–150 or more in terminal paniculate-corymbiform synflorescences; peduncles 3–10 mm, strigillose; bracts lanceolate, entire. Involucres cylindrical-campanulate, 4.5–7 mm; phyllaries 5–7-seriate, unequal, green distally, ca. 1 mm wide, apically minutely stipitate glandular, margin scarious, erose, purplish, ciliate, midvein more pronounced distally, ± translucent, apex rounded, erose, purplish, ciliate; outer phyllaries broadly ovate, ca. 1 mm; middle phyllaries oblong, 2–3 mm, base hardened; inner phyllaries oblong, 4–5 mm. Ray florets 8–17, white, tube hairy, lamina 3.5–5(–7) × 1–1.5 mm, eglandular; disk florets yellow, 5.5(–6) mm, tube base flared, tube apex and limb base hairy and sparsely minutely stipitate glandular, limb campanulate, ca. 3 mm, lobes spreading, narrowly triangular, ca. 2 mm, glabrous, eglandular. Achenes mottled purple, oblong, slightly compressed, 2–2.5 mm, strigillose, eglandular, 2-ribbed. Pappus 3-seriate, white or (innermost) ± reddish; outermost bristles few, 0.5–0.7 mm; inner bristles ca. 4 mm, acute; innermost bristles ca. 4.2 mm, weakly clavate. Fl. and fr. May–Dec. $2n = 18^*$.

• Grassy slopes, deciduous or mixed evergreen forests on steep slopes, roadsides or trailsides in forests, rock walls, cliffs, often on limestone, exposed open sites; 100–3000 m. Taiwan.

52. *Aster chingshuiensis* Y. C. Liu & C. H. Ou, Quart. J. Chin. Forest. 14: 26. 1981.

清水马兰 qing shui ma lan

Aster hualiensis S. S. Ying.

Herbs, perennial, 10–25 cm tall, sometimes caespitose; rhizomes long, slender. Stems ascending, simple, finely striate, densely villosulous proximally, strigillose distally, minutely stipitate glandular below leaves. Leaves cauline, gradually reduced upward, abaxially pale green, adaxially green, shiny, abaxially strigillose, minutely stipitate glandular, veins densely strigillose, adaxially scabridulous, margin revolute, sparsely ciliate, midvein prominent abaxially, apex acuminate, mucronate; lowest leaves withered by anthesis, shortly winged petiolate; blade obovate to oblanceolate, 0.7–1.5 cm, base tapering, margin serrulate to serrate; lower to upper leaves shortly petiolate (petiole 0.1–0.2 cm); blade oblanceolate to ovate, 1.2–3 × 0.5–2 cm, base cuneate-rounded to rounded, margin serrate to serrulate; synflorescence leaves shortly petiolate, ovate to lanceolate, 0.5–2.5 × 0.1–0.6 cm, base rounded, margin 1–5-serrate. Capitula 3–50 in terminal, dense corymbiform synflorescences; peduncles 3–30 mm, strigillose; bracts lanceolate, entire. Involucres cylindrical-campanulate, 4–5 mm; phyllaries 3–5-seriate, unequal, green distally, ca. 0.7 mm wide, apically strigillose and minutely stipitate glandular, margin scarious, erose, purplish, ciliate, midvein more pronounced distally, ± translucent, apex rounded to obtuse, erose, purplish, ciliate; outer phyllaries broadly ovate, ca. 1 mm; middle phyllaries oblong, 2–2.5 mm, base hardened; inner phyllaries oblong to lin-

ear-oblong, 4–4.5 mm. Ray florets 5–10, white, tube strigillose, lamina 3–5 × 1–1.5 mm, eglandular; disk florets yellow, ca. 3 mm, tube base flared, tube apex and limb base hairy and minutely stipitate glandular, limb campanulate, ca. 2 mm, lobes spreading, narrowly triangular, ca. 1 mm, abaxially sparsely minutely stipitate glandular. Achenes oblong, slightly compressed, ca. 2 mm, sparsely strigillose, minutely stipitate glandular, 3-ribbed. Pappus brownish, 4-seriate, dirty white or (innermost) ± reddish; outermost bristles few, 0.5–0.7 mm; outer bristles slender, very few or none, ca. 1.2 mm; inner bristles 2.8–3.2 mm, tapering; innermost bristles 3.5–4 mm, weakly clavate. Fl. and fr. Aug–Nov.

• Limestone crevices and gravel; 2000–2200 m. Taiwan.

53. *Aster taoyuenensis* S. S. Ying, J. Jap. Bot. 63: 49. 1988.

桃园马兰 tao yuan ma lan

Herbs, perennial, 30–70 cm tall; rhizomes long, slender. Stems ascending, simple, branched distally, finely striate, moderately to densely villous proximally, strigillose distally, sparsely minutely stipitate glandular. Leaves cauline, not or slightly reduced upward; lowest leaves withered by anthesis, abaxially pale green (spongelike), adaxially green, shiny, abaxially strigose, minutely stipitate glandular in pits, adaxially scabridulous, margin slightly revolute, coarsely 3- or 4-serrate distally, teeth pointing forward, villous-ciliate, ± 3-veined, veins prominent abaxially, apex acuminate, mucronate; lowest leaves shortly winged petiolate; blade obovate to oblanceolate, ca. 2.5 cm (insufficient material), base attenuate, margin serrate; lower to upper leaves shortly petiolate (petiole to 0.3 cm); blade oblanceolate (proximally) to usually lanceolate, 5.2–6.5 × 1.5–2(–2.5) cm, base rounded; synflorescence leaves shortly petiolate, lanceolate, 2.2–4 × 0.8–1.3 cm, base rounded, margin 1–3-serrate or entire. Capitula 7–9 in terminal, loose corymbiform synflorescences; peduncles 1–4 mm, densely strigillose, minutely stipitate glandular in pits; bracts narrowly lanceolate to oblanceolate or linear-oblanceolate, scarious, erose. Involucres broadly campanulate to hemispheric, (3–)5 mm; phyllaries 3- or 4-seriate, unequal, green distally, apically strigillose and minutely stipitate glandular, sometimes slightly pitted, margin scarious, erose, purplish, ciliate, midvein more pronounced distally, ± translucent, apex acuminate, erose, purplish, ciliate; outer phyllaries narrowly ovate to oblong-lanceolate, 1.5–2 × ca. 0.5 mm; middle phyllaries oblong, 3–4 × ca. 0.9 mm, base hardened; inner phyllaries linear-oblong, 4–5 × 0.4–0.5 mm. Ray florets 8–15, white, tube apex sparsely hairy, lamina 7–10 × 1.5–1.8 mm, eglandular; disk florets greenish yellow, 3.5–4 mm, tube base flared, tube apex and limb base strigillose and minutely stipitate glandular, limb campanulate, ca. 2.5 mm, lobes spreading, narrowly triangular, 1.5–1.7 mm, abaxially minutely stipitate glandular. Achenes black to mottled purple, obovoid, slightly compressed, 2–2.5 mm, strigillose, minutely stipitate glandular, 2-ribbed (straw-colored). Pappus 4-seriate, with dirty white barbellate bristles; outermost bristles few, slender, 0.3–0.7 mm; outer bristles very few, slender, ca. 2 mm; inner bristles 2.5–3 mm, tapering; innermost bristles 3.2–3.3 mm, apically flattened. Fl. Jun–Aug.

• Damp rocky mountain ridges and slopes, *Machilus-Castanopsis* forests; 500–900 m. Taiwan.

54. *Aster homochlamydeus* Handel-Mazzetti, Symb. Sin. 7: 1091. 1936.

等苞紫菀 deng bao zi wan

Aster ageratoides Turczaninow var. *grossedentatus* (Thunberg ex Diels) Kitamura; *A. trinervius* Roxburgh ex D. Don var. *grossedentatus* Thunberg ex Diels (Sep 1912); *A. trinervius* var. *grossedentatus* Franchet ex Diels (Oct 1912).

Herbs, perennial, 20–50 cm tall, sometimes caespitose; rhizomes long, slender. Stems erect, simple, finely striate, sparsely to moderately strigillose proximally, minutely stipitate glandular below leaves. Leaves cauline, gradually reduced upward, abaxially pale green, adaxially green, abaxially glabrous, veins strigillose to scabridulous, adaxially densely scabridulous, both surfaces sparsely minutely stipitate glandular in pits, more so apically, margin ciliate, midvein prominent abaxially, apex acuminate, mucronate; lowest leaves withered by anthesis, narrowly winged petiolate (petiole 0.5–10 cm); blade ovate, 1–2.5 cm, base attenuate, margin coarsely serrate; lower to upper leaves narrowly to very broadly petiolate; blade ovate to lanceolate, 5–10 × 1.5–4 cm, base cuneate-rounded to rounded, sometimes auriculate, sometimes clasping, margin coarsely serrate; synflorescence leaves sessile, lanceolate, 2–7 × 0.5–2 cm, base cuneate to rounded, margin 1–5-serrate. Capitula 1–10 in terminal corymbiform synflorescences; peduncles 10–90 mm, strigillose; bracts lanceolate, entire. Involucres campanulate, 5–8 mm; phyllaries 2- or 3-seriate, subequal, often squarrose, oblanceolate, abaxially sparsely to moderately villous-strigillose, sparsely minutely stipitate glandular, leaflike and green distally, margin erose, sparsely ciliate, midvein more pronounced distally, ± translucent, apex acuminate, sometimes purplish, sparsely ciliate; outer phyllaries 6–8 × ca. 1.5 mm, margin narrowly scarious; inner phyllaries 5–9 × ca. 2 mm, base ± hardened, margin broadly scarious. Ray florets 10–14, white or purple, lamina 10–15 × 2–3 mm, glabrous, eglandular; disk florets yellow, 4–5 mm, tube base flared, tube and limb glabrous, eglandular, limb campanulate, ca. 3 mm, lobes spreading, narrowly triangular, ca. 2 mm, sparsely strigose apically, eglandular. Achenes mottled purple, oblong, slightly compressed, 4–5 mm, sparsely strigillose, more densely so distally, eglandular, 4-ribbed (± translucent). Pappus 3-seriate, ± reddish; outermost bristles few, slender, 0.4–0.8 mm; inner bristles 2.5–3 mm, acute; innermost bristles 3.5–4 mm, slightly clavate. Fl. Apr–Aug, fr. Jul–Sep.

• Alpine and subalpine mixed forests; 3000–3700 m. S Gansu, SW Sichuan, NW Yunnan.

55. *Aster alatipes* Hemsley, J. Linn. Soc., Bot. 23: 407. 1888.

翼柄紫菀 yi bing zi wan

Herbs perennial, 36–100 cm tall; rhizomes long, slender, stoloniferous. Stems erect, simple, sometimes distally branched, ± flexuous, ± striate, hispid-villous, minutely stipitate glandular. Leaves cauline, slightly reduced upward, abaxially pale green, adaxially green, abaxially hispid-strigose, densely so on veins, adaxially hispid-strigose, both surfaces sparsely minutely stipitate glandular in pits, margin coarsely serrate to serrate, hispid,

strigose, or villous-ciliate, midvein prominent abaxially, apex acuminate, mucronate; lowest leaves withered by anthesis (not seen); lower to upper leaves broadly winged petiolate; blade ovate to lanceolate, 3.5–5.5(–10) × 1.5–2.5(–4) cm, base cuneate-rounded to rounded; synflorescence leaves broadly winged shortly petiolate, lanceolate, 1.3–2 × 0.6–0.9 cm, base cuneate, margin 3–6-serrate, slightly resinous. Capitula 16 or more in terminal corymbiform synflorescences, ca. 1.5 cm in diam.; peduncles 7–15 mm or longer, densely hispid-strigose, minutely stipitate glandular, resinous; bracts lanceolate, entire. Involucres campanulate, (4–)5–5.2 × ca. 5 mm; phyllaries 4-seriate, unequal, green apically, abaxially distally villosulous and minutely stipitate glandular, margin scarious, erose, moderately to densely villous-ciliate, midvein more pronounced distally, ± translucent, apex acute to rounded, villous-ciliate; outer phyllaries narrowly ovate, 1.5–2 × ca. 0.8 mm; inner phyllaries oblong, 3–6 × 1.8–1.2 mm, base hardened. Ray florets 10–14 or more, purple, tube apex and lamina base strigose, lamina 6–7(–9) × 1–1.5 mm, eglandular; disk florets yellow, (4–)5 mm, tube base flared, tube apex and proximal limb hairy, minutely stipitate glandular, limb campanulate, ca. 3.2 mm, lobes spreading, narrowly triangular, curved, ca. 1.5 mm, apically sparsely hairy, moderately to densely minutely stipitate glandular. Achenes (immature) oblong, slightly compressed, 2–3 mm, sparsely strigillose, sparsely minutely stipitate glandular, 2-ribbed (± translucent). Pappus 4-seriate, ± reddish; outermost bristles few, slender, 0.5–0.6 mm; outer bristles slender, 2–2.3 mm; inner bristles few, ca. 3 mm, acute; innermost bristles ca. 4 mm, weakly clavate. Fl. and fr. Jul–Oct.

• Shaded places in valleys of low mountains or canal banks; 800–1600 m. Anhui, Henan, NW Hubei, S Shaanxi, Sichuan.

56. *Aster limosus* Hemsley, J. Linn. Soc., Bot. 23: 413. 1888.

湿生紫菀 shi sheng zi wan

Herbs, perennial, 22–70 cm tall; rhizome thick. Stems often solitary, erect, simple or branched at middle, finely canaliculate, strigillose. Leaves thick, abaxially sparsely strigillose, veins densely villous, midvein or nearly palmate veins raised, lateral veins 3-paired, conspicuous, adaxially densely scabrous; lower leaves withered by anthesis, petiole 2–6 cm; blade cordate, reniform, or suborbicular, 2–5 × 2.2–4.5 cm; middle leaves cordate-ovate, margin serrate (teeth mucronulate), apex acute to acuminate; upper leaves gradually reduced, subsessile, ovate. Capitula many, in terminal corymbiform synflorescences, 2–2.5 cm in diam.; peduncles 7–12 cm; bracts oblong or linear. Involucres campanulate, 6–7 × ca. 8 mm; phyllaries 4-seriate, unequal (loosely imbricate), oblong, apex obtuse; outer phyllaries ca. 2 × 0.5 mm, densely strigillose, apex leaflike; inner phyllaries ca. 5 × 0.7 mm, glabrous, margin scarious, apex obtuse to acute, often purple-red. Ray florets ca. 10, purple, tube ca. 2 mm, lamina oblong, 8–9 × 1.5–2 mm; disk florets ca. 5 mm, tube 1.5–2 mm, lobes ca. 1 mm (not seen). Achenes (not seen) oblong, ca. 2 mm, densely strigillose, 2- or 3-ribbed. Pappus (not seen) of dirty white or ± reddish, subequal bristles.

• Muddy fields; ca. 1200 m. W Hubei (Yichang).

The leaf shape of *Aster limosus* is distinct from that of other species.

57. *Aster morrisonensis* Hayata, Icon. Pl. Formosan. 8: 48. 1919.

玉山紫菀 *yu shan zi wan*

Herbs, perennial, 10–40 cm tall or more, rhizomatous, stoloniferous. Stems erect, simple, sometimes branched in upper part; branches ascending, strigillose, densely leafy. Leaves cauline, slightly reduced upward, abaxially pale green, adaxially green, shiny, both surfaces scabrous, minutely stipitate glandular in pits, margin coarsely 1–5-serrate, scabrous, abaxially prominently 3-veined, apex acuminate, mucronate; lowest leaves withered by anthesis, long winged petiolate (petiole to 5.5 cm); blade spatulate to oblanceolate or lanceolate, 1.3–2.5 cm, base attenuate; lower to upper leaves shortly petiolate; blade lanceolate, 2–4 × 0.7–0.9 cm, base attenuate; synflorescence leaves shortly petiolate, lanceolate, margin entire. Capitula many in terminal paniculiform-corymbiform synflorescences (not measurable on specimen); peduncles 10–50 mm or longer, strigillose; bracts lanceolate, entire. Involucres campanulate to hemispheric, 3–5 mm; phyllaries 3-seriate, unequal, green distally, 0.7–0.9 mm wide, apically minutely glandular, margin narrowly scarious, erose, purplish, ciliate, midvein more pronounced distally, ± translucent, apex rounded, erose, purplish, ciliate; outer phyllaries broadly ovate, ca. 1.5 mm; middle phyllaries oblong, 2–3 mm, base hardened; inner phyllaries oblong, 4–5 mm. Ray florets 8–20, white, tube hairy, lamina 3.5–5(–7) × 1–1.5 mm, eglandular; disk florets yellow, 4–5.5(–6) mm, tube base flared, tube apex and limb base hairy, limb campanulate, lobes spreading, lanceolate, ca. 2 mm, glabrous, eglandular. Achenes mottled purple, oblong, slightly compressed, 1.8–2.5 mm, strigillose, eglandular, 2-ribbed. Pappus 3-seriate, white or (innermost) ± reddish; outermost bristles few, 0.5–0.7 mm; inner bristles ca. 4 mm, acute; innermost bristles ca. 4.2 mm, weakly clavate. Fl. Jul–Sep.

• Alpine areas; 3000–3700 m. Taiwan.

58. *Aster piccolii* J. D. Hooker, Bot. Mag. 125: t. 7669. 1899.

裸菀 *luo wan*

Asteromoea piccolii (J. D. Hooker) Handel-Mazzetti; *Gymnaster piccolii* (J. D. Hooker) Kitamura; *Kalimeris piccolii* (J. D. Hooker) S. Y. Hu; *Miyamayomena piccolii* (J. D. Hooker) Kitamura.

Herbs, perennial, 60–120 cm tall, rhizomatous. Stems erect, simple, sometimes branched in upper part, finely striate, strigillose, sparsely minutely stipitate glandular distally. Leaves cauline, gradually reduced upward, abaxially pale green (spongelike), adaxially green, both surfaces scabridulous, sometimes more sparsely so adaxially, abaxially minutely stipitate glandular in pits, margin coarsely serrate to serrate or entire (upper leaves), revolute, scabridulous, midvein prominent abaxially, apex acuminate, mucronate; lowest leaves withered by anthesis (not seen); lower to upper leaves shortly winged petiolate (petiole to 0.8 cm) or sessile, obovate or oblanceolate to narrowly lanceolate, 4–9 × 1.2–1.8 cm, base attenuate; synflorescence leaves sessile, linear-lanceolate, 2.1–2.8 × 0.4–0.5 cm, base cuneate, margin strongly revolute, entire. Capitula numerous in terminal or axillary corymbiform synflorescences; pe-

duncles 20–60 mm, strigillose, minutely stipitate glandular; bracts linear-lanceolate, entire, distally grading into phyllaries. Involucres hemispheric, 4–5 mm; phyllaries 3–6-seriate, unequal, often squarrose, green distally, abaxially distally sparsely strigillose, sparsely minutely stipitate glandular, margin scarious, erose, sometimes purplish, ciliate, midvein enlarged basally, almost keeled, distally ± translucent, apex obtuse to acute, erose, purplish, ciliate; outer phyllaries oblong, ca. 3 × 1.3 mm; middle phyllaries oblanceolate, 3.5–4 × ca. 1.2 mm, base hardened; inner phyllaries broadly oblanceolate, 4–5 × ca. 1.5 mm. Ray florets 10–26, purple-blue, veins prominent, tube sparsely minutely stipitate glandular, lamina 7–8.5 × 1–2.5 mm, glabrous; disk florets yellow, 3–4 mm, veins prominent, tube base flared, tube and limb base glabrous, minutely stipitate glandular, limb campanulate, 2–2.5 mm, lobes spreading, lanceolate, 0.8–1.5 mm, glabrous, minutely stipitate glandular. Achenes oblanceolate, 2.7–3 mm, sparsely strigose to glabrate or glabrous, minutely stipitate glandular distally, 3–6-ribbed. Pappus of ray absent, of disk 1-seriate; outermost series of scales 0.2–0.5 mm. Fl. Aug–Oct.

• Grasslands on slopes; 900–1700 m. Gansu, Guizhou, Henan, Shaanxi, Shanxi, Sichuan.

Specimens of *Aster piccolii* were not seen by one of us (Brouillet).

59. *Aster yuanqunensis* (J. Q. Fu) Brouillet, Semple & Y. L. Chen, **comb. nov.**

垣曲裸菀 *yuan qu luo wan*

Basionym: *Gymnaster yuanqunensis* J. Q. Fu, Bull. Bot. Res., Harbin 5(3): 141. 1985.

Herbs, perennial, ca. 57 cm tall, rhizomatous. Stems erect, simple, finely striate, glabrate at base, strigillose above. Leaves cauline, gradually reduced upward, laxly patent; lowest leaves withered by anthesis; lower to upper leaves shortly petiolate or sessile, ovate-oblong to narrowly oblong or lanceolate, 1.7–8 × 0.5–2.3 cm, thin, both surfaces sparsely strigillose, base cuneate, margin coarsely serrate to serrate, scabridulous, apex acuminate. Capitula 1–4 in terminal corymbiform synflorescences or solitary, ca. 3 cm in diam. Involucres hemispheric; phyllaries 4-seriate, unequal, green apically, abaxially strigillose, margin scarious, erose. Ray florets purple-blue, lamina oblong, ca. 17 mm; disk florets yellow, ca. 5 mm, sparsely hairy, limb campanulate, lobes reflexed, lanceolate. Achenes dark purple, obovoid, compressed, glabrous, 2–4-ribbed. Pappus (not described and absent on illustration). Fl. Oct.

• Among shrubs in mountain valleys; 900–1000 m. S Shanxi (Yuanqu).

Material of this species was not seen by us. The description is from the original Latin description and the illustration. This species is close to *Aster piccolii*.

60. *Aster pseudosimplex* Brouillet, Semple & Y. L. Chen, **nom. nov.**

四川裸菀 *si chuan luo wan*

Replaced synonym: *Aster simplex* C. C. Chang, Sinensia 6: 541. 1935, not *Aster simplex* Willdenow, Enum. Pl. 2: 887.

1809; *Asteromoea simplex* Handel-Mazzetti; *Gymnaster simplex* Y. Ling; *Miyamayomena simplex* Y. L. Chen.

Herbs, perennial, 10–67 cm tall. Stems ascending, solitary or 2–4, simple or 2- or 3-branched from middle part, white hispidulous-villous. Leaves: basal spatulate, long petiolate; lower cauline leaves withered by anthesis; middle leaves oblong-lanceolate or subelliptic, 1.5–2.5(–4) × 0.3–0.6(–0.9) cm, white hispidulous-villous on both surfaces, minutely stipitate glandular in pits, midvein abaxially convex, adaxially concave, base rounded, sessile, margin entire, apex obtuse or acute; uppermost leaves remote, linear, ca. 1 cm. Capitula solitary, 2–2.5 in diam. Involucres hemispheric, ca. 6 × 1.5 mm; phyllaries 3- or 4-seriate, unequal; outer phyllaries green, rather short, lanceolate, 4–5 × 1.2–1.5 mm, acute or obtuse, externally pubescent; inner phyllaries obovate-oblong, 5–5.5 × 1.5–2 mm, acute, margin broadly scarious, ciliate, apically red-purplish. Ray florets purplish red, ca. 16 × 2 mm, tube ca. 2 mm, glandular puberulent; disk florets ca. 4 mm, tube ca. 1 mm, puberulent. Achenes yellowish, obovoid, slightly compressed, ca. 2 × 1.3 mm, inconspicuously marginally ribbed, glabrous. Pappus absent. Fl. and fr. Jul–Sep.

- Grasslands on slopes, canal sides; 2600–3000 m. NW Sichuan.

61. *Aster lixianensis* (J. Q. Fu) Brouillet, Semple & Y. L. Chen, **comb. nov.**

理县裸苑 li xian luo wan

Basionym: *Gymnaster lixianensis* J. Q. Fu, Bull. Bot. Res., Harbin 5(3): 143. 1985.

Herbs, perennial, 15–48(–60) cm tall, caespitose. Stems ascending, solitary or 2–4, simple, striate, densely retrorsely hirsutulous. Leaves sessile, basal and lower cauline leaves withered by anthesis; middle and upper leaves dense, gradually reduced upward, lanceolate-ovate to narrowly oblong or linear, 1–3 × 0.1–0.6 cm, both surfaces strigose, abaxially pale, adaxially dark green, base truncate, margin entire, apex obtuse, mucronate. Capitula solitary, 2.5–3 cm in diam. Involucres broadly campanulate; phyllaries 3-seriate, unequal; outer series green, short, oblong, strigose; inner series obovate-lanceolate, 5–7 mm, margin broadly scarious, fimbriate, apically green or purplish. Ray florets bluish, 5–7 mm; disk florets yellow, 3–5 mm, limb funnelform, lobes lanceolate. Achenes (immature) obovoid, slightly compressed, inconspicuously 2- or 3-ribbed. Pappus absent. Fl. Jul–Aug.

- 2600–2800 m. NC Sichuan (Barkam, Lixian).

Material of this species was not seen by us. The description is from the original Latin description and the illustration. This species is close to *Aster pseudosimplex*.

62. *Aster sinoangustifolius* Brouillet, Semple & Y. L. Chen, **nom. nov.**

狭叶裸苑 xia ye luo wan

Replaced synonym: *Aster angustifolius* C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 43. 1935, not *Aster angustifolius* Jacquin, Pl. Hort. Schoenbr. 3: 63. 1798; *Asteromoea angustifolia* Handel-Mazzetti; *Gymnaster angustifolius* Y. Ling; *Kali-*

meris angustifolia S. Y. Hu; *Miyamayomena angustifolia* Y. L. Chen.

Herbs, perennial, 30–50 cm tall, rhizomatous. Stems erect, simple, sometimes flexuous, sometimes branched in upper part, finely striate, glabrous or glabrate, sparsely minutely stipitate glandular below leaves. Leaves cauline, gradually reduced upward, abaxially pale green (spongelike), adaxially green, abaxially sparsely scabridulous, minutely stipitate glandular in pits, adaxially scabridulous, margin remotely serrate to serrulate, revolute, scabridulous, midvein prominent abaxially, apex acuminate, mucronate; lowest leaves withered by anthesis (not seen); lower to upper leaves winged petiolate (petiole to 2 cm); blade oblanceolate to narrowly lanceolate, (6–)10–13(–15) × 0.5–1.9 cm, base attenuate; synflorescence leaves sessile, linear-lanceolate, 2–4 × 0.3–0.4 cm, base cuneate, margin entire, grading upward into phyllaries. Capitula 1–3, terminal or axillary, overall forming corymbiform synflorescences; peduncles 60–90 mm, strigillose, minutely stipitate glandular; bracts linear-lanceolate, entire. Involucres hemispheric, 5–6 mm; phyllaries 3- or 4-seriate, unequal, green distally, glabrous, sometimes apically minutely stipitate glandular, margin scarious, erose, sometimes purplish, ciliate, midvein ± translucent, sometimes multiveined, apex rounded, erose, purplish, ciliate; outer phyllaries oblong, 3–4 × 1.2–2 mm; middle phyllaries obovate, 5–5.5 × 2–2.5 mm, base hardened; inner phyllaries oblanceolate, 6–7 × 1.1–1.5 mm. Ray florets 15–20, purple to lavender, veins prominent, tube and lamina base sparsely minutely stipitate glandular, lamina 6–7 × ca. 1.5 mm, glabrous; disk florets yellow, ca. 3.5 mm, veins prominent, tube base flared, tube and limb base glabrous, minutely stipitate glandular, limb broadly campanulate, ca. 2.5 mm, lobes spreading, narrowly triangular, 0.7–1 mm, glabrous, tip sparsely minutely stipitate glandular. Achenes narrowly obovoid, ca. 2.1 mm, glabrous, 4–6-ribbed. Pappus absent. Fl. and fr. Jul–Oct.

- Riverbanks in valleys and forest margins; ca. 600 m. Fujian, Zhejiang.

63. *Aster lushiensis* (J. Q. Fu) Brouillet, Semple & Y. L. Chen, **comb. nov.**

卢氏裸苑 lu shi luo wan

Basionym: *Gymnaster lushiensis* J. Q. Fu, Bull. Bot. Res., Harbin 3(1): 110. 1983.

Herbs, perennial, (size not given). Stems erect, terete, slightly flexuous, branched upward, densely white appressed villous. Leaves: lowest and lower cauline leaves (not seen) shortly narrowly winged petiolate or subsessile; middle and upper cauline leaves sessile, ovate, broadly elliptic, or obovate, 2–8 × 1–4 cm, abaxially gray-white appressed villous, adaxially dark green, white hispidulous, base attenuate, margin obscurely repand-crenate, lateral veins 3- or 4-paired, adaxially prominent, apex obtuse or rounded. Capitula 2–5 in loose corymbiform synflorescences, 2–3 cm in diam. Involucres campanulate; phyllaries 3-seriate, unequal, abaxially puberulent; outer phyllaries shorter, ovate; inner phyllaries longer, oblong, membranous, margin scarious, hyaline. Ray florets bluish purple, lamina 8–16 mm; disk florets numerous, yellow, 3–4 mm. Achenes

(immature) obovoid-oblong, 5- or multiribbed. Pappus absent. Fl. Oct.

- Path sides on mountain slopes; ca. 800 m. Henan (Lushi).

The description of *Aster lushiensis* is incomplete because no specimens were seen by us.

64. *Aster verticillatus* (Reinwardt) Brouillet, Semple & Y. L. Chen, **comb. nov.**

秋分草 qiu fen cao

Basionym: *Rhynchospermum verticillatum* Reinwardt, Syll. Pl. Nov. 2: 8. 1825; *Leptocoma racemosa* Lessing; *R. formosanum* Yamamoto; *R. verticillatum* var. *subsessile* Oliver ex Miquel; *Zollingeria scandens* Schultz Bipontinus.

Herbs, perennial, 5–150 cm tall, sometimes caespitose; rhizomes long, slender. Stems erect, simple, usually divaricately branched in distal half, finely striate, strigillose, minutely stipitate glandular. Leaves cauline, gradually reduced upward, abaxially pale green, adaxially green, abaxially sparsely strigillose, more densely so on veins, minutely stipitate glandular in pits, adaxially scabridulous, eglandular, thin, margin sparsely ciliate, midvein prominent abaxially, apex acute to obtuse, mucronate; lowest leaves usually withered by anthesis, short, narrowly winged petiolate; blade obovate or ovate to lanceolate, 1.5–4.5 cm, base cuneate, margin crenate-serrate (teeth mucronulate); lower to upper leaves shortly petiolate (petiole to 0.6 cm); blade lanceolate to narrowly lanceolate, sometimes ovate, 3.5–14 × 0.4–5.5 cm, base attenuate, margin crenate-serrate to serrate or entire; synflorescence leaves shortly petiolate, lanceolate, 0.5–3 × 0.1–0.8 cm, base attenuate, margin 1–5-serrate or entire. Capitula 1–5 per branch, in terminal or axillary racemiform synflorescences, sometimes distributed along much of stem; peduncles 1–30 mm, sparsely to moderately strigillose; bracts absent or 1, oblanceolate, entire. Involucres broadly campanulate to hemispheric, 2–7 mm; phyllaries 3-seriate, unequal, green apically, ca. 1 mm wide, apically sometimes strigillose, sometimes minutely stipitate glandular, margin scarious, erose, ciliate, midvein more pronounced distally, ± translucent, apex rounded, erose, ciliate; outer phyllaries broadly ovate, ca. 1 mm; middle phyllaries oblong, 2–3 mm, base thin; inner phyllaries oblong, 4–5 mm. Ray florets 2- or 3-seriate, 10–40, white, tube (ca. 0.3 mm) and abaxial lamina minutely stipitate glandular, lamina ca. 1.2 × 0.3 mm, glabrous; disk florets yellow, ca. 2 mm, glabrous, minutely stipitate glandular, tube base flared, limb campanulate, ca. 1 mm, lobes spreading and reflexed, triangular, ca. 0.5 mm. Achenes purple proximally to mottled purple in proximal half (not purple above), obovoid, ca. 2 mm, glabrous, of ray compressed, distally minutely stipitate glandular, 2-ribbed, long beaked, of disk trigonous, eglandular, 3-ribbed, beakless or shortly beaked. Pappus 3-seriate, easily caducous and often absent (through loss), of mottled reddish brown, barbellulate bristles; outermost bristles 0–3, slender, ca. 0.1 mm; outer bristles absent or 1, slender, ca. 1.7 mm; innermost bristles 4 or 5, ca. 2 mm, slightly flattened distally. Fl. and fr. Aug–Nov.

Forest margins, shaded forests, disturbed forests, shaded stream-sides, damp weedy places, open grassy or brushy slopes, roadsides, thickets; 400–2500 m. Fujian, Guangdong, Guangxi, Guizhou, Hubei,

Hunan, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan [Bhutan, India, Indonesia, Japan, Malaysia, Myanmar, Nepal, Vietnam].

65. *Aster hunanensis* Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 611. 1937.

湖南紫菀 hu nan zi wan

Herbs, perennial, ca. 35 cm tall, rhizomatous and shortly stoloniferous. Stems erect, solitary, slender, glabrate, branched in upper part, loosely leafy. Leaves glabrous on both surfaces or abaxial veins sparsely strigillose, thick, margin slightly revolute, remotely serrate (teeth mucronate), sparsely scabrous, 3-veined, 2- or 3-paired lateral veins abaxially prominent, conspicuously reticulate veined; lower leaves (not observed) long broadly winged petiolate (petiole equaling blade); blade ovate or subelliptic, 6–7 × 3–4 cm, abruptly attenuate, apex acute or obtuse; middle leaves shortly petiolate, broadly winged and ± subclasping or not winged; blade oblong-lanceolate or elliptic, 4–7 × 1.5–2.5 cm, abruptly attenuate or rounded, apex acuminate; upper leaves gradually reduced, petiolate or base ± subclasping, margin shallowly serrate or entire. Capitula in axils of leaves or terminal, solitary and overall in paniculate-corymbiform synflorescences, 2–3.5 cm in diam.; peduncles 0.5–2.5 cm; bracts linear. Involucres campanulate, 5–7 mm in diam.; phyllaries 3- or 4-seriate, unequal, apex green, oblong, 3–4 × ca. 1 mm, abaxially glabrous, margin scarious, erose, ciliate, apex rounded or obtuse. Ray florets ?purplish (immature); disk florets (immature) 3.5–4 mm, tube ca. 1.5 mm, lobes ca. 0.8 mm. Achenes (immature) obovoid, ca. 2 mm, slightly compressed, 2–4-ribbed, with white short hairs. Pappus (immature) dirty white, of many unequal bristles 1.5–2 mm. Fr. Aug.

- 500–800 m. SW Hunan (Anhua).

The glabrate or glabrous stems and leaves are distinctive of *Aster hunanensis*.

66. *Aster menelii* H. Léveillé, Fl. Kouy-Tchéou, 87. 1914.

黔中紫菀 qian zhong zi wan

Herbs, perennial, ca. 70 cm tall; rhizomes procumbent, with long fibrous roots. Stems erect, slender, branched at middle, finely canaliculate, scabrous, densely leafy. Leaves abaxially pale green, adaxially brownish (when dry), both surfaces sparsely scabrous, 3-veined, midvein abaxially prominent, lateral veins parallel with margin; basal leaves few, rosulate, long petiolate; blade ovate-lanceolate, ca. 4.5 × 2.5 cm, base attenuate, margin sparsely shallowly toothed or subentire, apex acute; lower and middle leaves oblong-lanceolate, 4–10 × 1.5–2 cm, base gradually attenuate, margin 4- or 5-serrate or subentire, apex acuminate; upper leaves narrowed. Capitula in racemose-corymbiform synflorescences, ca. 2 cm in diam.; peduncles 2–3 cm; bracts linear-lanceolate, leaflike. Involucres hemispheric, ca. 8 mm in diam.; phyllaries 3-seriate, subequal, brown, oblong-lanceolate, abaxially puberulent, membranous, midvein herbaceous, apex acute or slightly acute. Ray florets ca. 10 or more, white, tube ca. 1.3 mm, lamina ca. 10 × 1.2 mm; disk florets yellow, 3–3.5 mm, tube ca. 1 mm, lobes ca. 0.5 mm. Achenes (immature) oblong, ca. 2 mm, strigillose. Pappus (immature) white, of 10–20 unequal bristles 1–1.5 mm. Fl. Jun.

- C Guizhou (Anshun).

Aster menelii is probably closely related to *A. hunanensis*. The structure of the phyllaries and pappus is similar, but the leaf shape is different.

67. *Aster gracilicaulis* Y. Ling ex J. Q. Fu, Bull. Bot. Res., Harbin 3(1): 116. 1983.

细茎紫菀 xi jing zi wan

Herbs, perennial, 30–60 cm tall. Stems 3–5-fascicled, erect or ascending, branched in upper part, shallowly canaliculate, red-brown in lower part, yellow villous-canescens or glabrescent, loosely leafy. Leaves abaxially pale green, sparsely hairy on veins, minutely stipitate glandular, adaxially scabrous, margin \pm revolute, entire or remotely serrulate (teeth mucronulate), scabrous, midvein prominent, 3-veined, veins subparallel, reticulate veins lax, apex acute; lower leaves withered by anthesis, long petiolate, narrowly lanceolate; middle leaves shortly petiolate, linear-lanceolate, 5–9 \times 0.4–0.7 cm, base attenuate, apex long acuminate, sometimes falcate; upper leaves reduced, linear to subulate. Capitula in corymbiform synflorescences, 2–2.5 cm in diam. Involucre campanulate, ca. 5 \times 8–10 mm; phyllaries 3- or 4-seriate, unequal, margin scarios, erose, ciliate, midvein green, apex obtuse; outer phyllaries linear-oblong, 2–2.5 \times ca. 0.7 mm, apically leaflike; inner phyllaries ca. 4.5 \times 1 mm, apically purple-red. Ray florets to 20, blue-purple, tube ca. 2.5 mm, lamina oblong, ca. 9 \times 2.5 mm; disk florets ca. 4 mm (immature). Achenes (immature) black, obovoid, ca. 2 \times 1.5 mm, strigillose, 2- or 3-ribbed. Pappus (immature) white, 3.5–4 mm. Fl. Jul.

• Slopes, among shrubs, gullies; 1000–1300 m. S Gansu (Hui-xian, Qingyan).

68. *Aster itsunboshi* Kitamura, Acta Phytotax. Geobot. 3: 130. 1934.

大埔紫菀 da pu zi wan

Herbs, perennial, ca. 3 cm tall, scapiform; rhizomes slender and long, woody. Stems usually simple, erect, sometimes decumbent, laxly leafy. Leaves densely strigose; basal leaves rosulate, present at anthesis, winged petiolate, obovate or oblong, 1.5–2 \times ca. 0.7 cm, thick, base gradually attenuate, margin serrate (teeth mucronulate), apex obtuse or \pm acute; cauline leaves gradually smaller, shortly petiolate or subsessile, spatulate or lanceolate, base attenuate, apex acute. Capitula 1 or 2, shortly pedunculate, erect, ca. 8 mm in diam. Involucre hemispheric, 4–7 mm, tinged purple-red; phyllaries 2-seriate; outer phyllaries lanceolate, short, margin fimbriate-ciliate, scabrous, apex acuminate. Ray florets white, 7.5–7.7 mm, tube ca. 1.6 mm; disk florets ca. 3.6 mm, tube ca. 1.2 mm, limb campanulate, lobes lanceolate, ca. 2 mm, glabrous. Achenes (immature) strigose. Pappus (immature) dirty white, often tinged yellow, or reddish, ca. 2 mm.

• Stony mountains. Taiwan.

The original description of *Aster itsunboshi* was translated from Kitamura. The material seen at PE was damaged in the area of the capitula so some floral and achene characters could not be determined. According to Soejima and C. I. Peng (Fl. Taiwan, ed. 2, 4: 855–857. 1998), citing Kitamura, this may be a juvenile form of *A. morrisonensis*. If this hypothesis were to prove incorrect, the species might be best treated in *A. sect. Alpigeni*.

69. *Aster molliusculus* (Lindley ex Candolle) C. B. Clarke, Compos. Ind. 45. 1876.

软毛紫菀 ruan mao zi wan

Diplopappus molliusculus Lindley ex Candolle, Prodr. 5: 277. 1836; *D. roylei* Lindley ex Candolle.

Herbs, perennial, 8–30(–40) cm tall, caespitose; caudex taprooted, sometimes thick and woody. Stems erect, simple, sometimes branched in upper part, sparsely villosulous, more densely so upward and below leaves, very sparsely to moderately minutely stipitate glandular, resinous. Leaves cauline, usually gradually increased upward, abaxially pale green (\pm spongelike), adaxially green, abaxially glabrous or sparsely strigose or villosulous, veins sparsely strigillose to strigose, sparsely minutely stipitate glandular in pits, adaxially glabrous, strigose, sparsely scabridulous, or sparsely villosulous, sometimes resinous, margin sparsely ciliate, midvein prominent abaxially, apex acute, mucronate; lowest leaves usually withered by anthesis, scaly, marcescent; lower to upper leaves shortly petiolate (petiole to 1 cm), oblanceolate to narrowly oblanceolate, 1–3.5 \times 0.3–0.8 cm, base attenuate to cuneate, margin sometimes revolute, entire (lower) or 2–6-serrate (upper). Capitula terminal, solitary (rarely 2) on branches; peduncles 3–13 mm, sparsely to densely strigillose, sometimes minutely stipitate glandular; bracts linear-lanceolate, entire. Involucre campanulate, 7–10 mm; phyllaries 2- or 3-seriate, unequal, green distally, linear-lanceolate, 0.5–1.1 mm wide, glabrous or strigillose on midvein, eglandular, margin scarios, erose, eciliate, midvein swollen or ridged proximally, \pm translucent, apex acuminate, erose, purplish, eciliate; outer phyllaries 4–5 mm; middle phyllaries 6–7 mm, base hardened; inner phyllaries 6–9 mm. Ray florets 15–25, white or pink, tube hairy, sometimes minutely stipitate glandular, lamina 5–9 \times 1.5–2.1 mm; disk florets yellow, 5–6 mm, tube base flared, tube and limb base sometimes sparsely hairy, minutely stipitate glandular, limb \pm campanulate, 3–3.5 mm, lobes spreading, narrowly triangular, 0.8–1 mm, glabrous, eglandular. Achenes oblong, slightly compressed, 3–4 mm, moderately to densely strigillose, eglandular, 4-ribbed. Pappus 4-seriate, dirty white; outermost series \pm scaly, 0.5–1.5 mm; outer bristles few, slender, 2.5–3.5 mm; inner bristles 4.5–5 mm, acute; innermost bristles 5–6.5 mm, weakly clavate to clavate. Fl. May–Jun, fr. Jun–Sep. $2n = 18, 27$.

Alpine and subalpine stony slopes; 1800–3500 m. W Xizang [NW India, Kashmir, Pakistan].

70. *Aster sikkimensis* J. D. Hooker, Bot. Mag. 77: t. 4557. 1851.

锡金紫菀 xi jin zi wan

Subshrubs or herbs, perennial, 50–80 cm tall, rhizomatous. Stems erect, simple, stout, flexuous, \pm woody at base, purplish, finely striate, strigillose, villosulous, sparsely minutely stipitate glandular, particularly below leaves. Leaves cauline, slightly reduced upward, abaxially pale green, glabrous, veins sparsely strigillose, minutely stipitate glandular, sometimes in pits, adaxially green, densely scabridulous, margin coarsely serrate, ciliate, veins prominent, apex long acuminate, mucronate; lowest leaves withered by anthesis (not seen), broadly winged peti-

olate, lanceolate, ca. 22 cm, base attenuate, apex acuminate; lower leaves (not seen) to upper leaves shortly broadly winged petiolate (base clasping) or sessile, lanceolate, (5–)6–17 × 1.5–5.5 cm, base attenuate or auriculate, clasping; synflorescence leaves sessile, lanceolate, 0.5–6 × 0.1–1.2 cm, base auriculate, clasping, margin serrate to serrulate, rapidly becoming bracts. Capitula 10–45 or more, in terminal corymbiform synflorescences, 10–12 mm in diam.; peduncles 6–50 mm, densely strigillose; bracts linear-lanceolate, entire. Involucre campanulate, 4–4.5 mm; phyllaries 2- or 3-seriate, subequal, sometimes squarrose, green distally, oblanceolate to lanceolate or linear-lanceolate (inner phyllaries), 3.5–4.5 × 0.5–1 mm, abaxially sparsely strigillose, mainly on veins, sparsely to moderately minutely stipitate glandular, margin scarious to narrowly scarious, erose, sparsely ciliate, midvein more pronounced distally, ± translucent, apex acuminate, purplish, sparsely ciliate. Ray florets 30–35(–60), white, rose, blue, or purple, tube apex sparsely stipitate glandular, lamina 4–5 × ca. 1 mm, glabrous; disk florets yellow, becoming purplish, 3.5–4 mm, tube base flared, limb campanulate, ca. 2 mm, glabrous, proximally sparsely stipitate glandular, lobes spreading, narrowly triangular, 0.8–1 mm, purplish. Achenes obovoid, slightly compressed, ca. 2.2 mm, sparsely strigillose, eglandular, 4-ribbed. Pappus 2- or 3-seriate, brownish; outer bristles 0–2, slender, 1.5–2 mm; inner bristles 2.5–3 mm, acute; innermost bristles 3.5–4 mm, slightly clavate. Fl. Aug–Oct.

2400–3600 m. S Xizang [India (Sikkim), Nepal].

Aster sikkimensis is related to *A. nigromontanus*, but it differs by its finely pubescent phyllaries and leaf shape.

71. *Aster pycnophyllus* Franchet ex W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 8: 332. 1915.

密叶紫菀 mi ye zi wan

Aster harrowianus Diels var. *pycnophyllus* (Franchet ex W. W. Smith) H. Léveillé.

Herbs, perennial, rhizomatous. Stems erect, 30–60 cm tall, flexuous, reddish, glabrescent below, moderately to densely strigose-villous above, usually branched only at synflorescence, more densely leafy above. Leaves cauline, thin, abaxially villous on veins, adaxially scabrous, both surfaces stipitate glandular, midvein ± prominent abaxially, lateral veins in 4 or 5 pairs, distinct; lower leaves absent at anthesis; middle and upper leaves petiolate; petiole 1–2(–4) cm, rarely subsessile; blade ovate to lanceolate, 7–13 × 2–2.5 cm, base truncate, rounded, or somewhat cordate, or attenuate, margin coarsely serrate (teeth mucronate), apex long acuminate (sometimes falcate); uppermost leaves smaller, narrowly ovate to lanceolate or linear. Capitula numerous in corymbiform synflorescences, 1.5–2 cm in diam.; peduncles 1–1.5 cm; bracts linear. Involucre campanulate, 4–5 × 6–8 mm; phyllaries 3- or 4-seriate, unequal, lanceolate to oblong, 2.8–4 × 0.6–0.8 mm, abaxially villosulous, apex acuminate, outer phyllaries purple, inner phyllaries with margin scarious, erose-fimbriate. Ray florets 10–30, purplish blue to nearly white, tube 1.8–2 mm, hairy, lamina 4–7 × 0.7–1.2 mm; disk florets yellow or sometimes purplish tinged, 4.2–5 mm, tube 1.2–1.6 mm, limb funnelform, tube, limb, and

lobes hairy, lobes lanceolate, 1–1.1 mm. Achenes lanceoloid, compressed, 1.7–2 × ca. 0.7 mm, strigose, 2-ribbed. Pappus 3-seriate, dirty white; outer bristles slender, ca. 2.7 mm; inner bristles ca. 3.8 mm, acute; innermost bristles clavate. Fl. Jun–Oct, fr. Sep–Dec.

Subalpine slopes, grasslands, thickets; 1000–3800 m. Sichuan, E and SE Xizang, NW Yunnan [India, N Myanmar].

72. *Aster nigromontanus* Dunn, J. Linn. Soc., Bot. 35: 501. 1903 [“*nigromontana*”].

黑山紫菀 hei shan zi wan

Herbs, perennial, 40–50 cm tall, rarely caespitose, rhizomatous. Stems erect, simple, stout, flexuous, shallowly striate, glabrous proximally, sparsely strigillose distally, eglandular. Leaves: basal leaves in a rosette, disappearing before stem elongation, winged long (petiole to 2.5 cm) or shortly petiolate; blade abaxially pale green, adaxially green, oblong, 4–6 × 1.5–2.5 cm, slightly reduced upward, abaxially glabrous, veins sparsely strigillose, very sparsely minutely stipitate glandular in pits, adaxially densely scabridulous, very sparsely minutely stipitate glandular in pits, base abruptly attenuate, margin coarsely serrate (teeth mucronate), ciliate, midvein prominent, apex acuminate, mucronate; lowest leaves withered by anthesis (not seen); lower leaves (not seen) to upper leaves shortly broadly winged petiolate (base clasping) or sessile, lanceolate, 11.5–17 × 2.8–6 cm, base attenuate; synflorescence leaves sessile, lanceolate, ca. 3.3 × 1 cm, base auriculate, clasping, rapidly becoming bracts. Capitula numerous, in terminal corymbiform synflorescences, 1.5–1.8 cm in diam.; peduncles 10–20 mm, densely strigillose, minutely stipitate glandular; bracts linear-lanceolate, entire. Involucre campanulate, 5–6 × 6–7 mm; phyllaries 2- or 3-seriate, subequal, green, lanceolate to oblong-lanceolate, 4–6 × 1–1.2 mm, abaxially sparsely strigillose proximally on veins, moderately to sparsely minutely stipitate glandular proximally, margin scarious or narrowly scarious, erose, sparsely ciliate, midvein more pronounced basally, ± translucent, apex acuminate, sometimes purplish, eciliate. Ray florets 25–30, white, tube hairy, stipitate glandular, lamina 5–7 × 1–1.2 mm, (2-veined), glabrous, eglandular; disk florets yellow, ca. 5 mm, tube base flared, veins prominent, translucent, limb campanulate, ca. 3.2 mm, hairy, very sparsely stipitate glandular, lobes spreading, narrowly triangular, ca. 1.2 mm. Achenes (immature) obovoid, slightly compressed, ca. 3 mm, sparsely strigillose, sparsely minutely stipitate glandular apically, 2-ribbed. Pappus 3- or 4-seriate, dirty white or slightly reddish; outermost bristles slender, ca. 0.5 mm; outer bristles few or none, slender, ca. 3 mm; inner bristles ca. 4.2 mm, acute; innermost bristles 4.6–4.7 mm, clavate. Fl. unknown, fr. Nov.

• Grasslands on slopes; 1500–3000 m. Yunnan (Jingdong, Mengzi).

The above description of *Aster nigromontanus* is based on the cotype at MO.

73. *Aster falcifolius* Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 610. 1937.

镰叶紫菀 lian ye zi wan

Aster brachyphyllus C. C. Chang (1935), not (Sonder) F. Mueller (1865).

Herbs, perennial, 30–55 cm tall; rhizomes long, slender. Stems erect, simple, shortly branched in upper part, finely striate, shiny, resinous, leafy, sparsely to densely villosulous to strigillose, sparsely or densely minutely stipitate glandular. Leaves cauline, slightly reduced upward, abaxially pale green, glabrous, veins sparsely strigillose, minutely stipitate glandular in pits, adaxially green, scabridulous, sparsely minutely stipitate glandular on veins, ± resinous, margin serrate to remotely serrate, ciliate, midvein prominent abaxially, sometimes 3-veined, reticulate venation prominent, apex acuminate to falcate-acuminate, mucronate; lowest leaves withered by anthesis, shortly winged petiolate; blade obovate to oblanceolate, 0.7–9 cm, base tapering; lower to upper leaves shortly petiolate (petiole to 0.3 cm); blade broadly to narrowly lanceolate, sometimes falcate, 2.7–7 × 0.6–1.7 cm, base rounded. Capitula 6–20 in terminal or axillary, racemiform synflorescences, sometimes distributed along much of stem, 2.5–3 cm in diam., sessile or peduncles 0.1–20 mm, densely strigillose, minutely stipitate glandular, resinous; bracts linear-oblanceolate, entire, sometimes crowded below head, often grading into phyllaries. Involucres campanulate, 6–8 × 8–12 mm; phyllaries 4- or 5-seriate, unequal, green apically, often squarrose, falcate, 0.7–1 mm wide, margin narrowly scariosus, erose, ciliate (outer phyllaries) to densely villous-ciliate (inner phyllaries) distally, midvein more pronounced distally, plus 3–7 dark green striae, apex obtuse to rounded, tip purplish (sometimes whole apex purplish), eciliate, ?minutely stipitate glandular, thinly to thickly resinous; outer phyllaries lanceolate, 1.5–3 mm; middle phyllaries oblong, 4–7 mm, base hardened; inner phyllaries oblong to linear-oblong, 6–9 mm. Ray florets 30–35, white or lavender, tube apex and lamina base sparsely hairy, lamina 6–8 × 1–1.5 mm, eglandular; disk florets yellow, ca. 6 mm, tube base flared, tube apex and limb base hairy, limb campanulate, ca. 4 mm, lobes spreading, triangular, ca. 1 mm, glabrous, eglandular. Achenes oblong, compressed, 2.7–3 mm, strigillose, sparsely stipitate glandular, 2-ribbed. Pappus 4-seriate, white or ± reddish, outermost slender bristles 0.4–0.8 mm; outer bristles few, slender, 2–3.5 mm; inner bristles ca. 5 mm, acute; innermost bristles ca. 5.5 mm, weakly clavate. Fl. Aug–Oct, fr. Oct–Nov.

• Slopes, roadsides, stream banks, rock outcrops; 600–1800 m. S Gansu, W Hubei, S Shaanxi, NW and W Sichuan.

74. *Aster turbinatus* S. Moore, J. Bot. 16: 132. 1878.

陀螺紫苑 tuo luo zi wan

Herbs, perennial, 60–100 cm tall, rhizomatous. Stems erect, simple, sometimes long branched in upper part, finely striate, villous, sparsely minutely stipitate glandular below leaves. Leaves cauline, gradually reduced upward, abaxially pale green, adaxially green, both surfaces moderately scabrous, more densely so adaxially, very sparsely minutely stipitate glandular, margin serrate to serrulate (teeth mucronulate), scabrous, midvein prominent abaxially, apex acute to acuminate, mucronate; lowest leaves (partly observed) withered by anthesis, narrowly winged petiolate; lower to upper leaves shortly winged petiolate (lower leaves), pandurate or ovate to ovate-lanceolate, 3.5–10.5(–15) × 0.8–2.8 cm, base truncate or

rounded or auriculate-clasping; synflorescence leaves sessile, lanceolate to ovate, 0.8–3 × 0.4–0.8 cm, base rounded, ± clasping. Capitula 1–10 in terminal racemiform synflorescences; peduncles 2–15 mm, strigillose; bracts numerous, sometimes overlapping, lowest bracts leaflike, ciliate, middle and upper bracts phyllary-like. Involucres campanulate, 10–12 × 10–18 mm; phyllaries 5- or 6-seriate, unequal, green apically, abaxially glabrous, eglandular, margin scariosus, erose, purplish, ciliate, midvein somewhat more pronounced distally, ± translucent, apex obtuse, erose, purplish, ciliate; outer phyllaries broadly ovate, ca. 3 × 2.5–3 mm; middle phyllaries ovate to oblanceolate, 5–7 × 2–3 mm, base ± hardened; inner phyllaries oblong to narrowly oblong, 8–12 × 1.2–1.8 mm. Ray florets 20–27, white or purple, lamina 10–11(–14) × 1.5–1.8(–3) mm, glabrous, eglandular; disk florets yellow, ca. 6 mm, tube base flared, limb campanulate, ca. 3.5 mm, lobes spreading, tip recurved, narrowly triangular, ca. 1.5 mm, glabrous, eglandular. Achenes mottled red, narrowly obovoid, slightly compressed, ca. 3 mm, strigillose, apically sparsely minutely stipitate glandular, 4- or 5-ribbed. Pappus 4-seriate, white; outermost bristles few, slender, 0.5–0.7 mm; outer bristles slender few, 3.5–4 mm; inner bristles 4.1–4.9 mm, tapering; innermost bristles 6–6.2(–6.5) mm, ± clavate. Fl. Aug–Oct, fr. Oct–Nov.

• Open forests, thickets, grasslands, hillsides, stream banks, shaded places; 200–800 m. Anhui, Fujian, Jiangsu, Jiangxi, Zhejiang.

The distinction between the two varieties of *Aster turbinatus* needs to be investigated.

- 1a. Lower leaf blade ovate or ovate-lanceolate, base truncate or rounded; ray floret lamina purple, ca. 14 × 2.5–3 mm 74a. var. *turbinatus*
- 1b. Lower leaf blade pandurate, base deeply auriculate-clasping; ray floret lamina white, smaller 74b. var. *chekiangensis*

74a. *Aster turbinatus* var. *turbinatus*

陀螺紫苑(原变种) tuo luo zi wan (yuan bian zhong)

Lower leaf blade ovate or ovate-lanceolate, base truncate or rounded. Ray floret lamina purple, ca. 14 × 2.5–3 mm.

• Hillsides, stream banks, shaded places; 200–800 m. Anhui, Fujian, Jiangsu, Jiangxi, Zhejiang.

74b. *Aster turbinatus* var. *chekiangensis* C. Ling ex Y. Ling, Fl. Reipubl. Popularis Sin. 74: 359. 1985.

仙白草 xian bai cao

Lower leaf blade pandurate, base deeply auriculate-clasping. Ray floret lamina white, smaller.

• Open forests, thickets, grasslands. Zhejiang.

Aster turbinatus var. *chekiangensis* is used medicinally for treating snakebites.

75. *Aster baccharoides* (Bentham) Steetz, Bot. Voy. Herald, 385. 1857.

白舌紫苑 bai she zi wan

Diplopappus baccharoides Benth, London J. Bot. 1: 487. 1842; *Aster brevipes* Benth.

Low shrubs or perennial herbs, 15–150 cm tall, basally woody, rhizomatous. Stems erect, branched or sometimes simple (herb), finely striate, densely strigose, minutely stipitate glandular. Leaves cauline, slightly reduced upward, abaxially pale green, moderately strigose, moderately to densely minutely stipitate glandular, adaxially green, densely scabridulous, minutely stipitate glandular, margin serrate to serrulate (teeth mucronate), scabrous, midvein prominent abaxially, apex acute, mucronate; lowest leaves withered by anthesis (herb), lower to upper leaves shortly winged petiolate; blade narrowly ovate to lanceolate, 1.3–7.5 × 0.4–1.8 cm, base attenuate to rounded; synflorescence leaves shortly petiolate, broadly lanceolate to oblanceolate, 0.7–3 × 0.3–0.8 cm, base cuneate to rounded, margin entire. Capitula numerous, in terminal or axillary corymbiform to paniculiform synflorescences, 1.5–2 cm in diam.; peduncles 2–8 mm, strigillose; bracts oblanceolate, margin entire, becoming phyllary-like distally. Involucres campanulate, 6–7 × ca. 7 mm; phyllaries 5–7-seriate, unequal, narrowly green apically, sometimes distally purplish, abaxially moderately to densely strigose, more so distally, sparsely to moderately minutely stipitate glandular, margin scarious (more broadly so in inner phyllaries), erose, villous-ciliate, midvein somewhat more pronounced distally, ± translucent, sometimes 3-veined, apex acute to obtuse or rounded, erose, sometimes mucro or tip purplish, ciliate; outer phyllaries broadly lanceolate to lanceolate, 1.5–2 × 0.7–1 mm; middle phyllaries lanceolate-oblong, 3–5 × 1–1.2 mm, base ± hardened; inner phyllaries oblong, 6–7 × 1–1.5 mm. Ray florets 8–18, white, lamina ca. 6 × 1.2–1.7 mm, glabrous, eglandular; disk florets yellow, 4.5–6.5 mm, tube base flared (veins marked), limb campanulate, 2.5–3.5 mm, glabrous, minutely stipitate glandular proximally, lobes spreading, tip recurved, narrowly triangular, 1.2–2 mm, glabrous, eglandular. Achenes dark purple, oblong, slightly compressed, ca. 3.5 mm, strigillose, apically sparsely minutely stipitate glandular, 2-ribbed. Pappus 4-seriate, white, of slender bristles; outermost bristles 1–3, 0.5–1.2 mm; outer bristles absent or 1, ca. 3 mm; inner bristles 4–5 mm, acute; innermost bristles 5–6 mm, clavate. Fl. Jul–Oct, fr. Aug–Nov.

• Slopes, grasslands, shrublands, sandy areas, sea bluffs, roadsides; sea level to 1000 m. Fujian, Guangdong, E Guangxi, Hunan, Jiangxi, Zhejiang.

Aster baccharoides is closely related to *A. turbinatus* but differs in having basally woody stems, narrow leaves, small capitula and florets, and white ray floret lamina.

76. *Aster sinianus* Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 609. 1937.

岳麓紫苑 yue lu zi wan

Herbs, perennial, rhizomatous. Stems erect, 40–60 cm tall, slender, canaliculate, woody at base, covered with spreading or crisped short hairs, shortly branched at middle part, with scattered leaves. Leaves abaxially sparsely hispidulous, rarely sparsely hispidulous on veins, adaxially sparsely puberulent, glabrescent, sometimes glandular, margin ciliate, midvein abaxially prominent, lateral veins indistinct; basal leaves absent at

anthesis; lower cauline leaves broadly winged petiolate; blade oblong or narrowly elliptic, 3–7 × 0.7–1.5 cm, base attenuate, margin entire or sparsely serrate (teeth mucronate), apex obtuse or acute; upper leaves often sessile, 0.5–2.5 mm, margin entire, apex rounded. Capitula 1–3, axillary at short branches and arranged in paniculate corymbs, ca. 1.5 cm in diam.; peduncles to 2 cm; bracts few, lanceolate, leaflike. Involucres campanulate or obconic, 4–5 × 5–6 mm; phyllaries ca. 4-seriate, unequal; outer phyllaries dark brown, ovate, 1–2 × ca. 1 mm, pubescent, apex mucronate; inner phyllaries oblong, ca. 4 × 1.2 mm, margin shortly ciliate, apex hairy. Ray florets ca. 10, white, tube ca. 3 mm, lamina ca. 4 × 1.5–2 mm; disk florets ca. 4 mm, tube ca. 1.5 mm, sparsely hairy, lobes ca. 1.5 mm. Achenes oblong, ± compressed, 1.5–2 mm, strigose. Pappus white, bristles to 4 mm. Fr. Jul–Sep.

• Roadsides on slopes; 600–900 m. Hunan, Jiangxi.

No specimens of *Aster sinianus* were seen by one of us (Brouillet).

77. *Aster velutinosus* Y. Ling, Fl. Reipubl. Popularis Sin. 74: 359. 1985.

毡毛紫苑 zhan mao zi wan

Herbs, perennial, ca. 50 cm tall (lower part not seen). Stems slender above middle, branched, puberulent, upper part white velutinous, densely or loosely leafy in upper part. Leaves abaxially gray-green, adaxially somewhat shiny, (lower leaves not seen); middle leaves sessile or shortly petiolate (petiole ca. 1.5 mm); blade lanceolate, 4–7.5 × 0.9–1.6 cm, abaxially densely velutinous, adaxially glabrous, villosulous at base and on veins, thin, base slightly rounded or subcuneate, margin slightly revolute, entire, scabrous, triplinerved, veins ± prominent abaxially, lateral veins 6 or 7 pairs, apex acuminate, sometimes falcate, mucronate. Capitula 2 or 3 at ends of branches, in ± corymbiform synflorescences; shortly pedunculate. Involucres campanulate, 4–5 mm; phyllaries 4- or 5-seriate, unequal; outer phyllaries ovate, ca. 1.5 mm, abaxially puberulent; inner phyllaries oblong, ca. 4 mm, margin narrowly scarious, apex rounded to obtuse, thick. Ray florets not seen; disk florets yellow, 3.4–3.8 mm, tube 1.2–1.3 mm, limb narrowly campanulate, lobes lanceolate, 1.1–1.2 mm, apically glandular and villosulous. Achenes brown, narrowly oblong, slightly compressed, ca. 2.9 mm, sparsely strigose, moderately so distally, pale 5- or 6-ribbed. Pappus reddish brown, 2-seriate; inner series ca. 3 mm, acute; innermost series 3.3–3.6 mm, clavate. Fl. Jul.

• Thickets on mountains; ca. 200 m. Guangxi.

Ray florets were not observed by us on the available specimens of *Aster velutinosus*; the capitula on the type specimen are too immature. On the fruiting specimen, however, there is no sign of ray florets, including on a head that was not fully opened; only disk florets were seen there.

78. *Aster ovalifolius* Kitamura, Acta Phytotax. Geobot. 1: 289. 1932.

卵叶紫苑 luan ye zi wan

Herbs, perennial, 40–100 cm tall. Stems sparsely branched, tomentose above. Leaves: basal leaves withered at anthesis;

cauline leaves crowded, sessile or shortly petiolate (petiole ca. 2 mm), adaxially pale green, ovate, 3.5–5.5 × 1.5–2.5 cm, slightly papery, both surfaces hispidulous, abaxially gland-dotted, base rounded, margin subentire or sparsely serrate at middle part, basally 3-veined, apex acute; upper leaves smaller, few near synflorescence, 0.8–1.5 cm. Capitula numerous, in paniculate-corymbiform synflorescences, 0.6–1.5 cm in diam.; peduncles 0.5–1.6 cm, erect or spreading, ± strict, densely pubescent, sometimes with a bract ca. 1 mm. Involucres campanulate, 6–7 × ca. 7 mm; phyllaries 4- or 5-seriate, ?unequal, oblong-lanceolate, margin entire, ciliate, apex brown, obtuse to rounded; outer phyllaries 1.5–2 mm; inner phyllaries gradually longer, 4–4.5 mm. Ray florets white, tube ca. 3 mm, lamina 7–8 × ca. 1.5 mm; disk florets yellow, 4–4.5 mm, tube ca. 2.5 mm, limb ca. 2.8 mm. Achenes oblong, slightly compressed, ca. 2 × 0.8 mm, strigose, 4–6-ribbed. Pappus dirty white or reddish brown, of unequal bristles ca. 4.5 mm. Fl. Aug.

- Sea level to low elevations. Taiwan.

No specimens of *Aster ovalifolius* were seen by us. The description is partly based on the treatment by Soejima and C. I. Peng (Fl. Taiwan, ed. 2, 4: 859–861. 1998).

79. *Aster sampsonii* (Hance) Hemsley, J. Linn. Soc., Bot. 23: 415. 1888 [*"Sampsonii"*].

短舌紫菀 duan she zi wan

Herbs, perennial, 30–97 cm tall, basally woody, rhizomatous. Stems erect, simple, finely striate (reddish or white), sparsely to densely villosulous, sparsely minutely stipitate glandular below leaves. Leaves cauline, gradually reduced upward, abaxially pale green, moderately scabridulous, strigose, minutely stipitate glandular, adaxially green, densely scabridulous, margin revolute, serrate to serrulate (teeth mucronulate), villosulous-ciliate, midvein prominent abaxially, apex acute, mucronate; lowest leaves (partly observed) withered by anthesis, sometimes marcescent, narrowly winged petiolate, smaller; lower to upper leaves long to shortly winged petiolate; blade ovate to linear-oblancoolate, 2–9.5 × 0.4–3.3 cm, base attenuate to cuneate; synflorescence leaves shortly winged petiolate, lanceolate, 0.9–2.5 × 0.3–0.5 cm. Capitula 7–38 in terminal, open corymbiform synflorescences, 0.8–1.5 cm in diam.; peduncles

9–45 mm, densely strigillose; bracts linear-lanceolate, entire, sometimes grading into phyllaries. Involucres campanulate, 4–6 mm; phyllaries 5- or 6-seriate, unequal, green apically, oblong, abaxially sparsely to moderately strigillose, apically minutely stipitate glandular, margin scarios, erose, purplish, villous-ciliate, midvein more pronounced distally, translucent, apex acute to obtuse, sometimes apiculate, erose, sometimes purplish; outer phyllaries 2–3 × 0.3–0.9 mm; middle phyllaries 4–5 × 1–1.1 mm, base ± hardened; inner phyllaries 6–7 × 0.5–1 mm. Ray florets 15–20, white or purplish, lamina 6–9 × 1.5–12 mm, glabrous, eglandular; disk florets yellow, ca. 6 mm, tube base flared (veins slightly marked), limb campanulate, ca. 3.5 mm, sparsely hairy, eglandular, lobes spreading, tip recurved, narrowly triangular, ca. 1.2 mm, glabrous, minutely stipitate glandular. Achenes narrowly obovoid, slightly compressed, 1.8–2 mm, sparsely strigillose, sparsely minutely stipitate glandular, 2-ribbed. Pappus 3-seriate, orangish; outermost series of scales few, whitish, linear, 0.3–1.2 mm; inner bristles 3–4 mm, acute; innermost bristles 4.5–5 mm, ± clavate. Fl. and fr. Jul–Oct.

- Grasslands or meadows on slopes, thickets; 500–1000 m. Guangdong, Guangxi, Hunan.

- 1a. Pappus absent in ray florets 79a. var. *sampsonii*
 1b. Pappus present in ray florets and
 disk florets 79b. var. *isochaetus*

79a. *Aster sampsonii* var. *sampsonii*

短舌紫菀(原变种) duan she zi wan (yuan bian zhong)

Heteropappus sampsonii Hance, J. Bot. 5: 370. 1867; *Erigeron hirsutus* Loureiro.

Pappus of ray florets absent.

- Guangdong, Hunan.

79b. *Aster sampsonii* var. *isochaetus* C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 7: 162. 1936.

等毛短舌紫菀 deng mao duan she zi wan

Pappus of ray florets present.

- N Guangdong, Guangxi, S Hunan.

7. *Aster* sect. *Alpigeni* Nees, Gen. Sp. Aster. 24. 1832.

山菀组 shan wan zu

Chlamyditis J. R. Drummond; *Wardaster* J. Small.

Herbs, perennial, usually simple, erect. Leaves basal (persistent or deciduous by anthesis) and cauline; blade spatulate or oblancoolate to ovate, oblong, or lanceolate to linear-lanceolate, margin flat, entire or serrate to coarsely serrate, rarely deeply pinnatifid, 1-veined. Capitula radiate, terminal, solitary at ends of scapiform stems, rarely 2–8 in corymbiform synflorescences. Involucres hemispheric to broadly campanulate; phyllaries 2- or 3-seriate, equal or subequal (outer sometimes shorter), rarely unequal, leaflike or upper part leaflike, not keeled, margin sometimes scarios. Receptacles flat or ± convex. Ray florets 1-seriate, 10–60(–100), purple, reddish, mauve, lavender, lilac, blue, pink, or white; disk floret limb funnellform to narrowly funnellform, sometimes campanulate, lobes equal. Achenes broadly to narrowly obovoid or oblong to oblanceoid, ± compressed, 2(–4)-ribbed. Pappus of ray and disk florets 1–4-seriate, of persistent, rarely caducous, numerous free bristles, innermost series clavate, outermost series of short bristles, sometimes scales.

About 50 species: C, NE, and SW Asia, Europe, and North America; 44 species (28 endemic) in China.

- 1a. Outer phyllary margin broadly scarious.
- 2a. Phyllaries linear to obovate-oblong; capitula 2–8, in corymbiform synflorescences 121. *A. senecioides*
- 2b. Phyllaries lanceolate to linear-lanceolate; capitula terminal, solitary.
- 3a. Phyllaries 6–12 mm; plants 3–15 cm tall 122. *A. batangensis*
- 3b. Phyllaries 5–7 mm; plants ca. 45 cm tall 123. *A. rockianus*
- 1b. Outer phyllary margin leaflike or hardened basally, sometimes narrowly or broadly scarious.
- 4a. Pappus 3- or 4-seriate, inner series of bristles equaling disk corollas, white, whitish, or somewhat tinged red, outermost series of scales.
- 5a. Phyllaries unequal, outer shorter than inner ones; leaf margin pinnatisect 120. *A. bipinnatisectus*
- 5b. Phyllaries subequal or equal; leaf margin entire or remotely serrate to serrulate.
- 6a. Ray floret lamina linear-lanceolate.
- 7a. Plants with tuberoid roots.
- 8a. Involucres 6–9 mm in diam., phyllaries 1–1.5 mm wide; disk florets orange-yellow, lobes minutely purple stipitate glandular 109. *A. asteroides*
- 8b. Involucres 6–7 mm in diam., phyllaries 1.5–3 mm wide; disk florets yellow, purplish brown distally, lobes sparsely minutely stipitate glandular 110. *A. likiangensis*
- 7b. Plants long rhizomatous.
- 9a. Involucres 2–3 cm in diam.; disk florets yellow or purplish tinged 113. *A. tsarungensis*
- 9b. Involucres 1.5–2(–3) cm in diam.; disk florets orange to yellow.
- 10a. Plants densely or sparsely villous, usually also glandular, or leaves glabrate; involucres 1.5–2(–3) cm in diam., phyllaries 1–2 mm wide 111. *A. flaccidus*
- 10b. Plants densely white hirsute or villous or tomentose; involucres ca. 1.5 cm in diam., phyllaries ca. 1 mm wide 112. *A. hololachnus*
- 6b. Ray floret lamina linear.
- 11a. Stems 5–12 cm 119. *A. brevis*
- 11b. Stems 13–75 cm.
- 12a. Phyllaries linear-lanceolate, 1–1.5 mm wide, apex acuminate to long acuminate.
- 13a. Inner phyllary margin scarious, abaxially brown stipitate glandular 117. *A. lipskii*
- 13b. Phyllary margin narrowly scarious, villous, eglandular, inner series often glabrate 118. *A. farreri*
- 12b. Phyllaries (1–)2–5 mm wide, apex acute or acuminate.
- 14a. Phyllaries dark colored stipitate glandular, ± villous along veins; disk florets orange to yellow, apex blackish or brownish purple 114. *A. diplostephioides*
- 14b. Phyllaries white villous, sometimes glandular; disk florets yellow to orange.
- 15a. Middle and upper cauline leaves lanceolate or oblong to oblanceolate; involucres 1.5–2.5 cm in diam., phyllaries 0.8–4(–5) mm wide 115. *A. yunnanensis*
- 15b. Middle and upper cauline leaves lanceolate to linear; involucres 0.8–0.9 cm in diam., phyllaries 1.5–2 mm wide 116. *A. setchuenensis*
- 4b. Pappus 2–4-seriate, of barbellate bristles, sometimes outer series of few slender bristles or scales.
- 16a. Phyllaries lanate.
- 17a. Disk corolla tube and limb sparsely villosulous, lobes lanate 107. *A. prainii*
- 17b. Disk corolla tube and limb without long hairs 108. *A. neolanuginosus*
- 16b. Phyllaries abaxially pilose, pilosulose, scabridulous, strigillose, strigose, hirsute-villous, hirsutulous, hispidulous, villous or villosulous to lanate, glabrate, or glabrous, sometimes glandular.
- 18a. Phyllaries leaflike at least apically, apex acute or acuminate.
- 19a. Pappus brown, purplish, or reddish brown, sometimes also yellowish at base.
- 20a. Achenes not winged.
- 21a. Pappus 3-seriate, outermost series of short bristles or scales, inner series of distally brown bristles; achenes oblanceolate, sparsely strigose; ray florets 25–30, lamina 10–20 mm 101. *A. latibracteatus*
- 21b. Pappus 2–4-seriate, outermost series of scales or slender bristles, inner series of reddish brown or brown bristles; achenes obovoid; ray florets 44–100, lamina 20–30 mm.
- 22a. Pappus 3- or 4-seriate, outermost series of few slender bristles or none, inner series of barbellate bristles; achenes glabrous or distally glabrate, minutely stipitate glandular 103. *A. bietii*
- 22b. Pappus 2-seriate, outermost series of narrow to broad scales, inner series of barbellate bristles; achenes sparsely strigillose, eglandular 102. *A. bulleyanus*
- 20b. Achenes winged.
- 23a. Basal leaves present at anthesis, middle and upper cauline leaves oblong to linear-lanceolate 106. *A. jeffreyanus*
- 23b. Basal leaves withered at anthesis, middle and upper cauline leaves ovate, oblong, or ovate-lanceolate.
- 24a. Capitula 3.5–4 cm in diam.; outer phyllaries 5–7 mm wide, hispidulous; lamina ca. 14 × 0.7 mm; pappus longer than tube of disk florets 104. *A. platylepis*

- 24b. Capitula 3–7.5 cm in diam.; outer phyllaries 1–4 mm wide, sparsely pilose to glabrate; lamina 15–35 × 1–3 mm; pappus 1–4 mm 105. *A. brachytrichus*
- 19b. Pappus white or whitish, reddish, yellowish, or straw-colored to brownish.
- 25a. Stems erect 100. *A. retusus*
- 25b. Stems ascending.
- 26a. Plants with long slender stolons (to 30 cm) 99. *A. stracheyi*
- 26b. Plants without stolons or with short stolons.
- 27a. Plants eglandular; pappus straw-colored to brownish reddish brown.
- 28a. Phyllaries leaflike, margin broadly scarious; ray florets 11–30; achenes strigose distally 95. *A. salwinensis*
- 28b. Phyllaries membranous, apex leaflike in outer series, inner bristles with broadly scarious margins; ray florets 13–17; achenes densely strigose 96. *A. tienschwanensis*
- 27b. Plants minutely stipitate glandular; pappus whitish to straw-colored or reddish based.
- 29a. Pappus whitish to straw-colored; phyllaries 2.5–3.5 mm wide; ray florets 40–70 97. *A. himalaicus*
- 29b. Pappus reddish based, whitish above; phyllaries 3–5 mm wide; ray florets 80 or more 98. *A. techinensis*
- 18b. Phyllaries of outer series leaflike or leaflike above, often hardened at base, apex rounded, obtuse, acute or acuminate.
- 30a. Pappus purplish to reddish- or purplish brown, or brown, equaling or shorter than disk florets, rarely somewhat longer.
- 31a. Pappus reddish brown or yellowish, of many bristles; capitula terminal, solitary, or 2–4, solitary at ends of stem and branches.
- 32a. Capitula terminal, solitary; phyllaries densely pilose; ray florets 11–13(–15), white; plants 4–7 cm tall, without stolons 93. *A. fanjingshanicus*
- 32b. Capitula 1–4, solitary at ends of stems and branches; phyllaries abaxially sparsely scabridulous; ray florets 12–20, blue-purple; plants 24–40 cm tall, with stolons 94. *A. giraldii*
- 31b. Pappus purplish to reddish- or purplish brown, or brown, of few bristles; capitula terminal, solitary, rarely solitary at ends of branches.
- 33a. Phyllaries squarrose, both surfaces densely hirsutulous; ray florets ca. 100 92. *A. megalanthus*
- 33b. Phyllaries appressed or sometimes squarrose, ± hairy or glabrous abaxially; ray florets 30–70.
- 34a. Rhizomes slender, often with stolons; leaves scabridulous or hirsute, phyllaries villosulous 90. *A. tongolensis*
- 34b. Rhizomes robust; leaves glabrate to sparsely pilosulose, phyllaries abaxially sparsely to densely pilosulose distally or glabrous, margin densely pilose-ciliate or eciliate 91. *A. souliei*
- 30b. Pappus white, dirty white, straw-colored, purplish, or buff, ± equaling or longer, rarely shorter, than disk florets, often with outer series of few short, slender bristles.
- 35a. Pappus purplish straw-colored; leaf surfaces strigose 89. *A. handellii*
- 35b. Pappus white or dirty white, reddish, purplish, buff, or straw-colored; leaf surfaces ± villous, hirsute-villous, pilose, scabrous, strigose, or strigillose.
- 36a. Phyllaries oblong or lanceolate, apex acute, 1–1.5 mm wide; involucre 0.7–1.5 cm in diam.
- 37a. Basal leaves withered and lower cauline withered or present at anthesis; stems 15–45 cm tall; pappus straw-colored or sometimes purplish 86. *A. lingulatus*
- 37b. Basal and lower cauline leaves present at anthesis; stems 40–75(–100) cm tall; pappus whitish 88. *A. neolegans*
- 36b. Phyllaries lanceolate to oblong or oblanceolate, spatulate, oblong, or linear, apex obtuse, rounded, acute, or sometimes acuminate, 1.3–3 mm wide, involucre 0.6–2 cm in diam.
- 38a. Cauline leaves rather similar in size and ± evenly distributed on stem; involucre 2–2.8 cm in diam.; phyllaries oblanceolate, 2–3 mm wide, glabrate (margin ciliate) 87. *A. tricephalus*
- 38b. Cauline leaves reduced upward; involucre 0.6–2 cm in diam.; phyllaries 1.3–2.5 mm wide, densely or sparsely hairy.
- 39a. Basal leaves withered at anthesis 85. *A. ionoglossus*
- 39b. Basal leaves present or withered and marcescent at anthesis.
- 40a. Pappus reddish or buff, barbellate above 84. *A. barbellatus*
- 40b. Pappus white, dirty white, barbellate throughout.
- 41a. Disk floret lobes unequal 83. *A. takasagomontanus*
- 41b. Disk floret lobes equal.
- 42a. Phyllaries unequal 82. *A. heterolepis*
- 42b. Phyllaries equal or subequal.
- 43a. Involucre 0.6–1 cm in diam.; outer phyllaries lanceolate to oblong or oblanceolate, apex rounded or obtuse to acute or acuminate; capitula solitary, terminal 80. *A. alpinus*
- 43b. Involucre 1–1.2 cm in diam.; outer phyllaries oblanceolate or spatulate, apex rounded or acute; capitula 2–30 in terminal corymbiform synflorescences, rarely solitary 81. *A. oreophilus*

80. *Aster alpinus* Linnaeus, Sp. Pl. 2: 872. 1753.高山紫菀 *gao shan zi wan*

Herbs, perennial, 10–35 cm tall, caespitose; rhizomes robust. Stems erect, simple, sparsely to densely villous, sparsely to moderately minutely stipitate glandular. Leaves basal and cauline, rosette marcescent at anthesis; cauline leaves much reduced upward, sparsely to moderately villous, sometimes sparsely minutely stipitate glandular, 3-veined, main veins ± prominent; basal leaves rosulate, petiolate, obovate to spatulate; lower cauline leaves with petiole winged, sometimes slender, up to 11 cm; blade linear-oblong, 1–10 × 0.4–1.5 cm, base attenuate, margin entire, sometimes undulate, apex rounded; middle cauline leaves sessile, oblong-lanceolate to linear, base attenuate. Capitula solitary, terminal, 3–3.5(–5.5) cm in diam.; bracts linear to linear-lanceolate, 1-veined. Involucres hemispheric, 1.5–2 × 0.6–1 cm; phyllaries 2- or 3-seriate, equal or subequal, rarely unequal, lanceolate to oblong or oblanceolate, 7–10 × 1.5–2.2 mm, abaxially sparsely villous to densely lanate (crosswalls sometimes purple to black), sometimes minutely stipitate glandular, margin sparsely to densely ciliate, apex rounded or obtuse to acute or acuminate; outer phyllaries leaf-like or base sometimes hardened; inner phyllaries leaflike distally, margin whitish, sometimes purple-red. Ray florets 26–60, purple to blue or reddish, tube glabrous, sometimes sparsely minutely stipitate glandular near junction with lamina, lamina 10–15 × 2–2.5 mm, glabrous, eglandular; disk florets yellow, 5.5–8.5 mm, limb funnelform, 4.5–6.5 mm, proximally sparsely hairy, sparsely minutely stipitate glandular, lobes spreading, equal, narrowly triangular, 1–1.5 mm. Achenes obovoid, compressed, ca. 3 mm, 2–4-ribbed, moderately to densely strigillose, distally sparsely to moderately minutely stipitate glandular. Pappus 4-seriate, white, barbellate throughout; outermost bristles few, slender, 0.5–1.8 mm; outer bristles slender, 3–4 mm; inner bristles 5–5.5 mm, acute; innermost bristles 6.5–7 mm, weakly clavate. Fl. Jun–Aug, fr. Jul–Sep. $2n = 18, 27, 35+1$ fragm., 36, 37.

Gansu, Hebei, Heilongjiang, Nei Mongol, Qinghai, Shaanxi, Shanxi, Xinjiang [Mongolia, Russia, Tajikistan; SW Asia, Europe, W North America].

This species is very variable. Many subspecies and varieties have been recognized by previous authors. Specimens from Xiaowutai Shan (Hebei) and Taibai Shan (Shaanxi) that were identified by Handel-Mazzetti and Onno as *Aster alpinus* var. *dolomiticus* (Beck) Onno do not match the type of that name from Europe. The typical variety appears to be European and does not reach Siberia; specimens identified as *A. alpinus* var. *alpinus* in China belong to *A. alpinus* var. *vierhapperi*, the variety widespread from Siberia to North America.

- 1a. Phyllaries unequal, apex rounded 80d. var. *diversisquamus*
 1b. Phyllaries subequal, apex obtuse or rounded.
 2a. Leaves abaxially ± densely glandular 80c. var. *fallax*
 2b. Leaves sometimes ± glandular.
 3a. Leaves densely to sparsely villous or subglabrous, lower leaves spatulate

- or oblong-spatulate 80a. var. *vierhapperi*
 3b. Leaves densely pubescent or densely villous, lower leaves linear-oblong 80b. var. *serpentimontanus*

80a. *Aster alpinus* var. *vierhapperi* (Onno) Cronquist, Vasc. Pl. Pacific NorthW. 5: 76. 1955.

空秆高山紫菀 *kong gan gao shan zi wan*

Aster alpinus subsp. *vierhapperi* Onno, Biblioth. Bot. 26(Heft 106): 25. 1932; *A. culminis* A. Nelson; *Diplactis alpinus* (Linnaeus) Semple subsp. *vierhapperi* (Onno) Semple.

Stems 10–20(–30) cm tall. Lower leaves spatulate or oblong-spatulate, densely to sparsely villous or subglabrous, sometimes ± glandular. Capitula 3–3.5 cm in diam. Phyllaries subequal, 1.5–2 mm wide, apex obtuse or rounded.

Hebei, Heilongjiang, Nei Mongol, Shanxi, N Xinjiang [E Russia; W North America].

80b. *Aster alpinus* var. *serpentimontanus* (Tamamschjan) Y. Ling, Fl. Reipubl. Popularis Sin. 74: 204. 1985.

蛇岩高山紫菀 *she yan gao shan zi wan*

Aster serpentimontanus Tamamschjan, Fl. URSS 25: 108. 1959; *A. alpinus* subsp. *serpentimontanus* (Tamamschjan) Á. Löve & D. Löve.

Stems 10–20(–35) cm tall. Lower leaves linear-oblong, 3–10 × 0.2–0.5 cm, densely pubescent or densely villous, sometimes ± glandular. Capitula 3.5–5.5 cm in diam. Phyllaries subequal, linear, 1–1.5 mm wide, apex obtuse or rounded.

2300–2500 m. N and W Xinjiang [Mongolia, Russia (W Siberia), Tajikistan (Pamirs)].

80c. *Aster alpinus* var. *fallax* (Tamamschjan) Y. Ling, Fl. Reipubl. Popularis Sin. 74: 205. 1985.

伪形高山紫菀 *wei xing gao shan zi wan*

Aster fallax Tamamschjan, Fl. URSS 25: 580. 1959; *A. flaccidus* Bunge var. *atropurpureus* Onno.

Stems to 35 cm tall. Lower leaves oblong-spatulate, 1.5–8 cm, sparsely puberulent, abaxially ± densely glandular. Capitula ca. 4 cm in diam. Phyllaries subequal, linear, ca. 10 × 1.5 mm, sparsely puberulent, apex obtuse or rounded.

1500–2100 m. N Heilongjiang, Nei Mongol [Russia (SE Siberia)].

80d. *Aster alpinus* var. *diversisquamus* Y. Ling, Fl. Reipubl. Popularis Sin. 74: 359. 1985.

异苞高山紫菀 *yi bao gao shan zi wan*

Stems 20–25 cm tall. Lower leaves ± erect, oblong-spatulate, 2–7 × 0.4–0.8 cm, sparsely or densely pubescent, sparsely glandular. Capitula 3–3.5 cm in diam. Phyllaries unequal, oblong-spatulate, 1.5–2.3 mm wide, outer series ca. 3/4 length of inner, blade reddish, apex rounded.

• About 1700 m. N Xinjiang (Tacheng).

This variety has unequal phyllaries, similar to *Aster heterolepis*, but its other features differ from the latter. It might be better treated as a species.

81. *Aster oreophilus* Franchet, J. Bot. (Morot) 10: 378. 1896.

石生紫菀 shi sheng zi wan

Aster tricarpitatus Vaniot; *A. vaniotii* H. Lévillé.

Herbs, perennial, 20–60 cm, caespitose; rhizomes procumbent or ascending; new rosettes sometimes present. Stems erect or ascending, simple, leafy, moderately to densely strigose and villosulous. Leaves basal and cauline; cauline leaves gradually reduced upward, sparsely to densely hispidulous, eglandular or sometimes sparsely minutely stipitate glandular, 3-veined, main veins abaxially prominent; basal leaves withered by anthesis, long winged petiolate, narrowly spatulate to obovate or oblanceolate, 2.5–8 × 0.5–1.5 cm, base attenuate, margin shallowly serrate distally, apex rounded or obtuse to acute; lower cauline leaves often marcescent, winged petiolate; blade lanceolate, base attenuate; middle and upper leaves erect; blade oblong to lanceolate, base attenuate, subclasping, margin serrate distally or entire, apex rounded to obtuse, mucronulate. Capitula 2–30 in terminal corymbiform synflorescences, sometimes terminal, solitary, 2.5–3.5 cm in diam.; peduncles 2–10 cm or more, densely strigillose and villosulous, sparsely to moderately minutely stipitate glandular; bracts linear-oblong or linear-lanceolate. Involucres hemispheric, 0.6–0.7(–0.8) × 1–1.2 cm; phyllaries 3-seriate, subequal, abaxially moderately strigillose, sparsely to moderately minutely stipitate glandular proximally; outer phyllaries oblanceolate, sometimes spatulate, 5–7 × 1.3–2 mm, leaflike, margin narrowly scarious, ciliate, midvein brownish, translucent, apex rounded or acute, sometimes purplish; inner phyllaries lanceolate, leaflike distally, purplish distally, margin ciliate, apex obtuse or acute. Ray florets 21–34, blue-purple to pink or pinkish white, tube glabrous, lamina 11–17 × 1–2 mm, glabrous, eglandular; disk florets yellow, 4–5 mm, tube ca. 1.7 mm, limb funnelform, 3–3.5 mm, glabrous, minutely stipitate glandular proximally, lobes spreading, triangular, equal, 0.7–1 mm. Achenes broadly obovoid, compressed, ca. 2 mm, densely strigillose, eglandular, margin 2-ribbed, densely strigillose-ciliate. Pappus 4-seriate, dirty white, barbellate throughout, sometimes outermost bristles few, slender, 0.5–0.7 mm; outer bristles few, slender, 2–3 mm; inner bristles 3.5–4 mm, acute; innermost bristles 4–4.5 mm, weakly clavate. Fl. and fr. Aug–Oct.

• Alpine and subalpine forest margins, grasslands, pastures, open slopes, roadsides; 2000–4000 m. SW Sichuan, Xizang, N and NW Yunnan.

The flowering capitula of *Aster oreophilus* are used medicinally to alleviate pain and as an antiphlogistic.

82. *Aster heterolepis* Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 614. 1937.

异苞紫菀 yi bao zi wan

Herbs perennial, 14–45 cm tall, ± caespitose; rhizomes robust; new rosettes sometimes present. Stems often with marcescent leaf remains, erect, branched upward or simple, villous-strigose, with sessile glands, loosely leafy above. Leaves ± thick, strigose, with dense sessile glands, triplinerved, midvein abaxially prominent; basal leaves rosulate and lower cauline

leaves present at anthesis, winged petiolate, petiole base clasping; blade spatulate or oblanceolate, 3–9 × 0.5–1.5 cm, base attenuate, margin entire, scabrous, apex rounded or obtuse; middle leaves sessile, oblong to oblanceolate; upper leaves ± linear-oblanceolate, small. Capitula solitary at ends of 2–4 branches, 3.5–5(–6) cm in diam. Involucres hemispheric, 0.8–1 × 1–1.5 cm; phyllaries 3-seriate, unequal; outer phyllaries spatulate, 4–7 × 1.5–2.5 mm, abaxially densely strigillose, with sessile glands, base hardened, distally leaflike, margin ciliate, apex rounded; inner phyllaries oblong to linear-oblong, ca. 10 × 2 mm, densely strigillose distally, ± membranous, margin scarious, erose-fimbriate, ciliate, apex acute or acuminate, purplish. Ray florets 30, bluish, tube 2.5–2.8 mm, sparsely hairy distally, lamina 15–18 × 2–2.5 mm; disk florets ca. 5.8 mm, tube ca. 2.2 mm, hairy distally onto limb base, limb funnelform, lobes lanceolate, ca. 1.3 mm, equal, tip revolute, with sessile glands. Achenes pale brown, obovoid, compressed, ca. 3 mm, strigillose, glandular apically, 2-ribbed. Pappus whitish, 3-seriate, bristles barbellate throughout; outermost bristles few, ca. 0.4 mm; inner bristles ca. 5 mm, acute; innermost bristles ca. 6.2 mm, clavate. Fl. and fr. Jun–Sep.

• Stony slopes; 1500–2500 m. S Gansu.

Aster heterolepis is closely related to *A. oreophilus*; it differs mainly in habit, the larger capitula, and phyllary shape.

83. *Aster takasagomontanus* Sasaki, Trans. Nat. Hist. Soc. Formosa 21: 151. 1931 [*Takasago-montanus*].

山紫菀 shan zi wan

Herbs, perennial, 8–20 cm tall; rhizomes thickened. Stems erect, simple, moderately strigillose, sparsely minutely stipitate glandular. Leaves basal and cauline; basal leaves rosulate, cauline leaves gradually reduced upward, densely hairy, sparsely to moderately minutely stipitate glandular, rarely eglandular; basal leaves present at anthesis, ascending, narrowly winged petiolate (petiole 0.9–4 cm); blade abaxially paler, ovate to broadly ovate or spatulate, 0.7–2 × 0.5–1.4(–1.9) cm, base attenuate, midvein conspicuous, margin entire or sparsely serrate, apex rounded to obtuse, mucronulate; cauline leaves petiolate, few; blade ovate to lanceolate, 2–3 cm, base attenuate to cuneate, margin serrate, apex obtuse to acute; uppermost leaves sessile, narrowly ovate to lanceolate, 2–2.5 cm, serrate. Capitula solitary or 2–5 in terminal corymbiform synflorescences, 3–3.5 cm in diam.; peduncles slender, 2–6 cm; bract 1 or absent, linear-oblanceolate, densely strigillose, eglandular. Involucre hemispheric, 0.7–1 × 1.5–1.7 cm; phyllaries 3-seriate, subequal, densely strigillose, adaxially strigillose at apex; outer phyllaries oblong to lanceolate, 6–9 × 1–2 mm, leaflike, margin narrowly scarious, ciliate, apex obtuse to acute, tinged reddish purple; inner phyllaries linear-lanceolate, 6–9 × 1–1.2, ± leaflike distally, margin scarious, erose, ciliate distally, acute. Ray florets 13–22, white, tube minutely hairy, minutely stipitate glandular, lamina ca. 7 × 2 mm, glabrous, eglandular; disk florets yellow, 3.5–4 mm, tube and proximal limb sparsely to moderately hairy, eglandular, limb funnelform, 2.5–2.8 mm, lobes spreading, triangular, unequal, 1–1.5 mm. Achenes narrowly obovoid, ± compressed, 3–4 mm, 2-ribbed, moderately to densely strigillose, densely mi-

nutely stipitate glandular. Pappus 4-seriate (unclearly), dirty white, bristles barbellate throughout; outermost bristles few, slender, ca. 1 mm; outer bristles few, slender, 2–2.5 mm; inner bristles ca. 3 mm, acute; innermost bristles 3.5–4.5 mm, weakly clavate. Fl. Jul–Sep. $2n = 18^*$.

• Among exposed rocks on slopes, alpine regions; 3400–3700 m. Taiwan.

84. *Aster barbellatus* Grierson, Notes Roy. Bot. Gard. Edinburgh 26: 119. 1964.

髯毛紫菀 ran mao zi wan

Herbs, perennial, 20–40 cm tall; rhizomes stout, stoloniferous. Stems erect, simple, sparsely or moderately hirsute, with sessile glands above, with marcescent leaf remains at base. Leaves basal and cauline, cauline leaves reduced upward, densely to moderately strigose, sometimes upper leaves glandular, midvein abaxially somewhat prominent, triplinerved, veins inconspicuous; basal leaves usually persistent, broadly winged petiolate; blade spatulate to oblanceolate, ca. 2.5×0.6 –1 cm, base attenuate, margin entire or sparsely serrulate, densely strigose-ciliate, apex obtuse or rounded; middle leaves oblong to oblanceolate, 2 – 3.5×0.4 – 0.7 cm, base subclasping; upper leaves small, apex acute. Capitula terminal, solitary, 4–5 cm in diam. Involucres hemispheric, 0.6 – 0.7×1.5 – 1.7 (–2) cm; phyllaries 3-seriate, spatulate-oblong to oblong or linear, 9 – 10×1.5 – 2.5 mm, abaxially sparsely strigose, leaflike, margin strigose-ciliate, inner phyllaries with margin scarios, erose-fimbriate, purplish, apex acute or obtuse, purplish. Ray florets 30–40, blue or purplish, tube 2–2.2 mm, hairy; disk florets yellow, 3.5 – 5 mm, tube ca. 1.3 mm, distal tube and limb base hairy, limb narrowly funnelform, lobes lanceolate, 1.2 – 1.5 mm, often purple. Achenes brown, obovoid, compressed, ca. 3 mm, densely strigose, sparsely glandular apically, 2-ribbed. Pappus reddish or buff, 3-seriate, bristles barbellate above; outermost bristles ca. 0.9 mm; inner bristles ca. 4.7 mm, acute; innermost bristles 5.1 – 5.5 mm (reaching base of disk corolla lobes), \pm clavate. Fl. Jul–Aug.

Open grassy slopes, field margins, sometimes among dwarf shrubs; 3000–4000 m. S Xizang [Bhutan, India (Sikkim), Nepal].

85. *Aster ionoglossus* Y. Ling ex Y. L. Chen, S. Yun Liang & K. Y. Pan, Acta Phytotax. Sin. 19: 87. 1981.

堇舌紫菀 jin she zi wan

Herbs, perennial, 35–40 cm tall; rhizomes stout, somewhat woody. Stems erect, thick, shallowly canaliculate, simple, base with marcescent leaf remains, hirsute-villous, short-stipitate glandular. Leaves basal and cauline; cauline leaves sparse, densely hirsute-villous, often short-stipitate glandular, \pm thick, margin entire, midvein abaxially prominent, 3-veined, veins subparallel; basal and lower cauline leaves crowded, winged petiolate; blade oblong-spatulate to oblanceolate, 4 – 6.5×0.6 – 1.2 cm, base attenuate, apex rounded or obtuse, rarely \pm acute; middle leaves oblong to lanceolate, 3 – 5×0.6 – 0.8 cm, base often cuneate or subrounded, subclasping; upper leaves small, lanceolate to linear, apex acute. Capitula terminal, solitary, 4.5 – 5.5 cm in diam. Involucres not described; phyllaries 2- or 3-seriate, equal, purple tipped, oblong or oblanceolate, 9 – $10 \times$ ca.

2 mm, abaxially densely hirsute-villous, margin ciliate; outer phyllaries leaflike, apex obtuse or rounded; inner phyllaries with margin scarios, erose, apex acute. Ray floret 30–40, blue-purple, tube 1.1–2 mm, lamina 15–20 mm; disk florets yellow, 5–7 mm, tube 1.1–1.4 mm, tube and limb hairy, limb funnelform, lobes lanceolate, 1.1–1.5 mm, glabrous, often purple. Achenes (immature) ca. 2.5 mm, strigillose. Pappus 3-seriate, reddish; outer bristles slender, ca. 1 mm; inner bristles ca. 4 mm, acute; innermost bristles 4.5–5.5 mm, clavate. Fl. Jul.

• Alpine open slopes; 3100–3800 m. S Xizang (Yadong).

86. *Aster lingulatus* Franchet, J. Bot. (Morot) 10: 377. 1896.

舌叶紫菀 she ye zi wan

Herbs, perennial, (15–)30–45 cm tall; rhizomes procumbent or ascending, stout. Stems erect or ascending, simple, leafy, moderately strigose and villosulous, eglandular. Leaves basal and cauline; cauline leaves slightly reduced upward, both surfaces scabrous, abaxially sparsely to moderately minutely stipitate glandular, adaxially eglandular, thick; basal leaves withered at anthesis, ascending, narrowly winged petiolate (petiole to 7 cm); blade oblanceolate or spatulate, 0.5 – 7×0.4 – 2.3 cm, base attenuate, margin serrate, apex obtuse to acute; lower cauline leaves withered or persistent at anthesis; cauline leaves petiolate to sessile, oblanceolate to lanceolate, 4 – 7×0.8 – 1.3 cm, base attenuate, often semiamplexicaul, margin serrate or entire, apex obtuse or rounded to acute; uppermost leaves erect or \pm spreading, lanceolate to narrowly lanceolate, 2 – 5×0.5 – 1.5 cm, base amplexicaul, margin slightly sinuate, entire, sometimes few serrate, apex obtuse or rounded. Capitula 2–5 in terminal corymbiform synflorescences, rarely solitary, 2–3 cm in diam.; peduncles 1–3 cm; bract 1 or absent, linear-lanceolate, densely strigillose and villosulous, eglandular. Involucres hemispheric, 0.7 – 1.2 cm in diam.; phyllaries 3-seriate, subequal, middle area green, 7 – 8×1 – 1.5 mm, densely pilose, \pm leaflike, margin scarios, slightly erose, sparsely ciliate, midvein inconspicuous, apex acute, dark purple, ciliate; outer phyllaries oblong; inner phyllaries lanceolate. Ray florets 22–28, blue-purple, tube glabrous, eglandular, lamina 15 – 18×2.2 – 2.5 mm, glabrous, eglandular; disk florets yellow, 5 – 6×3.5 – 4.5 mm, proximally sparsely hairy, lobes spreading, triangular, 1.2–2 mm. Achenes broadly obovoid, \pm compressed, ca. 3×2 mm, moderately strigillose, sparsely minutely stipitate glandular distally, margin densely strigillose-ciliate, 2-ribbed. Pappus 4-seriate, straw-colored or sometimes purplish, bristles barbellate throughout; outermost bristles few, slender, ca. 1 mm; outer bristles few, slender, 2–2.5 mm; inner bristles 4–4.5 mm, acute; innermost bristles ca. 5 mm, \pm clavate. Fl. Aug–Oct.

• Alpine or subalpine grassy slopes; 2600–3600 m. W Sichuan, NW Yunnan.

87. *Aster tricephalus* C. B. Clarke, Compos. Ind. 43. 1876.

三头紫菀 san tou zi wan

Herbs, perennial, 30–40 cm tall, rhizomatous, often with robust stolons bearing rosettes. Stems erect, simple below, sparsely pilose. Leaves basal and cauline, pilose, glandular, basal leaves (flowering stems) absent or withered by anthesis; blade spatulate, ca. 6.5×2 cm; cauline leaves \pm evenly distributed

and similar in size, usually overlapping, sessile, oblanceolate, elliptic, or lanceolate, 3.5–6.5 × 0.6–2.1 cm, base subclasping, margin entire or 2- or 3-serrulate, apex obtuse or acute; upper leaves often surrounding capitula. Capitula 1–3 (rarely more), 2–2.8 cm in diam. Involucres not described; phyllaries 1- or 2-seriate, leaflike, oblanceolate, 12–14 × 2–3 mm, glabrate, midvein brownish, ciliate, apex acute or obtuse. Ray florets 50–60, white or blue, tube ca. 0.2 cm, lamina ca. 18 mm; disk florets yellow, 4.5–5.5 mm, hairy, tube 1.5–2 mm, lobes ca. 1.5 mm. Achenes brown, obovoid, 3.4–4 mm, strigillose, apically glandular, 2-ribbed. Pappus whitish or buff, 5–5.5 mm. Fl. Aug–Oct.

3600–4000 m. S Xizang [India (Sikkim), Nepal].

Aster tricephalus is similar in height to *A. barbellatus* and *A. neoelegans* but differs in its flowering stems without basal leaves, the basal leaves being present only on well-developed stolons, its capitula usually 3, and its ray florets 50–60.

88. *Aster neoelegans* Grierson, Notes Roy. Bot. Gard. Edinburgh 26: 118. 1964 [*“neo-elegans”*].

新雅紫苑 xin ya zi wan

Aster elegans J. D. Hooker & Thomson ex C. B. Clarke, Compos. Ind. 44. 1876, not Willdenow (1803), nor Nees (1818), nor (Nuttall) Torrey & A. Gray (1841).

Herbs, perennial, 40–75(–100) cm tall, rhizomatous, stoloniferous. Stems simple, strigillose. Leaves strigillose, margin entire, scabrous; basal leaves persistent, winged petiolate, oblanceolate to spatulate, 5–7 × 0.8–1 cm, base attenuate, apex rounded; cauline leaves gradually reduced upward, sessile or broadly winged shortly petiolate; blade oblong to oblanceolate, base cuneate, subclasping, apex acute or obtuse; upper leaves remote, sessile, linear, apex acute. Capitula 3–6 in open corymbose synflorescences, 2–2.5 cm in diam. Phyllaries 3-seriate, oblong, 4–8 × 1–1.5 mm, abaxially strigillose, leaflike above, margin narrowly scarious, erose-fimbriate, ± purplish, villous-ciliate (red crosswalls), apex acute, purple-tipped. Ray florets 35–40, white, mauve, or blue-violet, tube ca. 1.5 mm, sparsely hairy, lamina 7–12 mm; disk florets yellow, hairy, ca. 4 mm, tube ca. 1.5 mm, limb funnelform, lobes lanceolate, ca. 1 mm. Achenes light brown, obovoid, compressed, 2.5–3 mm, sparsely strigose, glandular distally, 2-ribbed. Pappus whitish, 3-seriate, bristles barbellate throughout; outermost bristles ca. 0.6 mm; inner bristles ca. 3 mm, acute; innermost bristles ca. 3.5 mm, clavate. Fl. Jul–Sep.

Forest clearings, often on marshy ground; 2700–3000 m. S Xizang (Yadong) [Bhutan, India (Sikkim)].

89. *Aster handelii* Onno, Biblioth. Bot. 26(Heft 106): 52. 1932.

红冠紫苑 hong guan zi wan

Herbs, perennial, 9–35 cm tall, sometimes caespitose; rhizomes stout, often with stolons bearing rosettes. Stems erect or ascending, simple, sparsely to moderately strigose and/or villous, eglandular. Leaves basal and cauline; cauline leaves gradually reduced upward, both surfaces strigose, sometimes sparsely to moderately minutely stipitate glandular, abaxial

veins moderately to densely villous, sometimes ± thick, margin villous-ciliate, midvein abaxially ± prominent (some basal leaves abaxially ± 3-veined); basal rosette present at anthesis; basal and lower cauline leaves winged petiolate; blade spatulate to oblanceolate, 0.7–4 × 0.4–1.4 cm, base attenuate, margin entire, sometimes sinuate, apex rounded to obtuse; middle cauline leaves oblong to lanceolate, 1.8–4 × 0.2–0.8 cm, base subclasping, apex acute or obtuse. Capitula terminal, solitary, 4–5.5 cm in diam. Involucres hemispheric, 5–7 mm; phyllaries 2-seriate, equal, squarrose, oblong-linear, 7.5–9 × 1.2–2 mm, abaxially sparsely to moderately villosulous proximally, adaxially distally moderately to densely villosulous, leaflike, margin narrowly scarious, villous-ciliate, midvein inconspicuous, apex obtuse to acute, tip purplish. Ray florets 28–40, bluish purple to lavender blue, lamina 12–23 × 2.5–3 mm; disk florets orange, ca. 6 mm, limb funnelform, ca. 4.5 mm, proximally moderately hairy, lobes spreading, triangular, ca. 1.2 mm, abaxially minutely stipitate glandular. Achenes broadly obovoid, ± compressed, 2.6–3 mm, densely strigillose, margin 2-ribbed (ribs distally reddish brown), strigillose-ciliate (sometimes rib completely strigillose). Pappus 4-seriate, purplish straw-colored, bristles barbellate throughout; outermost bristles few, slender, ca. 0.5 mm; outer bristles slender, ca. 4 mm; inner bristles few, ca. 5 mm, acute; innermost bristles ca. 5.5 mm, slightly clavate. Fl. and fr. Jul–Sep.

• Alpine or subalpine grasslands and dry grasslands, pastures, wet meadows, mixed shrublands, clearings in *Quercus* forests; 3000–3500 m. SW Sichuan, NW Yunnan.

Aster handelii is similar to *A. tongolensis* but differs in the pappus structure.

90. *Aster tongolensis* Franchet, J. Bot. (Morot) 10: 376. 1896.

东俄洛紫苑 dong e luo zi wan

Aster subcaerulea S. Moore; *A. tongolensis* f. *glabratus* Diels; *A. tongolensis* f. *humilis* Diels.

Herbs, perennial, 14–47 cm tall, sometimes caespitose; rhizome slender, procumbent or ascending, often with stolons bearing rosettes. Stems erect, simple, somewhat slender, sparsely strigose or strigillose, villous or villosulous, sometimes sparsely minutely stipitate glandular. Leaves basal and cauline; cauline leaves gradually or sometimes abruptly reduced upward, both surfaces scabridulous or hirsute, margin ciliate, 3-veined, veins conspicuous; basal leaves winged petiolate, petiole base subclasping; blade spatulate or obovate to oblanceolate, 0.5–5 × 0.3–2 cm, base attenuate, margin entire or remotely serrulate in upper half, apex obtuse to rounded, sometimes acute; lower cauline leaves sessile, oblong to linear-lanceolate, base subclasping; middle and upper cauline leaves 1–5 × 0.1–0.7 cm, apex acute. Capitula terminal, solitary (rarely 2), 3–5(–6.5) cm in diam. Involucres hemispheric, 5–7 mm; phyllaries 2- or 3-seriate, subequal, appressed or often squarrose, oblong-linear, 5–8 × 0.8–1.5 mm, abaxially villosulous, hardened below, leaflike above, apex acute. Ray florets 30–70, blue or lavender to purplish, tube sparsely hairy, lamina 15–20 × 1–2 mm, glabrous, eglandular; disk florets orange, 3.5–4.5 mm, limb funnelform, 2.5–3 mm, proximally hairy, lobes

spreading to reflexed, narrowly triangular, 1–1.5 mm, abaxially sparsely hairy. Achenes broadly obovoid, ca. 2 mm, densely strigillose, 2-ribbed (ribs sparsely strigillose, densely so apically). Pappus 4-seriate, purple-brown to brown, of few bristles; outermost bristles slender, 0.2–0.7 mm; outer bristles slender, 0.7–1 mm; inner bristles 1.2–1.6 mm, acute; innermost bristles 1.5–2 mm, slightly to distinctly clavate. Fl. Jun–Aug, fr. Jul–Sep. $2n = 18^*$.

• Alpine and subalpine open forests, stream banks, grasslands, boggy margins of lakes, rocky or grassy slopes, pastures, shrub thickets, wet places; 2500–4000 m. S Gansu, Qinghai, NW and SW Sichuan, Xizang, NW Yunnan.

Aster tongolensis is frequently cultivated as an ornamental.

91. *Aster souliei* Franchet, J. Bot. (Morot) 10: 372. 1896.

缘毛紫菀 yuan mao zi wan

Herbs, perennial, 2–45 cm tall, sometimes caespitose; rhizomes robust, woody. Stems solitary, erect, simple, finely striate, sparsely to moderately pilose. Leaves basal and cauline, glabrate to sparsely pilosulose (more so toward apex), margin entire, sometimes remotely serrulate, eciliate to ± densely ciliate, midvein abaxially prominent, pilose; basal leaves present at anthesis, broadly winged petiolate, petiole base subclasping; blade spatulate or obovate to oblanceolate, 0.7–5 × 0.3–1.9 cm, base attenuate, apex obtuse to acute; cauline leaves abruptly reduced, narrowly lanceolate, 1–5 × 0.2–0.8 cm, base clasping, apex acute. Capitula terminal, solitary, 3–4(–6) cm in diam. Involucres hemispheric, 6–8 mm; phyllaries 3-seriate, subequal, appressed or sometimes squarrose, oblong, 6–11 × 1.5–2 mm, abaxially sparsely to densely pilosulose distally or glabrous, base ± hardened, leaflike above, margin scariosus, sometimes purplish distally, densely pilose-ciliate or eciliate, midvein glabrous or pilose, apex obtuse to slightly acute. Ray florets 25–55, blue-purple to violet, tube glabrous, lamina 12–25 × 2–3 mm, glabrous, eglandular; disk florets yellow, 3–5 mm, limb funnelform, 2–3 mm, proximally sparsely puberulent, lobes spreading, narrowly triangular, 1–2 mm. Achenes obovoid, ± compressed, 2.5–3 × ca. 1.5 mm, densely strigillose. Pappus (2 or)3-seriate, of few purplish- to reddish brown or brown, sometimes straw-colored bristles; bristles barbellate; outermost bristles few, slender, 0.1–0.3 mm; outer bristles 1–1.2 mm; inner bristles 1–2 mm. Fl. May–Jul, fr. Aug. $2n = 18^*$.

Alpine *Pinus* forest margins, open alpine coniferous forests, thickets and grasslands on slopes; 2700–4600 m. S Gansu, Qinghai, W Sichuan, Xizang, NW Yunnan [Bhutan, N Myanmar].

Aster souliei is sometimes cultivated as an ornamental.

This species is variable in size, leaf shape, involucre, and indumentum. The varieties may represent extremes in a continuum of variation.

- 1a. Phyllaries abaxially glabrous, margin ciliate or eciliate 91a. var. *souliei*
 1b. Phyllaries abaxially sparsely or densely pilosulose, margin ciliate 91b. var. *limitaneus*

91a. *Aster souliei* var. *souliei*

缘毛紫菀(原变种) yuan mao zi wan (yuan bian zhong)

Aster ganlun Kitamura.

Phyllaries abaxially glabrous, margin densely pilose-ciliate or eciliate.

W Sichuan, Xizang, NW Yunnan [Bhutan, N Myanmar].

91b. *Aster souliei* var. *limitaneus* (W. W. Smith & Farrer) Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 620. 1937.

毛背缘毛紫菀 mao bei yuan mao zi wan

Aster limitaneus W. W. Smith & Farrer, Notes Roy. Bot. Gard. Edinburgh 9: 80. 1916; *A. forrestii* Stapf; *A. tongolensis* Franchet subsp. *forrestii* (Stapf) Onno.

Phyllaries abaxially hairy, margin densely pilose-ciliate.

S Gansu, W Sichuan, NW Yunnan [Bhutan, N Myanmar].

92. *Aster megalanthus* Y. Ling, Fl. Reipubl. Popularis Sin. 74: 359. 1985.

大花紫菀 da hua zi wan

Herbs perennial, 35–45 cm tall; rhizomes robust (to 6 mm in diam.); roots dense, fibrous, bearing rosulate phyllome. Stems single, erect, stout (5–7 mm in diam.), purple-red above, angled and finely canaliculate, hirsute (hairs ca. 4 mm) below, densely leafy below, densely pilose above. Leaves: both surfaces densely pilose, margin hirsute-ciliate, midvein stout, hirsute, abaxially triplinerved, veins prominent, lateral veins fine; basal leaves withered or present at anthesis, broadly winged petiolate; blade oblong-spatulate, 7–12 cm, base attenuate, margin subentire toward middle, apex obtuse or rounded; middle cauline leaves sessile, oblong or oblong-lanceolate, smaller, apex obtuse or acute. Capitula terminal, solitary, ca. 6.5 cm in diam. Involucres hemispheric, ca. 2 cm in diam.; phyllaries 3-seriate, squarrose, oblong or linear-lanceolate, ca. 10 × 1.5–2 mm, leaflike, base hardened, outer phyllaries densely hirsutulous, inner phyllaries pilose distally, margin ± reddish, apex obtuse or ± acute. Ray florets ca. 100, purple-red, lamina 25–30 × ca. 3.4 mm; disk florets yellow, ca. 6 mm, sparsely hairy. Achenes (immature) ± compressed, ca. 2 mm, densely strigose. Pappus purplish brown, of few unequal bristles, barbellate throughout, bristles shorter than disk florets. Fl. Aug.

• Slopes; ca. 4000 m. W Sichuan (Zhegu Shan).

Aster megalanthus is closely related to *A. tongolensis* but differs by being taller and in having more ray florets with broader laminae and longer disk florets.

93. *Aster fanjingshanicus* Y. L. Chen & D. J. Liu, Bull. Bot. Res., Harbin 8(3): 11. 1988.

梵净山紫菀 fan jing shan zi wan

Herbs, perennial, 4–7 cm tall; rhizomes short or long, woody, without stolons, collar clad with marcescent petiole remains, fibrous rooted. Stems slender, erect, simple, finely striate, densely or sparsely white pilose, glandular. Leaves basal and cauline; basal leaves rosulate, present at anthesis, winged petiolate; petiole equaling blade; blade oblanceolate-spatulate or spatulate, 8–15 × 3–5 mm, abaxially pale green, sparsely pilose on veins, adaxially dark green, densely strigose, base cu-

neate-attenuate, margin ciliate, entire, midvein and lateral veins abaxially distinctly prominent, lateral veins 2- or 3-paired, apex rounded, inconspicuously mucronulate; cauline leaves (3 or) 4 or 5, sessile or subsessile, lanceolate, spatulate, or rarely linear-oblong, 5–15 × 2–3 mm, apex obtuse or acuminate. Capitula terminal, solitary. Involucre campanulate, 0.4–0.5 × 0.6–0.8 cm; phyllaries 2- or 3-seriate, subequal, leaflike; outer phyllaries oblong-lanceolate, 1–1.5 mm wide, abaxially densely pilose, apex acuminate or ± acute; inner phyllaries linear or linear-lanceolate, glabrous or apically sparsely puberulent, margin narrowly scarious. Ray florets 11–13(–15), white, tube ca. 2 mm, lamina oblong, 6–7 × ca. 1 mm; disk florets yellow, ca. 3 mm, tube ca. 1 mm, lobes ovate-lanceolate. Achenes oblong, ± compressed, 1.5–2 mm, sparsely strigose. Pappus (?3- or 4-seriate), reddish brown; bristles many, barbellate throughout, ± equaling disk corollas. Fl. Jun–Jul.

• Grasslands on slopes, rocky areas; 2000–2400 m. Guizhou (Fanjing Shan).

No specimens of *Aster fanjingshanicus* were seen by one of us (Brouillet).

94. *Aster giraldii* Diels, Bot. Jahrb. Syst. 36(Beibl. 82): 103. 1905.

秦中紫菀 qin zhong zi wan

Herbs, perennial, 24–40 cm tall; rhizomes slender; stolons present. Stems erect, slender, solitary or fascicled, sparsely strigillose, simple or ± branched. Leaves basal and cauline, thin, abaxially sparsely scabridulous, veins scabrous, adaxially scabrous, margin scabrous, midvein ± prominent, lateral veins 3- or 4-paired; basal leaves withered at anthesis; lower cauline leaves long petiolate; blade oblong-spatulate to oblanceolate, 4–7 × 1–1.3 cm, base attenuate, margin serrate (teeth mucronulate); middle leaves sessile or shortly petiolate; blade oblong or lanceolate, 3–5 × 1(–2) cm, base cuneate, apex acute to acuminate; upper leaves small, lanceolate, base often rounded, subclasping. Capitula terminal, solitary or 2–4, terminal at ends of stem and branches, 2–3 cm in diam. Involucre hemispheric-campanulate, 6–7 × 7–10 mm; phyllaries 3-seriate, base hardened, leaflike above, margin scarious, erose-fimbriate, ± acute; outer phyllaries 3–4 × 1–1.5 mm, abaxially sparsely scabridulous; inner phyllaries ca. 4.5 × 1.5–2 mm. Ray florets 12–20, blue-purple, tube ca. 1 mm, glabrous, lamina 10–15 × 2–2.5 mm; disk florets 2.8–4 mm, tube 1–1.5 mm, glabrous, limb campanulate, enlarged, lobes lanceolate, 0.7–1 mm, recurved. Achenes purple, obovoid, slightly compressed, ± trigonous, 2.5–3 × ca. 1.5 mm, sparsely strigose, 4-ribbed. Pappus (?3- or 4-seriate), reddish brown or yellowish; bristles many, stout, barbellate throughout, 0.9–2 mm. Fl. and fr. Aug–Dec.

• Ravines, open forests; 1800–2600 m. Shaanxi (Huxian, Taibai Shan).

95. *Aster salwinensis* Onno, Biblioth. Bot. 26(Heft 106): 74. 1932.

怒江紫菀 nu jiang zi wan

Herbs, perennial, 4–24 cm tall; rhizomes long, slender, sometimes with short stolons. Stems ascending, rarely erect, sparsely to moderately villous, eglandular. Leaves basal and

cauline; cauline leaves reduced upward, sometimes abruptly so, thin, glabrous, eglandular, abaxial veins sparsely pilose, adaxial veins also moderately pilosulose, margin serrate to serrulate or entire (uppermost leaves), midvein abaxially prominent, ciliate, apex mucronate; basal leaves present at anthesis, sometimes marcescent; basal and lower cauline leaves broadly to narrowly winged petiolate (petiole to 2 cm); blade obovate to oblanceolate, 0.5–4 × 0.3–1.5 cm, base attenuate, apex rounded; cauline leaves ± erect, sessile, obovate to ovate or ovate-lanceolate, 1–2.5 × 0.9–3 cm, base rounded or cuneate, subclasping, apex rounded to acute. Capitula terminal, solitary, often subtended by a leaflike bract, 2–3 cm in diam. Involucre hemispheric, 5–9 mm; phyllaries 2- or 3-seriate, subequal, often squarrose, linear-lanceolate, 8–10 mm, leaflike, margin broadly scarious, erose, eciliate, midvein conspicuous proximally, apex acuminate, purplish distally; outer phyllaries 1–1.8 mm wide, abaxially villous proximally to sparsely to moderately so distally, eglandular; inner phyllaries 0.6–1 mm wide, sparsely villous. Ray florets 11–30, blue to blue-purple, rarely white, tube sparsely hairy apically, lamina 7–12 × 1–2.3 mm, glabrous, eglandular; disk florets yellow, 4.5–5.5 mm, limb funnelform, 3–3.5 mm, glabrous, lobes spreading, narrowly triangular, 1–1.3 mm, often tinged purple-brown, glabrate. Achenes brown, narrowly obovoid, compressed, ca. 4 mm, strigose distally, eglandular, 3- or 4-ribbed. Pappus 4-seriate, straw-colored to brownish, with few bristles barbellate throughout; outermost series of slender bristles or narrow scales 0.7–1 mm; outer series of slender bristles, 2–3.5 mm; inner bristles 3.5–4 mm, acute; innermost bristles 4–4.5(–5) mm, weakly clavate. Fl. Jul–Sep, fr. Aug–Oct.

Alpine meadows on slopes or on rocks, openings in *Rhododendron*-bamboo thickets; 3300–4600 m. SW Sichuan, E Xizang, NW Yunnan [NE Myanmar].

96. *Aster tientschwanensis* Handel-Mazzetti, Oesterr. Bot. Z. 89: 819. 1940.

天全紫菀 tian quan zi wan

Herbs, perennial, 7–18 cm tall; rhizomes robust, without stolons. Stems ascending, simple, slender, sparsely villous, often glabrescent below. Leaves crowded below and scattered above, glabrate, rather thick, margin villous-ciliate, midvein abaxially prominent, lateral veins 2- or 3-paired and obliquely ascending; basal leaves winged petiolate; blade spatulate, 2–7 × 0.5–1.5 cm, base attenuate, margin 2–5-crenate-serrate, apex obtuse or rounded; lower cauline leaves present at anthesis, sessile or shortly winged petiolate, spatulate to oblanceolate, 1–1.5 × ca. 0.3 cm, apically 3-serrate or entire; upper leaves small, oblong or linear, margin entire. Capitula terminal, solitary, 2–2.7 cm. Involucre hemispheric-campanulate, ca. 7 × 6–10 mm; phyllaries 3-seriate, subequal, or outer phyllaries somewhat shorter, linear-lanceolate or linear-oblanceolate, 6–7.2 × ca. 1 mm, abaxially glabrous or sparsely villous, membranous, margin villous-ciliate, margin of inner phyllaries ± broadly scarious, erose-fimbriate, apex acute to acuminate, ± leaflike, purplish. Ray florets 13–17, white, tube ca. 1.5 mm, hairy, lamina 10–11 × ca. 2 mm; disk florets ca. 4.5 mm, tube 1–1.2 mm, hairy, limb funnelform, glabrous, lobes lanceolate, ca. 0.8 mm. Achenes (immature) narrowly oblong, ± compressed, ca. 2.5

mm, densely strigose, 2-ribbed. Pappus (immature) 3-seriate, reddish, bristles barbellate throughout; outer bristles short; inner bristles 3.5–4.5 mm. Fl. May–Jul.

• Mountain forest margins and thickets; ca. 3300 m. C and NC Sichuan (Lixian, Tianquan).

Aster tienschwanensis is similar to *A. salwinensis* but differs from it by its thick, glabrate leaves, densely strigose achenes, and reddish pappus.

97. *Aster himalaicus* C. B. Clarke, Compos. Ind. 42. 1876.

须弥紫菀 xu mi zi wan

Aster mekongensis Onno, p.p.

Herbs, perennial, 8–25 cm tall; rhizomes robust, without stolons, collar clad with marcescent leaf remains. Stems ascending, simple, proximally villosulous, distally sparsely so, minutely stipitate glandular, more densely so distally. Leaves basal and cauline, thin, sparsely villosulous, more densely so on veins, moderately to densely minutely stipitate glandular, margin villous-ciliate, veins abaxially prominent, apices with purple mucro; basal leaves withered at anthesis, marcescent, broadly winged petiolate (petiole to 2 cm); blade oblanceolate, 0.9–2.5(–4.5) × 0.5–2.5 cm, base attenuate, margin serrulate (teeth mucronate), apex rounded to acute; lower cauline leaves oblong or obovate to oblanceolate, 1.5–4 × 0.5–1.2 cm, base rounded, subclasping, margin entire or dentate to serrulate; upper leaves approaching capitulum. Capitula terminal, solitary, 4–4.5 cm in diam. Involucres hemispheric, 11–13 × 13–14 mm, often overtopping disk; phyllaries 2- or 3-seriate, subequal, apex slightly spreading, oblong-lanceolate to lanceolate, 13–14 × 2.5–3.5 mm, abaxially sparsely villosulous to glabrate, tip densely minutely stipitate glandular, membranous, margin scarious, ciliate, multiveined, apex acuminate, leaflike, purplish. Ray florets 40–50(–70), blue-purple, lamina 12–15(–17) × 0.5–0.7 mm; disk florets purple-brown or yellow, ca. 5 mm, tube and proximal limb hairy, limb funnellform, ca. 4 mm, lobes erect, triangular, ca. 1 mm, tips sparsely minutely stipitate glandular. Achenes brown, narrowly obovoid, compressed, 2.5–3 mm, strigillose, minutely stipitate glandular, more densely so distally, 2-ribbed. Pappus 4-seriate, whitish to straw-colored; outermost series of few tiny scales 0.3–0.5 mm; bristles barbellate throughout; outer bristles slender, 2–3 mm; inner bristles 4–4.5 mm, acute; innermost bristles ca. 5 mm, weakly clavate. Fl. Jul–Aug, fr. Sep–Oct. $2n = 10$.

Alpine meadows, *Pinus* forests; 3600–4800 m. Sichuan, S Xizang, NW Yunnan [Bhutan, India (Sikkim), N Myanmar, Nepal].

98. *Aster techinensis* Y. Ling, Fl. Reipubl. Popularis Sin. 74: 359. 1985.

德钦紫菀 de qin zi wan

Herbs, perennial, 15–25 cm tall, caespitose; rhizomes robust, without stolons. Stems ascending, simple, proximally villosulous, distally sparsely so, densely minutely stipitate glandular, more densely so distally. Leaves basal and cauline, thin, sparsely villous to glabrate, more densely villous on veins, minutely stipitate glandular, margin serrate to serrulate (teeth mu-

cronate), villous-ciliate, 3-veined, veins abaxially prominent, apex rounded to acute, mucronate; basal leaves withered at anthesis, marcescent, broadly winged petiolate (petiole to 4 cm); blade oblanceolate, 1.5–4.5 × 0.5–2 cm, base attenuate; lower cauline leaves winged petiolate to sessile, oblanceolate to lanceolate, 1.5–4.4 × 0.5–1.5 cm, base cuneate or attenuate to rounded, clasping; upper leaves sessile, lanceolate, base rounded, clasping. Capitula terminal, solitary, 3.5–4.5 cm in diam. Involucres hemispheric, 1.3–1.4 × 1.8–2.5 cm, often overtopping disk; phyllaries 2-seriate, unequal, multiveined, margin ciliate, apex slightly spreading, both surfaces densely minutely stipitate glandular; outer phyllaries oblong-lanceolate to lanceolate, 13–16 × 3–5 mm, abaxially sparsely villosulous on veins, leaflike, apex acuminate, green or purple tinged, tip villosulous; inner phyllaries narrowly lanceolate, 9–15 × 1.2–1.5 mm, membranous, margin broadly scarious, glabrate. Ray florets ca. 80 or more, blue-purple, tube hairy, lamina 15–18 × 1–1.5 mm, eglandular; disk florets yellow, ca. 7 mm, tube and basal limb hairy, limb funnellform, ca. 4 mm, lobes erect to spreading, purple-black, triangular, ca. 1 mm, glabrous, tip sparsely minutely stipitate glandular. Achenes (immature) oblanceolate, compressed, ca. 2.5 mm, sericeous, densely minutely stipitate glandular, 2-ribbed. Pappus 4-seriate, reddish based, whitish above, bristles few, barbellate throughout; outermost series of slender bristles or scales 0.5–1 mm; outer bristles slender, 2–5 mm; inner bristles 5–5.5 mm, acute; innermost bristles 6–7 mm, weakly clavate. Fl. Aug.

• About 3500 m. NW Yunnan (Dèqên).

Aster techinensis is closely related to *A. himalaicus* but differs in its stems, leaves, and phyllaries sparsely villosulous and its pappus reddish.

99. *Aster stracheyi* J. D. Hooker, Fl. Brit. India 3: 250. 1881.

匍生紫菀 fu sheng zi wan

Herbs, perennial, 3–15 cm tall; rhizomes procumbent, with several long, slender stolons (to 30 cm) with rosettes. Stems ascending or erect, reddish, sparsely to moderately villous, eglandular. Leaves basal and cauline, sparsely to moderately pilose to glabrate, margin revolute, ciliate, apex obtuse, sometimes acute, mucronulate; basal leaves withered by anthesis, winged petiolate (petiole to 6.5 cm); blade spatulate or elliptic, 0.7–3.5 × 0.5–1.3 cm, thick, base attenuate, margin serrate, midvein pronounced; cauline leaves abruptly reduced, few, sessile or (lower leaves) shortly petiolate; blade linear or oblong to oblanceolate or obovate, 0.5–2.5 × 0.1–0.8 cm, 3-veined, base attenuate, margin entire or 1- or 2-denticulate or -serrate, apex acute or obtuse. Capitula terminal, solitary, ca. 2.5 cm in diam. Involucres hemispheric, 13–18 × 8–12 mm; phyllaries 3-seriate, equal, sometimes squarrose, lanceolate or oblanceolate, 8–12 × 1.5–3.5 mm, abaxially glabrous, membranous, shiny, margin scarious, ciliate, purplish, midvein apparent, sometimes strigillose, apex acuminate, purplish. Ray florets 29–42, violet, lamina 8–10 × 1.5–2 mm, tube and abaxial lamina base strigillose, eglandular; disk florets yellow (anther appendages bluish), 4–5 mm, limb funnellform, 2.5–3.5 mm, base sparsely hairy, lobes spreading, triangular, ca. 1 mm. Achenes (imma-

ture) obovoid, 2.2–3 mm, strigillose, minutely stipitate glandular, 2-ribbed. Pappus 3- or 4-seriate, white or whitish; outermost series of narrow scales, 0.3–0.8 mm; outer bristles slender, 3.5–4 mm; inner bristles 5.5–6 mm, acute; innermost bristles 6–6.5 mm, clavate. Fl. and fr. Jul–Sep.

Rocks near streamsides, among boulders in alpine tundra; 3300–4800 m. S Xizang (Tingri) [Bhutan, India, Nepal].

100. *Aster retusus* Ludlow, Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 69. 1956.

凹叶紫菀 *ao ye zi wan*

Herbs, perennial, 2–8 cm tall; rhizomes often vertical, stout, with stolons (to 2–4 cm), collar with marcescent leaf remains. Stems erect, simple, usually purple-brown, sparsely villous at base, more densely so above (hairs with purple crosswalls). Leaves glabrous, triplinerved, with fine 1-paired marginal veins; basal leaves rosulate, present at anthesis, shortly and broadly or narrowly winged petiolate; blade spatulate to oblanceolate, 1–3 × 0.3–0.5 cm, margin entire, eciliate or sparsely ciliate, base gradually attenuate, apex rounded to obtuse, retuse, 3-mucronulate; cauline leaves 3 or 4, oblanceolate, 1–2 × 0.2–0.4 cm, sessile or rarely petiolate. Capitula terminal, solitary, 2–2.5 cm in diam. Involucres hemispheric, ca. 1 cm in diam.; phyllaries 3-seriate, subequal, lanceolate, 6.5–9 × 1.5–2.5 mm, abaxially glabrous, ± leaflike at least above, margin villous-ciliate (purple crosswalls), of inner phyllaries broadly scarious, erose-fimbriate, apex acute or acuminate, recurved, margin and apex purplish. Ray florets 16–25, purplish mauve, tube ca. 2.5 mm, hairy distally, lamina 10–18 × ca. 1.5 mm; disk florets yellow and purplish in distal 1/2, 3.5–6 mm, tube 2–2.5 mm, limb narrowly funnelform, lobes lanceolate, ca. 0.8 mm, ± recurved. Achenes (immature) ovoid, compressed, ca. 2 mm, strigose, 2-ribbed. Pappus 4-seriate, yellowish; outermost bristles 0.5–1 mm; outer bristles slender, ca. 2 mm; inner bristles ca. 4.5 mm, acute; innermost bristles ca. 5.5 mm, clavate. Fl. Jul–Aug.

- Alpine meadows or on rocks; 4000–4300 m. SE Xizang.

Aster retusus resembles *A. batangensis* in leaf shape but differs in habit and leaf surface pubescence.

101. *Aster latibracteatus* Franchet, J. Bot. (Morot) 10: 371. 1896.

宽苞紫菀 *kuan bao zi wan*

Herbs, perennial, 5–20(–60) cm tall; rhizomes robust, collar clad by marcescent leaf remains. Stems erect or ascending, ± stout, densely villous (hairs with purple crosswalls), densely leafy. Leaves basal and cauline, thin, villous (crosswalls yellow in basal leaves, purple in upper leaves), margin sparsely mucronulate, entire in upper leaves, densely villous; basal and lower cauline leaves broadly winged petiolate; blade spatulate or oblanceolate, 2–5 × 0.6–1.7 cm, base attenuate, apex rounded; upper leaves oblanceolate, oblong, lanceolate, or ovate, 1.5–4 × 0.7–1.3 cm, base rounded, apex obtuse to acute, mucronate; uppermost leaves dense, surrounding capitula. Capitula terminal, solitary, 5–6 cm in diam. Involucres 1.5–2.5 cm in diam.; phyllaries 3-seriate, subequal, leaflike, abaxially

sparsely villous, margin sparsely to densely villous-ciliate (purple to brown crosswalls); outer phyllaries ovate to lanceolate, 10–12 × 3–6 mm; inner phyllaries lanceolate to oblong, 2–3 mm wide. Ray florets 25–30, blue or purplish, tube ca. 2.5 mm, lamina 10–20 × 1–2 mm; disk florets yellow, 5.7–7.5 mm, tube 1.8–2.4 mm, distal tube and limb base hairy, limb narrowly funnelform, lobes lanceolate, 1–1.5 mm, tip purple. Achenes pale brown, oblanceolate, compressed, 3–3.2 × ca. 1.5 mm, sparsely strigose, not winged, 2-ribbed. Pappus 3-seriate, yellowish at base, brown distally; bristles barbellate throughout, stout; outermost series of short bristles or scales ca. 0.3 mm; inner bristles 3–4 mm, acute; innermost bristles ca. 5.5 mm, clavate. Fr. Aug–Oct.

Stony alpine pastures, slopes; 2800–4000 m. NW Yunnan (Dali, Dêqên, Gongshan) [N Myanmar].

102. *Aster bulleyanus* Jeffrey ex Diels, Notes Roy. Bot. Gard. Edinburgh 5: 184. 1912.

扁毛紫菀 *bian mao zi wan*

Herbs, perennial, 15–40 cm tall, sometimes caespitose; rhizome robust. Stems erect or ascending, simple, slender, finely striate, leafy, sparsely to moderately villous, minutely stipitate glandular. Leaves basal and cauline; cauline leaves gradually reduced distally, abaxially sparsely pilosulose, veins villous, sparsely minutely stipitate glandular, adaxially sparsely pilosulose, veins sparsely villous, margin serrate, ciliate, 3–5-veined, veins abaxially prominent; basal leaves sometimes withered at anthesis, long petiolate (petiole to 8 cm); blade ovate to obovate, 1.5–6 × 0.7–2 cm, apex rounded to obtuse or acute, mucronate; cauline leaves shortly and broadly winged petiolate or sessile, ovate, 1.5–8 × 0.6–3.5 cm, base attenuate, clasping, apex acute. Capitula solitary, terminal, 7–9 cm in diam. Involucre hemispheric, 2–2.3 cm in diam.; phyllaries 3-seriate, subequal, squarrose to reflexed, lanceolate to linear-lanceolate, 9–10 mm, leaflike, margin villous-ciliate, apex acuminate, tip purplish, proximally white villous, moderately to densely minutely stipitate glandular; outer phyllaries 2–3 mm wide; inner phyllaries ca. 1.5 mm wide. Ray florets 44–51(–100), purplish, tube ca. 1 mm, lamina 20–30 × 1.5–2 mm, glabrous, eglandular; disk florets purplish brown, ca. 5 mm, limb funnelform, ca. 3.5 mm, glabrous, lobes spreading, narrowly triangular, ca. 1 mm. Achenes obovoid, compressed, 3–4 mm, sparsely strigillose, densely so distally, eglandular, not winged, 4-ribbed. Pappus 2-seriate, brown, few; outer series of narrow to broad, erose scales 1–1.5 mm; inner series of stout, flat bristles barbellate throughout, 3–4 mm, long acute. Fl. and fr. Aug–Sep.

- Alpine or subalpine meadows, streamsides; 2800–4300 m. NW Yunnan.

103. *Aster bietii* Franchet, J. Bot. (Morot) 10: 373. 1896.

线舌紫菀 *xian she zi wan*

Aster mekongensis Onno, p.p.

Herbs, perennial, 14–45 cm tall, sometimes caespitose; rhizomes robust, sometimes with short stolons. Stems erect or

ascending, simple, sparsely villous (crosswalls purple), distally minutely stipitate glandular. Leaves basal and cauline; cauline leaves gradually reduced, thin, abaxially sparsely villous to pilosulose, adaxially glabrate or sparsely pilosulose, margin entire or remotely serrate to serrulate, apex mucronate; basal leaves withered at anthesis, sometimes marcescent, long winged petiole (petiole to 10 cm); blade oblong to spatulate, 2–10 × 1–3.5 cm, base attenuate, apex acute or acuminate; lower to middle cauline leaves sessile, obovate to lanceolate, 3–9 × 1–2.8 cm, base cuneate to rounded, subclasping, apex acute to obtuse; upper cauline leaves 1.5–3 × 0.8–1.2 cm, apex acute. Capitula terminal, solitary, 7–8 cm in diam. Involucres hemispheric, 1.5–2.5 cm in diam.; phyllaries 2-seriate, equal, lanceolate to narrowly lanceolate, 15–20 mm, abaxially sparsely villous, densely minutely purple stipitate glandular, leaflike, margin long ciliate, apex long acuminate, often purplish; outer phyllaries 2–5 mm wide, proximally lanate and distally so on midvein, sometimes lanate more distally; inner phyllaries 2–3 mm wide. Ray florets 50–70, purplish blue, tube sparsely strigillose, lamina 30–40 × 1–1.5 mm, glabrous, eglandular; disk florets yellow, 7–9 mm, limb funnelform, 4–6 mm, sparsely strigillose proximally, lobes spreading, narrowly triangular, 1.8–2.3 mm, minutely stipitate glandular, tip purple. Achenes obovoid, compressed, 4–4.5 mm, glabrous or distally glabrate, moderately to densely minutely stipitate glandular, not winged, 2-ribbed. Pappus 3- or 4-seriate, reddish brown, bristles barbellate throughout; outermost bristles very few or none, slender, ca. 0.7 mm; outer bristles few, slender, 2–4 mm; inner bristles 5–5.5 mm, acute; innermost bristles ca. 6 mm, weakly clavate. Fl. Jul–Aug, fr. Aug–Nov.

• Alpine and subalpine meadows and screes, ledges of cliffs; 3300–4600 m. E Xizang, NW Yunnan.

104. *Aster platylepis* Y. L. Chen, Kew Bull. 39: 159. 1984.

阔苞紫菀 *kuo bao zi wan*

Doronicum latisquamatum C. E. C. Fischer, Bull. Misc. Inform. Kew 1937: 98. 1937, not *Aster latisquamatus* (Maximowicz) Handel-Mazzetti (1938).

Herbs, perennial, 20–30 cm tall. Stems erect, slender, brown or purplish, gray hairy. Leaves: basal withered at anthesis (not seen); cauline leaves oblong or somewhat obliquely ovate, 1.6–4.2 × 0.8–2.2 cm, membranous, abaxially pubescent, adaxially hispidulous, eglandular, base subcordate or rounded, clasping, margin ± sinuate-crenate, 5–7-veined from base, apex obtuse. Capitula terminal, solitary, 3.5–4 cm in diam. Involucres campanulate; phyllaries 2- or 3-seriate, abaxially hispidulous; outer phyllaries lanceolate to ovate-lanceolate, 13–19 × 5–7 mm, margin purplish, apex subacute, purplish; innermost phyllaries usually shorter, narrower. Ray florets ?30–60, 1–3-seriate, purplish, tube ca. 2 mm, lamina ca. 14 × 0.7 mm; disk florets yellow-brown, ca. 4.5 mm, lobes triangular, short, acute. Achenes narrowly oblong ?when mature, sparsely hairy, ?winged, 2-ribbed. Pappus longer than tube of disk florets. Fl. Aug.

Rocky soils; 3000–4000 m. S Xizang (Tsampo Lake) [India].

No specimens of *Aster platylepis* were seen by one of us (Brouillet).

105. *Aster brachytrichus* Franchet, J. Bot. (Morot) 10: 372. 1896.

短毛紫菀 *duan mao zi wan*

Aster bodinieri H. Léveillé.

Herbs, perennial, 10–50 cm tall, sometimes caespitose; rhizomes robust, woody. Stems erect, simple, densely pilose proximally and apically, sparsely to moderately so at midstem, moderately to densely minutely stipitate glandular, usually regularly leafy. Leaves basal and cauline; cauline leaves slightly and gradually reduced upward, sparsely to moderately pilose or glabrous, veins villous abaxially, margin sparsely shallowly serrate or serrulate, sometimes entire, pilose-ciliate, triplinerved abaxially, veins slightly prominent; basal leaves usually withered at anthesis, long petiole (petiole to 4 cm); blade spatulate to obovate or oblanceolate, 1–6 × 0.6–3.5 cm, base attenuate, apex rounded to obtuse; lower and middle cauline leaves sessile, ovate or ovate-lanceolate to oblong, 2–7 × 0.5–3 cm, base rounded or attenuate, subclasping, apex rounded to acute; upper leaves ovate to linear-lanceolate, 1–3.5 × 0.2–1.8 cm. Capitula terminal, solitary, 3–7.5 cm in diam. Involucres hemispheric, 1–2 cm in diam., overtopping disk florets; phyllaries 2- or 3-seriate, subequal, squarrose, 10–13 × 1–4 mm, sparsely pilose to glabrate, sometimes inner phyllaries sparsely minutely stipitate glandular distally, margin whitish, pilose-ciliate; outer phyllaries linear-lanceolate to oblong, leaflike, apex acute to obtuse; inner phyllaries linear-lanceolate to linear, apex long acuminate. Ray florets 30–60, blue to purplish, tube less than ca. 1 mm, lamina 15–35 × 1–3 mm, glabrous, eglandular; disk florets orange becoming reddish, 3.5–5 mm, limb funnelform becoming ± campanulate distally, 2.5–4 mm, glabrous, lobes spreading, narrowly triangular, 0.8–1.5 mm. Achenes obovoid, ± compressed, 2.5–4 mm, glabrous, sparsely minutely stipitate glandular apically, margin winged, 2-ribbed, plus sometimes 2- or 3-ribbed on each side. Pappus series reduced, indistinguishable, sometimes basally fused, purple brown to brown; bristles flattened, barbellate throughout, 1–4 mm, acute. Fl. Jun–Aug, fr. Aug–Oct.

Alpine meadows, mountain slopes, alpine coniferous forests, *Pinus* forests, thickets, pastures; 2500–4900 m. Guizhou, SW Sichuan, N and NW Yunnan [N Myanmar].

Aster brachytrichus is difficult to distinguish from *A. jeffreyanus*.

Leaf shape and vestiture and capitula size are variable within the species and have been used as the basis for the varieties recognized in the species. However, there seems to be a continuum in all the features used to partition the variation, and phenotypic plasticity could account for some of it. A thorough morphometric analysis would be needed to determine which varieties deserve recognition. The four varieties recognized are distinguished as follows.

Aster brachytrichus var. *tenuiligulatus* Y. Ling (Fl. Reipubl. Popularis Sin. 74: 360. 1985; 细舌短毛紫菀 *xi she duan mao zi wan*; 2600–3500 m. NW Guizhou, SW Sichuan) has oblong leaves densely hispidulous adaxially, with rounded apex, and smaller capitula (3–3.5 cm in diam.), with involucres ca. 1 cm in diam. and ray floret lamina ca. 15 × 1 mm. The other three varieties have leaves adaxially glabrous or sparsely hispidulous and larger capitula (4–7.5 cm in diam.), with involucres 1.5–2 cm in diam. and ray floret lamina 15–35 × 1–3 mm. *Aster brachytrichus* var. *angustisquamus* Y. Ling (Fl. Reipubl. Popularis Sin. 74: 360. 1985; 狭苞短毛紫菀 *xia bao duan mao zi wan*; ca. 2700 m;

NW Yunnan: Zhongdian) has linear phyllaries 1.5–2 mm wide, while *A. brachytrichus* var. *brachytrichus* and *A. brachytrichus* var. *latifolius* have linear-lanceolate phyllaries 2.3–4 mm wide. *Aster brachytrichus* var. *brachytrichus* (短毛紫菀(原变种) duan mao zi wan (yuan bian zhong); 2500–3500 m) has middle cauline leaves 2–6 × 0.5–2.5 cm, with a rounded or somewhat acute apex, but leaf shape is variable; plants with a remotely serrate leaf margin have sometimes been segregated as *A. brachytrichus* var. *oreaster* Onno. *Aster brachytrichus* var. *latifolius* Y. Ling (Fl. Reipubl. Popularis Sin. 74: 360. 1985; 宽叶短毛紫菀 kuan ye duan mao zi wan; ca. 3000 m; NW Yunnan: Lijiang, Yulong Shan) has middle cauline leaves 7–9 × 2.5–4.5 cm, with a rounded apex.

106. *Aster jeffreyanus* Diels, Notes Roy. Bot. Gard. Edinburgh 5: 185. 1912.

滇西北紫菀 dian xi bei zi wan

Herbs, perennial, 10–30 cm tall, sometimes caespitose; rhizomes robust, with rosettes. Stems erect, simple, sparsely to densely villous, eglandular. Leaves basal and cauline; cauline leaves gradually reduced distally, abaxially sparsely pilose, villous, veins villous, adaxially glabrate proximally to villous apically, eglandular, margin remotely serrulate or entire (upper leaves), villous-ciliate, 3-veined, veins prominent; basal leaves usually present at anthesis, shortly petiolate; blade obovate to oblanceolate, 1.6–4 × 1–1.3 cm, base abruptly attenuate to attenuate, apex obtuse or rounded; middle cauline leaves ± erect, sessile, oblong to linear-lanceolate, base subclasping; upper leaves linear-lanceolate, 1–3.5 × 0.1–0.6 cm, base clasping. Capitula terminal, solitary, 3.5–5 cm in diam. Involucres hemispheric, 0.5–0.8 cm in diam.; phyllaries 2- or 3-seriate, subequal, sometimes squarrose, ovate-lanceolate, 7–8.5 × 2.5–3 mm, leaflike, margin broadly scarios, remotely erose; outer phyllaries 2.5–3 mm wide, sparsely villous proximally, glabrous distally; inner phyllaries 1.5–2 mm wide, glabrate, margin ciliate, vein sparsely villous. Ray florets 30–50, blue to purple, lamina 15–20 × ca. 2 mm, glabrous, eglandular; disk florets 3.5–4 mm, limb funnelform, ca. 2.5 mm, glabrous, lobes spreading, narrowly triangular, ca. 1 mm. Achenes broadly obovoid, compressed, ca. 2 mm, glabrous, distally strigillose and minutely stipitate glandular, margin winged, wings strigillose-ciliate apically, 4-ribbed. Pappus 2- or 3-seriate, purplish brown, bristles few, barbellate; outermost bristles 0.2–0.5 mm; inner bristles 0.8–1.2 mm, acute; innermost bristles 1.2–1.4 mm, slightly clavate. Fl. Jun–Jul.

• Alpine or subalpine open slopes, meadows; 2800–3800 m. Guizhou, SW Sichuan (Muli), NW Yunnan (Lijiang, Zhongdian).

107. *Aster prainii* (J. R. Drummond) Y. L. Chen, Geol. Ecol. Stud. Qinghai-Xizang Plateau 2: 1314. 1981.

厚棉紫菀 hou mian zi wan

Chlamyditis prainii J. R. Drummond, Bull. Misc. Inform. Kew 1907: 91. 1907.

Herbs, perennial, 4–10 cm; rhizomes creeping or ascending, caudices stout, multibranching, sometimes with long, slender stolons bearing rosettes. Stems erect or ascending, simple, densely white lanate, sparsely minutely stipitate glandular, collar with marcescent leaf petioles. Leaves basal and cauline; cauline leaves abruptly reduced, densely white lanate, margin

entire; basal leaves present at anthesis, long petiolate (petiole to 2 cm); blade spatulate, 0.6–1.5 × 0.4–0.8 cm, base attenuate, midvein visible, inconspicuously 3-veined, apex rounded to obtuse; middle cauline leaves spatulate, 0.6–0.8 cm; upper cauline leaves linear, often surrounding involucre. Capitula terminal, solitary, ca. 4.5 cm in diam. Involucres broadly campanulate, 12–15 mm; phyllaries 3-seriate, oblong-lanceolate, densely lanate; outer phyllaries sometimes squarrose, 8–12 × 1.5–2 mm, multiveined, apex acuminate, tip purplish; inner phyllaries 10–12 × ca. 1.5 mm. Ray florets 38–40, deep blue, tube and lamina base hairy, eglandular, lamina 10–16 × ca. 2 mm; disk florets orange becoming purplish, 6.5–7 mm, limb funnelform, ca. 5 mm, sparsely villosulous, lobes erect, triangular, ca. 1 mm, lanate. Achenes (immature) narrowly obovoid, compressed, ca. 3 mm, densely strigillose, 4-ribbed. Pappus 4-seriate, straw-colored, sometimes apically reddish, bristles barbellate; outermost series of numerous, white scales 0.7–1 mm; outer bristles slender, 4–5 mm; inner bristles 6–7 mm, acute; innermost bristles 7–8 mm, weakly clavate. Fl. Aug–Sep.

Slopes above snowline, stony grounds; 4200–5400 m. Sichuan, S Xizang [Bhutan].

108. *Aster neolanuginosus* Brouillet, Semple & Y. L. Chen, **nom. nov.**

棉毛紫菀 mian mao zi wan

Replaced synonym: *Wardaster lanuginosus* J. Small, Trans. & Proc. Bot. Soc. Edinburgh 29: 230. 1926; *Aster lanuginosus* (J. Small) Y. Ling in Y. Ling & Y. L. Chen, Fl. Reipubl. Popularis Sin. 74: 234. 1985, not *Aster lanuginosus* H. L. Wendland in Bartling & H. L. Wendland, Beitr. Bot. 2: 9. 1825.

Herbs, perennial, subscapiform. Stems solitary or 2. Basal leaves crowded; cauline leaves few. Capitula terminal, solitary. Involucres broadly campanulate; phyllaries 3-seriate, unequal, ca. 10 mm, densely lanate. Ray florets 20–30, purple, lamina ca. 15 mm; disk florets yellow, limb campanulate, ca. 7 mm, without long hairs. Achenes compressed, 2.5–3 mm, hairy, 2-ribbed. Pappus brownish, numerous, unequal, of barbellate bristles.

• About 5000 m. SW Sichuan (Muli).

The anthers of *Aster neolanuginosus* are described as having an apiculate base.

Specimens were not seen by us; the description is from the protologue.

109. *Aster asteroides* (Candolle) Kuntze, Revis. Gen. Pl. 1: 315. 1891 [“*asterodes*”].

星舌紫菀 xing she zi wan

Heterochaeta asteroides Candolle, Prodr. 5: 282. 1836; *Aster hedinii* Ostenfeld; *A. heterochaeta* Benth. ex C. B. Clarke, nom. illeg. superfl.; *A. likiangensis* Franchet subsp. *hedinii* (Ostenfeld) Onno; *Erigeron heterochaeta* Botschantzev.

Herbs, perennial, 2–15(–30) cm tall; rhizomes short; roots tuberoid, near ground surface. Stems erect, solitary, scapiform, purplish or green below, base without marcescent leaf remains, basally densely to distally sparsely villous, densely minutely glandular pubescent. Leaves basal and cauline; cauline leaves abruptly reduced, villous, sparsely minutely stipitate

glandular, margin entire (basal leaves rarely serrulate), ciliate, 3–5-veined; basal leaves present at anthesis, shortly petiolate, ovate to oblong, 0.5–2 × 0.4–1.3 cm, base rounded to ± attenuate, apex obtuse to acute; middle cauline leaves sessile, oblong to lanceolate, apex obtuse to acuminate; upper leaves subsessile, linear to linear-lanceolate. Capitula terminal, solitary. Involucres hemispheric, 6–9 mm in diam.; phyllaries 2- or 3-seriate, subequal, oblanceolate-oblong to oblong-lanceolate, 5.5–7 × 1–1.5 mm, villous, densely minutely purplish stipitate glandular, more so distally, membranous, margin scarious, densely purplish villous-ciliate, multiveined, apex acuminate, leaflike, tip recurved, purplish. Ray florets 35–60, bluish purple to deep mauve, lamina linear-lanceolate, 10–15 × 1–2 mm; disk florets orange-yellow, 3–3.5 mm, limb funnelform, ca. 2.5 mm, base minutely purple stipitate glandular, lobes erect, triangular, 0.6–0.8 mm, abaxially sparsely hairy, minutely purple stipitate glandular. Achenes narrowly obovoid, ca. 2 mm, strigillose, eglandular, 3- or 4-ribbed. Pappus 2-seriate, straw-colored; outermost series of few broad scales 0.7–1 mm; inner series of few clavate, barbellate bristles ca. 3 mm. Fl. and fr. Jun–Aug.

Alpine thickets, damp grasslands, marshy areas; 3200–4600 m. Gansu, E Qinghai, W Sichuan, C and S Xizang, NW Yunnan [Bhutan, India (Sikkim), Kashmir, Nepal].

Aster asteroides somewhat resembles *A. flaccidus* but is easily distinguished from it by its tuberous roots and purplish glandular disk floret lobes.

110. *Aster likiangensis* Franchet, J. Bot. (Morot) 10: 370. 1896.

丽江紫菀 li jiang zi wan

Aster asteroides (Candolle) Kuntze subsp. *costei* (H. Léveillé) Grierson; *A. costei* H. Léveillé; *A. likiangensis* subsp. *costei* (H. Léveillé) Onno.

Herbs, perennial, 3–20 cm tall, scapiform, sometimes caespitose; rhizomes short, thick; roots tuberoid near ground surface. Stems erect, simple, usually ± purplish, villosulous to villous (crosswalls often purple), proximally sparsely to distally densely minutely purplish stipitate glandular. Leaves basal and cauline; cauline leaves abruptly reduced, sparsely to moderately villosulous, sparsely minutely purple stipitate glandular, margin entire or remotely serrate to serrulate, ciliate, often 3-veined; basal leaves present at anthesis, long (petiole to 4 cm) or shortly petiolate; blade ovate to oblong or oblanceolate, 0.5–3.5 × 0.2–2.2 cm, base attenuate, apex acute to obtuse; middle cauline leaves sessile, ovate or obovate to linear-lanceolate, 0.8–2 × 0.1–0.6 cm. Capitula terminal, solitary. Involucres hemispheric, 6–7 mm in diam.; phyllaries 2- or 3-seriate, subequal, oblong to lanceolate or linear-lanceolate, 8–12 × 1.5–3 mm, abaxially densely purple villous proximally to sparsely so distally, sparsely proximally to densely distally minutely purplish stipitate glandular, membranous, margin narrowly scarious, purple apically, purple villous-ciliate, purple minutely stipitate glandular, multiveined, apex acute to acuminate, tip twisted, purple. Ray florets 12–55, bluish to lavender-purple, lamina 11–21 × 1.5–3 mm, glabrous, eglandular; disk florets yellow, sometimes purplish brown distally, 4–5 mm, tube 1–1.5 mm, glabrate, limb funnelform, 3.5–4 mm, lobes erect, triangular, 0.5–1 mm, glabrous, sparsely minutely stipitate glandular. Achenes (imma-

ture) narrowly obovoid, ca. 3 mm, sparsely strigillose, eglandular, 2-ribbed. Pappus (immature) 2-seriate, straw-colored; outermost series of few broad scales ca. 1 mm; inner series of sometimes purplish, barbellate bristles 3.5–4 mm. Fl. and fr. Jun–Aug.

Alpine meadows, wet open slopes, valleys, mixed shrubs, marshy places; 3500–4500 m. SW Sichuan, SE Xizang, NW Yunnan [Bhutan].

Aster likiangensis is closely related to *A. asteroides* and has been regarded as a subspecies of it by Grierson (Notes Roy. Bot. Gard. Edinburgh 26: 67–163. 1964). It is distinguished by the purple disk floret lobes that are stipitate glandular.

111. *Aster flaccidus* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 2: 599. 1835.

萎软紫菀 wei ruan zi wan

Herbs, perennial, 3–30(–40) cm tall, often scapiform; rhizome long, slender, sometimes stoloniferous. Stems erect, simple, white (sometimes purple) villous, more densely so upward (sometimes also basally), sparsely to densely minutely stipitate glandular. Leaves basal and cauline; cauline leaves reduced upward, thin, sparsely to moderately villous, sometimes glabrate, sparsely to moderately minutely stipitate glandular, margin entire or remotely serrulate (basal), ciliate, finely 3-veined; basal leaves present, sometimes withered or absent at anthesis, short or long (petiole to 7 cm) petiolate; blade spatulate to oblong to oblanceolate, 1–9.5 × 0.5–1.6 cm, base attenuate, apex rounded or obtuse to acute; cauline leaves usually sessile, oblong or oblong-lanceolate, 1.5–9 × 0.2–1.5 cm, base attenuate to cuneate or ± rounded, usually subclasping; upper cauline leaves lanceolate to lanceolate-linear. Capitula terminal, solitary, 3.5–5(–7) cm in diam.; peduncles sparsely to densely villous, sometimes more densely so below capitula, sparsely to densely glandular. Involucres hemispheric, (1.2–)1.5–2(–3) cm in diam.; phyllaries 2-seriate, subequal, lanceolate, 7–13 × 1–2 mm, abaxially basally densely white lanate to sparsely white villous, usually less so upward, sparsely to densely minutely stipitate glandular, margin scarious, sometimes purple tinged, ciliate, membranous, multiveined, apex acuminate, tip sometimes spreading, often densely villous. Ray florets 31–67, blue or mauve, lavender-blue, rarely pink or pinkish white, lamina linear-lanceolate, 9–25 × 1–2.5 mm, abaxially proximally hairy (crosswalls purple) or glabrous, eglandular; disk florets orange to yellow, 4.5–7 mm, limb funnelform, 3.5–5 mm, proximally sparsely hairy, lobes erect, triangular, 0.7–1.5 mm. Achenes brownish, narrowly obovoid, compressed, 2.5–3.5 mm, sparsely strigillose, sparsely to moderately (apically) minutely stipitate glandular, rarely glabrous and eglandular, margin strigillose-ciliate, 2-ribbed, ribs pronounced. Pappus 4-seriate, whitish (sometimes purplish), bristles barbellate; outermost series of narrow scales 0.6–1.5 mm; outer bristles few, slender, 3.5–5 mm; inner bristles 6–6.5 mm, acute; innermost bristles 6.5–7.5 mm, weakly clavate. Fl. and fr. Jun–Nov. $2n = 54$.

Damp alpine grasslands, alpine and subalpine pastures, meadows, thickets, screes, fallow fields, forests; 1800–5100 m. S Gansu, N Hebei, E Qinghai, S Shaanxi, Shanxi, W Sichuan, Xinjiang, Xizang, NW Yunnan [Afghanistan, Bhutan, India, Kashmir, Kazakhstan, Mongolia, Nepal, Pakistan, Russia (E Siberia), Uzbekistan; SW Asia (Iran)].

Aster flaccidus is used medicinally to treat pulmonary abscesses, tuberculosis, and pertussis.

Three forms have been recognized in China: *Aster flaccidus* f. *flaccidus* with leaves ± villous, stem apex and involucre base more densely white villous and inconspicuously glandular, involucre 1.5–2(–3) cm in diam.; *A. flaccidus* f. *glabratus* Y. Ling (Fl. Reipubl. Popularis Sin. 74: 239. 1985; NE Xizang) with leaf surfaces glabrous or sparsely villous on abaxial veins only, margin ciliate or not, involucre 2–2.5 cm in diam., phyllaries to 12 mm, abaxially or on veins villous, eglandular; and *A. flaccidus* f. *griseobarbatus* Grierson (Notes Roy. Bot. Gard. Edinburgh 26: 131. 1964; 3200–4900 m; S and E Xizang, NW Yunnan [Bhutan, NE India]) with upper stems and involucre purplish brown or gray-brown hairy.

- 1a. Stems 3–15(–40) cm, sparsely glandular; leaf surfaces sparsely to densely villous or at least veins villous; involucre 1.5–2(–3) cm in diam.; outer phyllary base densely lanate or villous, abaxially sparsely glandular 111a. subsp. *flaccidus*
- 1b. Stems 3–15 cm, densely glandular upward; leaf surfaces glabrate or abaxial veins sparsely villous; involucre 1.2–1.8 cm in diam.; outer phyllary base sparsely villous, abaxially densely glandular 111b. subsp. *glandulosus*

111a. *Aster flaccidus* subsp. *flaccidus*

萎软紫菀(原亚种) wei ruan zi wan (yuan ya zhong)

Aster flaccidus subsp. *fructuglandulosus* (Ostenfeld) Onno; *A. flaccidus* var. *fructuglandulosus* Ostenfeld; *A. flaccidus* f. *stolonifer* Onno; *A. glarearum* W. W. Smith & Farrer; *A. kansuensis* Farrer; *A. tibeticus* J. D. Hooker; *Erigeron flaccidus* (Bunge) Botschantzev.

Stems 3–15(–40) cm, sparsely glandular. Leaf surfaces sparsely to densely villous or at least veins villous. Involucre 1.5–2(–3) cm in diam.; outer phyllary base densely lanate or villous, abaxially sparsely glandular.

Alpine and subalpine pastures, thickets, screes; 1800–5100 m. S Gansu, N Hebei, E Qinghai, S Shaanxi, Shanxi, W Sichuan, NW Xinjiang, Xizang, NW Yunnan [Bhutan, NW India, Kashmir, Kazakhstan, Mongolia, Nepal, Pakistan, Russia (E Siberia), Uzbekistan; SW Asia (Iran)].

111b. *Aster flaccidus* subsp. *glandulosus* (Keissler) Onno, Biblioth. Bot. 26(Heft 106): 66. 1932.

腺毛萎软紫菀 xian mao wei ruan zi wan

Aster flaccidus var. *glandulosus* Keissler, Ann. K. K. Naturhist. Hofmus. 22: 26. 1907; *A. glandulosus* (Keissler) Handel-Mazzetti (1930), not Labillardière (1806).

Stems 3–15 cm, densely glandular upward. Leaf surfaces glabrate or abaxial veins sparsely villous. Involucre 1.2–1.8(–2) cm in diam.; outer phyllary base sparsely villous, abaxially densely glandular.

Damp alpine grasslands; 4000–5000 m. S Xinjiang, S Xizang [NW India, Kashmir].

112. *Aster hololachnus* Y. Ling ex Y. L. Chen, S. Yun Liang & K. Y. Pan, Acta Phytotax. Sin. 19: 88. 1981.

全茸紫菀 quan rong zi wan

Herbs, perennial, 4–6 cm tall, caespitose; rhizomes procumbent or ascending, branched, collar clad with marcescent leaf remains. Stems erect, slender, densely white hirsute or villous. Leaves: basal leaves narrowly winged petiolate, base attenuate, apex rounded; middle cauline leaves few, spreading or erect, oblong-lanceolate, 1.7–2.2 × 0.4–0.6 cm, base sub-clasping, apex somewhat acute; upper leaves linear-lanceolate, acuminate, gray-white thickly tomentose, triplinerved, veins abaxially somewhat prominent. Capitula solitary, ca. 2.5 cm in diam. Involucre hemispheric, ca. 1.5 cm in diam., thickly gray-white tomentose; phyllaries 2- or 3-seriate, linear-lanceolate, ca. 8 mm, herbaceous, acuminate; outer phyllaries ca. 1 mm wide; inner phyllaries narrower to ca. 0.5 mm wide, with narrowly membranous margin, hairy above. Ray florets ca. 50, lamina (not open) linear-lanceolate, ca. 10 × 1 mm; disk florets yellow, ca. 6 mm, tube ca. 1 mm, puberulent, lobes glandular. Ovary oblong, sparsely pubescent or subglabrous. Pappus 2-seriate, white; outer bristles very short, paleaceous; inner bristles ca. as long as disk corolla.

- Glacier areas; 5300–5400 m. S Xizang (Tingri).

Aster hololachnus is closely related to *A. flaccidus*, from which it differs mainly in having densely gray-white tomentose leaves and narrower phyllaries and ray florets.

113. *Aster tsarungensis* (Grierson) Y. Ling, Fl. Reipubl. Popularis Sin. 74: 241. 1985.

察瓦龙紫菀 cha wa long zi wan

Aster flaccidus Bunge subsp. *tsarungensis* Grierson, Notes Roy. Bot. Gard. Edinburgh 26: 133. 1964.

Herbs, perennial, 6–45 cm tall, sometimes caespitose; rhizomes long, slender. Stems erect, simple, striate, purplish brown, moderately to densely villous, moderately to densely minutely purple stipitate glandular, sparsely leafy. Leaves basal and cauline; cauline leaves gradually reduced upward, thin, villous, sparsely stipitate glandular, margin remotely serrulate, villous-ciliate, prominently 3-veined, apex acute, tip blunt; basal leaves present at anthesis, long winged petiolate (petiole to 2.5 cm); blade spatulate to ovate or lanceolate, 0.5–5 × 0.2–1.8 cm, base attenuate; lower and middle cauline leaves broadly winged petiolate or sessile, lanceolate, 2.5–9.5 × 0.5–2.3 cm, base attenuate, sometimes subclasping (upward); upper cauline leaves (when present) sessile, linear. Capitula terminal, solitary, 4–6 cm in diam. Involucre broadly hemispheric, 2–3 cm in diam.; phyllaries 2-seriate, subequal, squarrose or spreading, oblong-lanceolate to lanceolate, 6–10 × 1.5–2.5 mm, densely villous (inner phyllaries sparsely so), distally minutely stipitate glandular, membranous, margin scarios, ciliate distally, multi-veined, apex shortly acuminate, purple. Ray florets 2-seriate, 60–85, bluish purple, tube and basal lamina sparsely hairy, eglandular, lamina linear-lanceolate, 13–15(–20) × 1.6–1.8 mm; disk florets yellow or purplish tinged, 4.5–5.5 mm, limb funnel-form, 3–4 mm, lobes erect, triangular, 0.5–0.6 mm. Pappus 4-

seriate, dirty white; outermost series of white, broad scales 0.6–0.8 mm; bristles barbellate; outer bristles few, slender, 3.1–4.5 mm; inner bristles few, 5–6.5 mm, acute; innermost bristles 6–6.5 mm, weakly clavate. Fl. and fr. Jun–Oct.

• Alpine and subalpine meadows, valley slopes, *Rhododendron* thickets, limestone scree slopes; 2600–4800 m. W Sichuan, SE Xizang, NW Yunnan.

Aster tsarungensis is closely related to and usually regarded as a subspecies of *A. flaccidus*. However, its densely purplish brown glandular, villous stems and yellow disk florets distinguish it from that species.

114. *Aster diplostephioides* (Candolle) Benth. ex C. B. Clarke, Compos. Ind. 45. 1876.

重冠紫菀 chong guan zi wan

Heterochaeta diplostephioides Candolle, Prodr. 5: 282. 1836; *Aster delavayi* Franchet; *A. diplostephioides* var. *delavayi* (Franchet) Onno; *A. vilmorinii* Franchet, p.p.; *Erigeron delavayi* (Franchet) Botschantzev; *E. diplostephioides* (Candolle) Botschantzev.

Herbs, perennial, 13–57 cm tall, often caespitose; rhizomes robust, branched; roots long, thick, collar clad with marcescent basal leaf bases. Stems erect, simple, sparsely to moderately villous, sparsely to densely minutely stipitate glandular, leafy or sometimes scapiform. Leaves basal and cauline; cauline leaves gradually reduced, thin, sparsely to moderately villous, sparsely to moderately minutely stipitate glandular, margin remotely serrate to serrulate or entire, villous-ciliate, midvein prominent; basal leaves withered at anthesis; basal and lower cauline leaves long (petiole to 10 cm) or narrowly winged petiolate; blade oblong to oblanceolate, 1.3–15 × 0.8–2.3(–4) cm, base attenuate, apex acute to obtuse or rounded, sometimes mucronate; middle cauline leaves oblong to linear-lanceolate, base auriculate, subclasping; upper cauline leaves 1.4–8.5 × 0.2–1.3 cm. Capitula terminal, solitary, 6–9 cm in diam. Involucres hemispheric, 2–2.5 cm in diam.; phyllaries 2- or 3-seriate, linear-lanceolate, 9–16 × 1–1.5 mm, longer than disk, abaxially sparsely or sometimes moderately villous along veins, densely or sometimes sparsely, dark colored, and minutely stipitate glandular, membranous, margin narrowly scarious, ciliate, multiveined, apex acuminate, spreading. Ray florets 2-seriate, 45–93, mauve to purple or lilac-blue, lamina linear, 18–25 × 1–2 mm, glabrous, eglandular; disk florets 5–6 mm, orange to yellow, apex blackish or brownish purple externally, tube and proximal limb hairy, limb narrowly funnelform, 3.5–4 mm, lobes erect, triangular, ca. 1 mm. Achenes narrowly obovoid, 3–4 × 1–1.5 mm, sparsely strigillose, minutely stipitate glandular, more densely so distally, 4–6-ribbed. Pappus 3-seriate, white; outermost series of few white becoming straw-colored, broad scales 0.8–1.2 mm; bristles barbellate; inner bristles 3.5–6 mm, acute; innermost bristles 4–7 mm, weakly clavate. Fl. Jul–Sep, fr. Sep–Dec. $2n = 18$.

Alpine and subalpine grasslands, rich or wet alpine meadows, scrub, boggy areas, stream banks, floodplains, seepage areas in coniferous or mixed forests; 2700–4600 m. W Gansu, E Qinghai, SW and W Sichuan, S Xizang, NW Yunnan [Bhutan, India, Kashmir, Nepal, N Pakistan].

115. *Aster yunnanensis* Franchet, J. Bot. (Morot) 10: 375. 1896.

云南紫菀 yun nan zi wan

Herbs, perennial, 30–75 cm tall, often caespitose; rhizomes robust, branched; roots long, thick, collar clad with marcescent leaf bases. Stems erect, simple or branched, sparsely to sometimes moderately villous, moderately to densely minutely stipitate glandular, leafy. Leaves basal and cauline; cauline leaves gradually reduced, abaxially sparsely villous or glabrous, moderately to densely minutely stipitate glandular, adaxially sparsely villosulous or sometimes villous, moderately to densely minutely stipitate glandular, margin entire or serrate to serrulate, sparsely to moderately villosulous-ciliate, densely minutely stipitate glandular, midvein abaxially prominent, veins conspicuous; basal leaves withered at anthesis; basal and lower cauline leaves ± broadly winged petiolate (petiole to 6 cm) or lower leaves sessile; blade ovate to oblanceolate, (5–)7–18 × 1–4 cm, base attenuate, apex acute to obtuse; middle cauline leaves sessile, lanceolate or oblong to oblanceolate, 5–16 × 0.8–6 cm, base rounded or cordate to auriculate, semiamplexicaul, apex acute, sometimes obtuse. Capitula terminal, solitary or 2–9 in lax corymbiform synflorescences, 4–8.5 cm in diam.; peduncles 4–16 cm, sparsely to moderately villous, densely minutely stipitate glandular. Involucres hemispheric, 1.5–2.5 cm in diam.; phyllaries 3-seriate, subequal, ovate-lanceolate to linear-lanceolate, 10–16 × 0.8–4(–5) mm, densely white villous basally and glabrate above or sparsely villous distally, or sparsely villous along veins, or glabrate, moderately to densely minutely purple stipitate glandular, membranous, margin narrowly scarious, erose, purple, distally ciliate, multiveined, apex acute to acuminate, purple-tipped. Ray florets 65–125, pale purple to purple-blue, tube apex and lamina base minutely stipitate glandular, tube 1.6–2 mm, lamina linear, 20–30 × 1–2.5 mm, glabrous; disk florets yellow to orange, 5–5.6 mm, tube 1.8–2 mm, tube apex and base of limb minutely stipitate glandular, limb narrowly funnelform, ca. 3.5 mm, lobes erect, triangular, 1–1.2 mm. Achenes (immature) narrowly obovoid, compressed, 3–4 mm, sparsely strigillose, sparsely minutely stipitate glandular distally, 4-ribbed. Pappus 3-seriate; outermost series of broad scales 1–1.2 mm, white or straw-colored; bristles barbellate; inner bristles acute; innermost bristles ca. 6.5 mm, weakly clavate. Fl. Jul–Sep, fr. Sep–Oct.

• Alpine and subalpine grasslands or meadows, forest margins, slopes, seepage areas, cutover mixed forests, scrub, pastures; 2300–4500 m. Gansu, Qinghai, Sichuan, E and S Xizang, Yunnan.

Aster yunnanensis is closely related to *A. diplostephioides* but differs in having usually branched stems, usually broader phyllaries (rarely somewhat narrow), and disk florets apically yellow, not purple. Based on variations in width and indumentum of the phyllaries, this species can be divided into the following varieties. Grierson (Notes Roy. Bot. Gard. Edinburgh 26: 67–163. 1964) did not segregate *A. yunnanensis* var. *angustior* and *A. yunnanensis* var. *labrangensis*.

- 1a. Phyllaries ovate-lanceolate, 3–4(–5) mm wide, often pubescent in lower part only; ray floret lamina 1.5–2.5 mm wide 115a. var. *yunnanensis*

- 1b. Phyllaries linear-lanceolate, 0.8–2 mm wide, abaxially densely villous at least at base; ray floret lamina 1–2 mm wide.
- 2a. Leaves abaxially villous on veins, margin villous; phyllaries abaxially densely villous at base or throughout 115b. var. *angustior*
- 2b. Leaves densely yellow villous with glandular hairs, margin villous; phyllaries villous 115c. var. *labrangensis*

115a. *Aster yunnanensis* var. *yunnanensis*

云南紫菀(原变种) yun nan zi wan (yuan bian zhong)

Aster diplostephioides (Candolle) C. B. Clarke var. *yunnanensis* (Franchet) Onno.

Stems 2–8-branched, rarely simple. Leaves: margin entire or serrulate, villous, lower cauline leaves 17–18 × 2–4 cm, middle leaves abaxially villous on veins, adaxially sparsely villosulous, and glandular, base rounded or auriculate. Capitula 5–8.5 cm in diam. Involucres 2–2.5 cm in diam.; phyllaries ovate-lanceolate, 3–4(–5) mm wide, densely villous basally, sparsely villous and purplish glandular above. Ray floret lamina 25–35 × 1.5–2.5 mm.

• Alpine and subalpine grasslands; 2500–4500 m. SW and W Sichuan, NW Yunnan.

115b. *Aster yunnanensis* var. *angustior* Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 622. 1937.

狭苞云南紫菀 xia bao yun nan zi wan

Aster vilmorinii Franchet; *Erigeron vilmorinii* (Franchet) Botschantzev.

Stems 2- or 3-branched or simple. Leaves: margin sparsely serrate or subentire, villous, lower cauline leaves 7–15 × 1–2.5 cm, middle leaves somewhat narrow or broader, abaxially villous at least at base, veins villous, adaxially sparsely villosulous, glandular, base rounded or cordate. Capitula 4–6 cm in diam. Involucres 1.5–2 cm in diam.; phyllaries linear-lanceolate, 0.8–1.5 mm wide, abaxially densely villous at base or throughout, glandular. Ray floret lamina 20–25 × 1–2 mm.

• Alpine and subalpine forest margins and open grasslands; 2300–4100 m. SW and W Sichuan, NW Yunnan.

115c. *Aster yunnanensis* var. *labrangensis* (Handel-Mazzetti) Y. Ling, Fl. Reipubl. Popularis Sin. 74: 246. 1985.

夏河云南紫菀 xia he yun nan zi wan

Aster labrangensis Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 621. 1937; *A. kawaguchii* Kitamura.

Stems 2–5 branched. Leaf margin serrulate or entire, villous, lower and middle cauline leaves 5–10 × 1.5–2.8 cm, densely villous, glandular, base truncate or cordate. Capitula 4–6 cm in diam. Involucre 1.5–2 cm in diam.; phyllaries linear-lanceolate, 10–13 × 1–2 mm, villous, glandular. Ray floret lamina 20–25 × 1–1.5 mm. $2n = 18^*$.

• Alpine and subalpine open slopes and grasslands; 3600–4300 m. S Gansu, E and S Qinghai, W Sichuan, E and S Xizang.

116. *Aster setchuenensis* Franchet, J. Bot. (Morot) 10: 377. 1896.

四川紫菀 si chuan zi wan

Herbs, perennial, 20–50 cm tall, sometimes caespitose; rhizomes slender. Stems erect, simple, striate, glabrate, densely minutely reddish stipitate glandular, leafy. Leaves basal and cauline; cauline leaves reduced upward, thin, abaxially pale green, glabrous, eglandular, adaxially scabrous distally, margin sparsely serrulate, scabrous-ciliate, midvein prominent, apex acuminate, tip rounded; basal leaves withered or present at anthesis, sessile or shortly petiolate, oblanceolate, 3–14.5 × 0.4–1.5 cm; middle cauline leaves sessile, lanceolate, 2.5–6 × 0.4–0.9 cm, base rounded-auriculate, subclasping; upper leaves linear, acute. Capitula terminal, 4–6 in lax corymbiform synflorescence, 2–4 cm in diam.; peduncles 1.5–13 cm; bracts linear, densely minutely stipitate glandular. Involucres 8–9 mm; phyllaries 3-seriate, subequal, membranous, apex acute to acuminate, reddish purple; outer phyllaries lanceolate, ca. 6 × 1.5–2 mm, abaxially densely minutely stipitate glandular; inner phyllaries linear-lanceolate, ca. 7 × 0.9 mm, minutely stipitate glandular distally, margin scarios, erose, purplish distally, ciliate distally. Ray florets 25–40, bluish mauve to purple, tube distally hairy and minutely stipitate glandular, lamina 10–12 × ca. 1.5 mm; disk florets yellow, ca. 6 mm, tube ca. 2 mm, limb funnel-form, 4–4.5 mm, proximally hairy, lobes erect, triangular, 0.7–0.8 mm. Achenes narrowly obovoid, 3–4 mm, sparsely to moderately strigillose, minutely stipitate glandular distally, margin 6-ribbed. Pappus 4-seriate, white; outermost series of scales linear, 0.7–1 mm; bristles barbellate; outer bristles few, slender, 2–2.5 mm; inner bristles 5–5.5 mm, acute; innermost bristles 5.7–6 mm, weakly clavate. Fl. Aug–Sep.

• Mountain forests or streamsides, disturbed damp shrublands; 3100–3500 m. NC Sichuan (Barkam, Lixian).

Aster setchuenensis is distinguished by its scabrous leaves and capitula in lax corymbiform synflorescences.

117. *Aster lipskii* Komarov, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 2: 8. 1921.

青海紫菀 qing hai zi wan

Herbs, perennial, ca. 50 cm tall, rhizomes robust. Stems erect, sparsely short villous. Leaves: basal and lower cauline leaves long petiolate, lanceolate, shortly villous, abaxial midvein densely villous, base attenuate, margin entire, shortly villous-ciliate; upper cauline leaves sessile, base clasping; uppermost leaves small, linear-lanceolate. Capitula terminal, solitary, 5–6 cm in diam. Involucres not visible; phyllaries subequal, (not fully visible) to 1.5 mm wide, abaxially brown stipitate glandular, margin of inner phyllaries scarios, ciliate, apex long acuminate. Ray florets dark purple, ca. 25 mm, tube ca. 2 mm, lamina linear, 10–15 mm; disk florets yellow, ca. 4.4 mm, tube ca. 1.1 mm, upper tube and limb base hairy, lobes lanceolate, ca. 0.7 mm. Achenes (immature) oblanceolate, compressed, 2-ribbed, strigose. Pappus (immature) whitish, 3-seriate; outermost series of scales 0.5–0.7 mm; inner series of bristles 4.1–4.7 mm, acute; innermost bristles ca. 6 mm, ± clavate. Fl. Jul.

• About 3800 m. E Qinghai (near Qinghai Hu).

The type of *Aster lipskii* has not been seen. The original description was based on seeds collected from near Qinghai Hu and cultivated at the Komarov Botanical Gardens. This species differs from *A. diplostephioides* in its narrower phyllaries (to 1.5 mm).

118. *Aster farreri* W. W. Smith & Jeffrey, Notes Roy. Bot. Gard. Edinburgh 9: 78. 1916.

狭苞紫菀 xia bao zi wan

Aster diplostephioides (Candolle) C. B. Clarke subsp. *farreri* (W. W. Smith & Jeffrey) Onno; *A. nigrotinctus* Y. Ling; *A. vilmorinii* Franchet var. *nigrotinctus* (Y. Ling) Y. Ling; *Erigeron farreri* (W. W. Smith & Jeffrey) Botschantzev.

Herbs, perennial, 30–60 cm tall, sometimes caespitose; rhizome long, slender, sometimes adjacent rosettes present, sometimes collar clad in basal marcescent leaves. Stems erect, simple, sparsely to moderately villous, sparsely minutely stipitate glandular, densely so upward, leafy. Leaves basal and cauline, sparsely villous, eglandular, margin entire or sparsely serrulate, villous-ciliate, midvein abaxially prominent; basal leaves absent at anthesis; basal and lower cauline leaves long petiolate (petiole to 7 cm); blade oblanceolate to narrowly oblanceolate, 1.5–16(–22) × 0.7–2.3 cm, base attenuate, apex acute; middle cauline leaves linear-lanceolate, 7–13 × 0.7–2 cm, base rounded, subclasping to clasping, apex acuminate; upper leaves linear, ca. 2 × 0.1 cm, apex acute. Capitula terminal, solitary, 5–8 cm in diam. Involucres hemispheric, 2–2.4 cm in diam.; phyllaries 3-seriate, subequal, linear-lanceolate, 10–16 × 1–1.5 mm, often surpassing disk florets, membranous, margin narrowly scarious, erose, ciliate, multiveined, apex acuminate, spreading; outer phyllaries abaxially villous, eglandular; innermost phyllaries colorless, glabrate, tip villous. Ray florets 75–121, purplish blue or lilac, tube distally sparsely minutely stipitate glandular, lamina 17–30 × 1–1.2 mm; disk florets yellow, 6.5–7 mm, tube and proximal limb minutely stipitate glandular, limb narrowly funnelliform, ca. 5 mm, sometimes sparsely hairy proximally, lobes erect, triangular, 0.7–1 mm. Achenes narrowly obovoid, 3–4 mm, sparsely to moderately strigillose, eglandular, 4-ribbed. Pappus 4-seriate; outermost series of few white scales 0.3–1 mm; bristles dirty white, barbellate; outer bristles slender, 2–4 mm; inner bristles 5–5.5 mm, acute; innermost bristles 6–8 mm, weakly clavate. Fl. Jul–Aug, fr. Aug–Sep.

• Subalpine grasslands or meadows, open slopes, open *Picea* woodlands, forest margins, *Rhododendron* and shrub thickets, roadsides; 1300–4100 m. SE Gansu, N Hebei, E Qinghai, Shanxi, W Sichuan.

Aster farreri is distinguished from *A. diplostephioides* by its narrow, eglandular phyllaries, often overtopping the disk florets, and very narrow leaves.

119. *Aster brevis* Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 625. 1937.

短茎紫菀 duan jing zi wan

Aster flaccidus Bunge f. *tunicatus* Onno.

Herbs, perennial, 5–12 cm, subcaespitose; rhizome thick, clad in hard, fibrous marcescent leaf remains; roots simple. Stems strigose, with densely long-stipitate glandular leaves.

Leaves 4–7, ± equidistant, margin revolute, scabrous; basal leaves long petiolate, petiole base clasping; blade spatulate-lanceolate, 1–4 × 0.5–1 cm, thick, glabrous, base attenuate, margin serrulate, apex acute to rounded; cauline leaves sessile, oblong, 1.2–2 cm, abaxially ± hairy, midvein scabrous, adaxially glabrous, base clasping, apex obtuse (lower cauline leaves sometimes glabrous). Capitula terminal, solitary, 3.5–4 cm in diam. Involucres hemispheric, up to 1 cm; phyllaries equal, leaflike, lanceolate, ca. 2 mm wide, strigose, eglandular, apex acuminate, purplish tinged. Ray florets dark blue, tube ca. 2.3 mm, hairy, lamina linear, 10–12 × 1–1.2 mm; disk florets orange-yellow, ca. 5.3 mm, tube ca. 1.5 mm, tube and limb hairy, limb cylindrical-funnelform, lobes narrowly triangular, ca. 0.9 mm, glabrous, somewhat purplish when dry. Achenes (immature) compressed, sparsely strigose, 2-ribbed. Pappus (immature) 3-seriate, yellowish; outer series of scales ca. 0.6 mm; bristles rigid, barbellate; inner series of bristles ca. 5 mm, acute; innermost bristles ca. 5.6 mm, slightly clavate. Fl. Jul.

• Alpine slopes; ca. 3900 m. NW Yunnan (Zhongdian).

According to Onno, *Aster brevis* is distinguished from *A. flaccidus* by its stout rhizomes and roots.

No specimens were seen by us.

120. *Aster bipinnatisectus* Ludlow ex Grierson, Notes Roy. Bot. Gard. Edinburgh 26: 144. 1964.

重羽紫菀 chong yu zi wan

Herbs, perennial, 2–8 cm tall, sometimes caespitose; rootstock woody, collar densely clad by marcescent leaf remains. Stems 2 or 3 or many, pilose. Leaves white villous; basal leaves dense, rosulate, petiolate, petiole 1–2 cm, base clasping; blade 1–2 cm, bipinnatisect; lobes 3–5 pairs, 5–7 mm, each with 3–8 pairs of secondary segments, 1–3 cm; cauline leaves 3 or 4, similar to but smaller than basal leaves, pinnatisect. Involucres 2.5–3.5 cm in diam.; phyllaries unequal, purplish at tips, villous; outer phyllaries 6–7 × ca. 0.75 mm; inner phyllaries 9–10 × 0.8–1 mm. Ray florets 20–35, pale mauve, tube 2.5–3 mm, lamina 1.3–1.5 × ca. 0.2 cm; disk florets yellow, 5.5–6 mm, tube ca. 1.6 mm, lobes ca. 1 mm. Achenes ca. 1.5 × 0.5 mm. Pappus: outer bristles ca. 1 mm; inner bristles slender. Fl. Jul.

• Rock faces; ca. 3200 m. SE Xizang (Xoka).

Specimens of *Aster bipinnatisectus* were not seen by us; the description is based on the protologue by Grierson.

This species is distinguished from all other species of the genus by its bipinnatisect, villous leaves. Rosettes at the base of woody stems are also a distinguishing character.

121. *Aster senecioides* Franchet, J. Bot. (Morot) 10: 381. 1896.

狗舌草紫菀 gou she cao zi wan

Aster senecioides var. *latisquamus* Y. Ling.

Herbs, perennial, 16–50 cm tall; rhizomes robust. Stems erect, often single, slender to robust, densely hirsute-villous, densely strigillose below capitula. Leaves: both surfaces densely strigose, abaxial veins densely strigose-villous, thick, midvein slightly prominent, lateral veins 4–6 pairs; basal and lower cauline leaves similar, present at anthesis; basal leaves long winged

petiolate; lower cauline leaves shortly winged petiolate; blade elliptic or oblong-spatulate, 4–18 × 1.4–4 cm, base attenuate, margin coarsely serrate, apex obtuse or rounded; middle and upper cauline leaves sessile, oblong or lanceolate, 2–6 × 0.3–2 cm, base attenuate or rounded-subclasping, margin sparsely serrate or entire, apex acute to rounded. Capitula 2–6(–8) in corymbiform synflorescences, 2–3 cm in diam.; peduncles 1.5–7 cm; bracts linear to linear-lanceolate. Involucres hemispheric, 1–1.2 × 1–1.5 cm; phyllaries 3-seriate, linear to obovate-oblong, apex obtuse or acute to acuminate; outer phyllaries 7–10 mm, margin broadly scarious, sparsely strigose-villosus; inner phyllaries 10–11 × 2–3.5 mm, glabrous or strigose-villosus on midvein and at tip, margin scarious, erose or not. Ray florets 16–20, purplish, tube 2–3.7 mm, hairy, lamina 12–14 × 2–4 mm; disk florets yellow-green, 5–6 mm, tube 1.2–2.5 mm, sparsely hairy, limb funnelform, lobes ovate, ca. 1 mm. Achenes oblanceolate, ± compressed, 3–3.5 × ca. 1 mm, strigose, 5-ribbed. Pappus yellowish, 3-seriate, stout, outer bristles ca. 1.2 mm; inner bristles ca. 4.2 mm, acute; innermost bristles ca. 5.5 mm, clavate. Fl. Aug–Sep, fr. Sep–Oct.

• Alpine valleys, coniferous forests, rocky slopes; 2000–3000 m. SW Sichuan, N and NW Yunnan.

Two varieties of *Aster senecioides* have been recognized. However, upon examination of specimens, the width of the scarious phyllary margin is identical, and phyllary width and ray floret lamina width overlap significantly. Varieties would need a morphometric study before they can be accepted.

122. *Aster batangensis* Bureau & Franchet, J. Bot. (Morot) 5: 50. 1891.

巴塘紫菀 *ba tang zi wan*

Herbs, perennial, 3–15 cm tall, caespitose; rhizome pro-cumbent, caudex thick, branched, woody; taproot thick, woody. Stems ascending, sometimes erect, simple, slender, reddish brown striate, villosulous, sometimes sparsely so, sparsely to densely (distally) minutely stipitate glandular, scapiform. Leaves basal and cauline, both surfaces sparsely strigillose or glabrous or sometimes distally sparsely to moderately strigillose and veins sparsely to densely strigillose, margin entire, strigillose-ciliate, midvein prominent abaxially; basal leaves present at anthesis, marcescent, long winged petiolate (petiole to 2 cm); blade obovate to oblanceolate, 0.2–6 × 0.1–0.9 cm, base attenuate, apex rounded or retuse to obtuse, largest mucronulate; cauline leaves subpetiolate or sessile, narrowly oblong-oblanceolate to narrowly lanceolate, 0.9–3.5 × 0.2–0.4(–0.7) cm, abruptly reduced and gradually smaller distally, base cuneate to rounded, apex obtuse to acuminate, mucronulate. Capitula terminal, solitary, 3–4.5 cm in diam. Involucres broadly campanulate, 0.5–1(–1.5) cm in diam.; phyllaries 3-seriate, subequal, spreading to squarrose, lanceolate to linear-lanceolate (some inner phyllaries), 6–12 × 0.5–2 mm, abaxially strigillose, basally more so, or glabrous, minutely stipitate glandular, membranous, margin narrowly to broadly scarious, erose, eciliate, sometimes purplish, few veined, midvein prominent, apex acute to acuminate, tip sometimes purplish. Ray florets 12–26, purple to lavender or lavender-blue, tube ca. 3 mm, lamina 12–22 × 1–2.5 mm, glabrous, eglandular; disk florets yellow to yellow-

orange, 4.6–5 mm, tube ca. 1.5 mm, limb narrowly funnelform, 3.2–3.5 mm, base sparsely hairy, lobes spreading, triangular, ca. 1 mm, eglandular. Achenes narrowly obovoid, ± compressed, 3.5–4 mm, strigillose, eglandular, margin 3-ribbed. Pappus 4-seriate, white; outermost series of few white scales 0.5–1 mm; bristles barbellate; outer bristles few, slender, 2–3 mm; inner bristles 4–4.5 mm, acute; innermost bristles faintly reddish, 5–5.5 mm, weakly clavate. Fl. May–Sep, fr. Sep–Oct.

• Forest and thicket margins, open grasslands, meadows, pastures, open slopes, stony or scree slopes, cliff faces, stream banks; 2500–4600 m. SW and W Sichuan, E Xizang, NW Yunnan.

- 1a. Leaves sparsely strigillose; phyllaries strigillose, minutely stipitate glandular; stems villosulous 122a. var. *batangensis*
- 1b. Leaves glabrous or sometimes distally strigillose, veins strigillose; phyllaries glabrous, minutely stipitate glandular; stems sparsely villosulous 122b. var. *staticifolius*

122a. *Aster batangensis* var. *batangensis*

巴塘紫菀(原变种) *ba tang zi wan* (*yuan bian zhong*)

Stems villosulous. Leaves sparsely strigillose. Phyllaries strigillose, basally more so, minutely stipitate glandular.

• Forest and thicket margins, open grasslands, meadows, pastures, stony or scree slopes, cliff faces, stream banks; 3400–4600 m. SW and W Sichuan, E Xizang, NW Yunnan.

122b. *Aster batangensis* var. *staticifolius* (Franchet) Y. Ling, Fl. Reipubl. Popularis Sin. 74: 253. 1985 [*“staticifolius”*].

匙叶巴塘紫菀 *shi ye ba tang zi wan*

Aster staticifolius Franchet, J. Bot. (Morot) 10: 370. 1896.

Stems sparsely villosulous. Leaves glabrous or sometimes distally strigillose, veins strigillose. Phyllaries glabrous, minutely stipitate glandular.

• Open slopes, gravelly cliffs, forest margins, pastures; 2500–4000 m. SW Sichuan, NW Yunnan (Lijiang).

123. *Aster rockianus* Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 613. 1937.

腾越紫菀 *teng yue zi wan*

Herbs, perennial, ca. 45 cm tall; rhizomes short, multi-branched. Stems simple, bearing fascicled leaves and lateral stems at ends of branches, canaliculate, appressed shortly hairy, glabrate below, densely leafy. Leaves thin, lower leaves withered at anthesis, basal leaves (non-reproducing rosettes) petiolate, petiole longer than blade; blade lanceolate, 2–4 × ca. 1 cm, veins on both surfaces sparsely shortly hairy, base attenuate, apex acute or rounded, mucronate, margin sparsely serrate (teeth mucronulate); cauline leaves shortly winged petiolate, narrowly lanceolate, 3–8 × 0.4–0.8 cm, apex long acuminate. Capitula numerous in dense corymbiform synflorescences, ca. 10 cm in diam. Involucres broadly campanulate, ca. 1 cm in diam.; phyllaries 2-seriate, linear-lanceolate, 5–7 mm, densely

hairy, apex acuminate; outer phyllaries shorter than inner ones, inner phyllaries glabrous below, margin scarious, apex reddish. Ray florets 2-seriate, blue (when dry), lamina oblanceolate, 4–5 × ca. 1 mm; disk florets 4–5 mm. Achenes (immature) obovoid, compressed, strigose, margin thick. Pappus white or brownish, equal, equaling disk corollas.

• Yunnan (Tengchong).

In aspect, *Aster rockianus* is similar to *A. moupinensis*, but its leaf shape and capitula are different. This species may be related to *A. diplostephioides*, but it differs in habit.

No specimens were seen by us.

140. *SOLIDAGO* Linnaeus, Sp. Pl. 2: 878. 1753.

一枝黄花属 *yi zhi huang hua shu*

Chen Yilin (陈艺林 Chen Yi-ling); John C. Semple

Herbs, perennial, rarely subshrubs; rhizome short to long or woody caudex. Stems decumbent to ascending or erect. Leaves basal (persistent or not by anthesis) and cauline, alternate, sessile or petiolate, blade ovate to broadly to narrowly lanceolate. Capitula usually small, radiate, numerous in terminal racemiform, paniculiform, or corymbose-paniculiform synflorescences. Involucre narrowly campanulate to ± cylindric; phyllaries 3–5-seriate, imbricate or subequal, linear-lanceolate, deltate, or oblong, herbaceous, margin scarious, apex rounded to obtuse or acute to attenuate. Receptacles slightly convex, alveolate, naked. Florets fertile; ray florets female, 1-seriate, usually yellow, usually glabrous, apex inconspicuously 2- or 3-denticulate; disk florets bisexual, yellow turning brown with age, tubular, limb expanded or narrow, apex 5-denticulate; anther base obtuse; style branches flattened, appendage lanceolate. Achenes obconic to cylindric, sometimes ± laterally compressed, glabrous or moderately strigillose, 8–10-ribbed. Pappus of outer short setiform scales rarely present, and 2 series of 25–45 fine, persistent, long, barbellate bristles, mid series 90%–95% length of inner, apically attenuate, inner apically very weakly to moderately clavate.

About 120 species: mainly in North America, a few species in Asia, Europe, and South America; six species (three introduced) in China.

- 1a. Synflorescence racemiform, long paniculiform, or corymbose-paniculiform, branches erect, inserted around stem, capitula attached around branch; involucre 3.5–9.5(–10) mm; inner (longest) pappus bristles weakly to moderately clavate.
 - 2a. Phyllaries rounded or obtuse; involucre 4–6 mm; rare, occurs in NE China 3. *S. pacifica*
 - 2b. Phyllaries acuminate or acute; involucre 3.5–9.5(–10) mm.
 - 3a. Upper stem leaves small, length from widest point to apex 6.5–31.5 mm, mean 14.3 mm; involucre 3.5–7.7 mm; pappus bristles 3.1–5.2 mm; E and S China, common 1. *S. decurrens*
 - 3b. Upper stem leaves larger, length from widest point to apex 25–45 mm, mean 34.5 mm; involucre 6–9.5(–10) mm; pappus bristles 4.5–7 mm; NE and far W China 2. *S. dahurica*
- 1b. Synflorescence pyramidal, secund, branches usually spreading, curved, capitula attached on upper side of branch; involucre 2.3–4 mm; inner (longest) pappus bristles not obviously clavate.
 - 4a. Stem leaves with multiple prominent lateral veins 4. *S. rugosa*
 - 4b. Stem leaves with 2 very prominent lateral veins (triplinerved).
 - 5a. Upper stem leaves sharply serrate, abaxial veins sparsely hairy; involucre 2.5–3 mm; lower stem glabrous or hairy 5. *S. canadensis*
 - 5b. Upper stem leaves entire, abaxial veins densely hairy; involucre 3–4 mm; lower stem hairy 6. *S. altissima*

1. *Solidago decurrens* Loureiro, Fl. Cochinch. 2: 501. 1790.

一枝黄花 *yi zhi huang hua*

Amphirhapis chinensis Schultz Bipontinus; *A. leiocarpa* Benth; *Solidago cantoniensis* Loureiro; *S. virgaurea* Linnaeus subsp. *leiocarpa* (Benth) Hultén; *S. virgaurea* var. *leiocarpa* (Benth) A. Gray; *S. virgaurea* var. *paludosa* Honda.

Herbs, perennial, woody caudex shortly branched. Stems (5–)35–100 cm tall, erect, usually slender, solitary or rarely fascicled, simple or branched in upper part. Leaves: lower cauline 1–25 (including petiole) × 0.4–3(–4) cm, petiole 2–4 cm or more, with long wings, blade lanceolate to ovate, both surfaces puberulent or adaxially glabrous, upper margin serrate or entire; mid cauline petiole winged, blade elliptic, long elliptic, ovate, or broadly lanceolate, 2–14 × 0.4–2(–2.9) cm, base cuneate-attenuate, upper margin serrate, serrulate, or entire; upper cauline length from widest point to apex 6.5–31.5 mm, mean

14.3 mm. Capitula numerous in terminal, dense or lax racemiform or corymbose-paniculiform synflorescences, branches erect, inserted around stem, capitula attached around branch, rarely lower branches elongated terminating in separate synflorescences. Involucre 3.5–6.2(–7.7) mm; phyllaries 4–6-seriate, lanceolate or narrowly lanceolate, apex acute or acuminate. Ray florets 2–9, lamina 2–5(–6.5) × 0.9–2.8 mm. Achenes 2–3 mm, glabrous to sparsely strigose Pappus bristles 3.1–5.2 mm, inner (longest) weakly to moderately clavate. Fl. and fr. Apr–Nov.

Forests, forest margins, thickets and grasslands on slopes; below 100–2900 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Taiwan, Yunnan, Zhejiang [India, Japan, Korea, Laos, Nepal, Philippines, Vietnam].

This species is used medicinally for promoting hemostasis and for treating a variety of conditions, including snakebites, carbuncles, and furuncles. The leaves and capitula of *Solidago decurrens* are usually much smaller than those of *S. dahurica*.

2. *Solidago dahurica* (Kitagawa) Kitagawa ex Juzepczuk, Fl. URSS 25: 42. 1959.

兴安一枝黄花 xing an yi zhi huang hua

Solidago virgaurea Linnaeus var. *dahurica* Kitagawa, Rep. Inst. Sci. Res. Manchoukuo 1: 297. 1937; *S. virgaurea* subsp. *dahurica* (Kitagawa) Kitagawa.

Herbs, perennial, woody caudex shortly branched; rhizomes woody, sometimes to 5–10 cm. Stems erect, 36–100 cm tall, simple or inflorescence-branched in upper part, glabrous in lower part, sparsely puberulent in upper part. Leaves: lower cauline petiole usually equaling blade, winged, blade elliptic, long elliptic, or lanceolate, rarely ovate, 7–18 × 2.5–3.5 cm, both surfaces glabrous or sparsely puberulent along veins, base gradually narrowed, decurrent, margin coarsely or finely serrate; mid cauline sessile, blade elliptic, long elliptic, or lanceolate, 5–17 × 1.5–4 cm; upper cauline length from widest point to apex 25–45 mm, mean 34.5 mm. Capitula 10–12 × ca. 10 mm, few to numerous in terminal, dense or lax, long paniculiform synflorescences to 30 cm, or in racemiform ones 10–12 cm, rarely glomerate, branches erect, inserted around stem, capitula attached around branch. Involucre campanulate, 6–9.5(–10) mm; phyllaries 3–5-seriate, lanceolate, 5–8 mm, outer often not much shorter than inner, margin narrowly scarious, apex acuminate or acute. Ray florets 5–10, yellow, lamina 4.6–6.5 mm; disk florets 4–24, averaging 12, 5–7.3 mm, lobes 1.1–1.5 mm. Achenes angled, 2.5–4 mm, distal 1/3–1/2 sparsely to moderately strigose, proximally glabrous or glabrate. Pappus white, bristles 4.5–6.8 mm, inner (longest) weakly to moderately clavate. Fl. and fr. Jul–Sep.

Forests, forest glades; 300–2100 m. Hebei, Heilongjiang, Jilin, Liaoning, Shanxi, Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Nepal, E and SC Russia, Uzbekistan].

This species has been treated as a variety or subspecies of *Solidago virgaurea* Linnaeus (Sp. Pl. 2: 880. 1753; 毛果一枝黄花 mao guo yi zhi huang hua). Typical *S. virgaurea* is native to Europe and SW Asia eastward to India, Nepal, and Pakistan. Its presence in China has not been confirmed, but it may occur in westernmost Xinjiang. It has large capitula similar to those of *S. dahurica* but has achenes that are very sparsely to densely strigose over the entire surface, not just distally.

3. *Solidago pacifica* Juzepczuk, Fl. URSS 25: 576. 1959.

钝苞一枝黄花 dun bao yi zhi huang hua

Solidago virgaurea Linnaeus var. *coreana* Nakai.

Herbs, perennial; rhizomes robust. Stems erect, slender, to 100 cm tall, simple, glabrous, laxly leaved. Leaves elliptic or lanceolate, both surfaces glabrous, or sparsely ciliate, lower cauline narrowly petiolate, upper cauline gradually smaller. Capitula 7–12 mm, numerous, in terminal corymbs, several corymbs arranged in racemiform synflorescences to 35 cm, branches erect, inserted around stem, capitula attached around branch. Involucre campanulate, 4–6 mm; phyllaries 3- or 4-seriate, elliptic or oblanceolate, 4–6 mm, rounded or obtuse. Ray florets ca. 5 mm. Achenes ca. 2 mm, glabrous. Pappus inner (longest) bristles weakly to moderately clavate. Fl. and fr. Aug–Oct.

Grasslands on slopes, forests, forest margins; ca. 1600 m. Hebei, Heilongjiang, Jilin, Liaoning [Russia].

4. *Solidago rugosa* Miller, Gard. Dict., ed. 8, *Solidago* no. 25. 1768.

多皱一枝黄花 duo zhou yi zhi huang hua

Herbs, perennial; rhizomes creeping, branched. Stems 30–50 cm tall (potentially to 100 cm), erect, simple, green, shortly hirsute. Leaves: lower cauline absent at anthesis, similar to mid or upper ones but larger; mid to upper cauline numerous, lanceolate, 4.5–7 cm, tapering at both ends, margin of lower cauline sharply serrate, lateral veins multiple, prominent (not trinerved), apex acuminate; upper cauline similar, ± reduced, margin sometimes entire. Capitula very small, in secund, pyramidal, paniculiform synflorescences, branches spreading to curved downward, lower branches longest, capitula borne on one side, sometimes a few lower branches much elongated. Involucre 3–4 mm; phyllaries linear-lanceolate, apex acute to obtuse. Florets golden yellow; ray florets 3–8, lamina 1.6–1.9 mm; disk florets 3–6, 2.9–3.3 mm, lobes 0.8–1.1 mm. Pappus inner (longest) bristles not obviously clavate. Fl. Aug–Sep.

Forest margins. Introduced in Jiangxi [native to E North America].

The Chinese plants belong to *Solidago rugosa* var. *rugosa*.

5. *Solidago canadensis* Linnaeus, Sp. Pl. 2: 878. 1753.

加拿大一枝黄花 jia na da yi zhi huang hua

Herbs, perennial; rhizomes creeping, branched. Stems to 150 cm tall, erect, simple, shortly and softly downy above. Leaves numerous, lanceolate or linear-lanceolate, 5–12 cm, abaxially downy, veins sparsely hairy, adaxially shortly pilose, tapering at both ends, margin of basal sometimes entire, of lower and upper cauline sharply serrate, longitudinal veins 3 (triplinerved), of which 2 lateral veins protrude weakly, apex acuminate. Capitula in paniculiform synflorescences, branches (racemes) curved downward, capitula attached on upper side of branch. Involucre 2.5–3 mm; phyllaries linear-lanceolate, slightly obtuse. Florets golden yellow; ray florets hardly longer than involucre. Pappus inner (longest) bristles not obviously clavate. Fl. Aug–Sep.

Occasionally cultivated in gardens and parks in China, and may possibly become naturalized [native to North America].

6. *Solidago altissima* Linnaeus, Sp. Pl. 2: 878. 1753.

高大一枝黄花 gao da yi zhi huang hua

Herbs, perennial; rhizomes creeping, branched. Stems erect, to 250 cm tall, simple, shortly and softly aqua-rose downy. Leaves numerous, lanceolate or linear-lanceolate, 5–12 cm, tapering at both ends, apex acuminate, margin of lower leaves sharply serrate, of basal leaves sometimes entire, of upper leaves entire, with 3 longitudinal veins, of which 2 lateral veins protrude weakly, glabrous or downy abaxially, shortly pilose adaxially. Capitula in paniculiform synflorescences, capitula attached on one side, branches curved downward. Involucre 3–4 mm; phyllaries linear-lanceolate, slightly obtuse. Florets

golden yellow; ray florets hardly longer than involucre. Pappus inner (longest) bristles not obviously clavate. Fl. Aug–Sep.

Jiangxi, Liaoning, Shandong, Sichuan, Taiwan, Yunnan, Zhejiang [native to North America; widely introduced elsewhere].

Cultivated in China; now widely naturalized as an often abundant weed in disturbed areas. Anhui, Fujian, Hebei, Henan, Hubei, Jiangsu,

The Chinese plants belong to *Solidago altissima* var. *altissima*. Material from China has often been misidentified as *S. canadensis*.

141. ERIGERON Linnaeus, Sp. Pl. 2: 863. 1753.

飞蓬属 fei peng shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Herbs, perennial, sometimes annual or biennial, or sometimes subshrubs. Leaves alternate, margin entire, serrate, or lobed. Capitula radiate, sometimes disciform or rarely discoid, solitary or several, sometimes numerous, in racemiform, corymbiform, or paniculiform synflorescences. Involucre hemispheric to campanulate or turbinate to cylindrical; phyllaries 2–5-seriate, subequal, sometimes outer ones shorter, sometimes ± imbricate, linear-lanceolate to linear, membranous or herbaceous, margin scarious, midvein reddish brown, purplish, or green. Receptacles flat to slightly convex or conic, ± alveolate, naked. Ray florets fertile, rarely absent (discoid capitula) or 12–350, 1–5- or more seriate, inner series lamina reduced and/or elaminate, or all reduced or elaminate (disciform capitula), lamina purple, blue, pink, or white, rarely yellow or orange, usually short and narrow, sometimes ± broad; disk florets bisexual, 3–450, yellow (veins often orange), sometimes white, limb cylindrical to narrowly funnelform [rarely campanulate], lobes (4 or)5, deltate; anther base obtuse, apical appendages ovate-lanceolate; style branch tips deltate, obtuse or arcuate. Achenes oblong-lanceoloid to oblong-obovoid, compressed to flattened, glabrous or sparsely strigose or strigillose to sericeous, eglandular, 2(or 4)-veined, veins often orange. Pappus persistent or caducous, free or ± basally connate, 1- or 2-seriate, outer series of short setae or scales, inner of 5–40(–50) fine, barbellate or barbellulate bristles, sometimes pappus only on ray or only on disk achenes [or absent].

About 400 species: Asia, Europe, North America, a few in Africa and Australia; 39 species (14 endemic, six introduced) in China.

The sections of *Erigeron* used here follow Nesom (Lundellia 11: 8–38. 2008), except that the polyphyletic *Conyza* s.s. is included within the genus, as *E. sect. Caenotus* and *E. sect. Conyza*.

Key to sections

- 1a. Ray florets 1–3-seriate, lamina strap-shaped (sometimes narrowly), usually spreading.
 - 2a. Pappus of ray florets of short scales, without bristles, of disk florets 2-seriate, outer series of short scales, inner of 10–15 bristles; capitula numerous in corymbiform synflorescences; herbs annual or biennial; capitula nodding in bud 3. *E. sect. Phalacroloma*
 - 2b. Pappus of ray and disk florets 2-seriate, outer of short scales or bristles, inner of bristles; capitula 1–5 terminal or from upper branches; herbs perennial, rarely annual or biennial; capitula erect in bud.
 - 3a. Leaves mostly basal, margin entire; capitula solitary 1. *E. sect. Erigeron*
 - 3b. Leaves mostly cauline (basal withered at anthesis), margin serrate or lobed; capitula 1–5 from upper branches 2. *E. sect. Karvinskia*
- 1b. Ray florets 4- or 5-seriate, sometimes elaminate or lamina filiform, erect.
 - 4a. Ray florets in 2 zones, outer 1–3 series laminate, inner 2 elaminate; achenes 2–2.4 mm; pappus accrescent 4. *E. sect. Trimorpha*
 - 4b. Ray florets not in 2 zones, laminate or elaminate; achenes 0.8–2 mm; pappus not accrescent.
 - 5a. Leaf margin entire or sparsely serrate 5. *E. sect. Caenotus*
 - 5b. Leaf margin coarsely serrate or lobed, rarely entire 6. *E. sect. Conyza*

1. *Erigeron* sect. *Erigeron*

飞蓬组 fei peng zu

Herbs, perennial, rarely biennial or subshrubs; rhizome short, erect; caudex simple or shortly branched; herbage strigose to hirsute or villous. Stems simple. Leaves mostly basal, oblanceolate to obovate or spatulate, base not clasping, margin entire. Capitula erect in bud, solitary. Ray florets white or blue, rarely yellow or orange, lamina strap-shaped, erect or spreading, coiling (rarely not coiling). Achenes 1.6–2.8 mm, 2-veined. Pappus 2-seriate, outer of short scales or setae, inner of (7–)10–30 bristles, rarely accrescent.

About 65 species: Asia, Europe, North and South America; 27 species (13 endemic) in China.

- 1a. Ray floret lamina involute when dry.
 - 2a. Disk floret limb cylindrical or cylindrical-funnelform, anthers and style branches not exerted from corolla.
 - 3a. Disk floret limb cylindrical-funnelform 23. *E. petiolaris*
 - 3b. Disk floret limb cylindrical and abruptly ampliate or narrowly cylindrical.
 - 4a. Phyllaries exceeding or equaling disk florets, outer series slightly shorter than or equaling inner.

- 5a. Phyllaries appressed, apex purple, densely villous (some with purple crosswalls) 24. *E. eriocalyx*
 5b. Phyllaries ± loose, green or purplish, densely yellowish villous at base 25. *E. lachnocephalus*
 4b. Phyllaries longer than disk florets, outer series usually 1/2 as long as inner.
 6a. Stems sparsely hirsute; achenes ca. 0.3 mm wide, sparsely strigose 26. *E. lonchophyllus*
 6b. Stems ± densely hirsute and strigillose; achenes ca. 0.6 mm wide, strigose 27. *E. oreades*
- 2b. Disk floret corollas narrowly funnelliform, anthers and style branches often exerted from disk corolla.
 7a. Capitula 0.8–1.5 cm in diam.; ray florets 5–7 mm; phyllaries shorter than to equaling or sometimes slightly exceeding disk florets.
 8a. Plants 15–50(–60) cm tall; mid and upper cauline leaves narrowly oblong, apex obtuse or rounded, surfaces eglandular 20. *E. himalajensis*
 8b. Plants 5–25 cm tall; mid and upper cauline leaves linear or linear-lanceolate, apex acute or shortly acuminate, surfaces often stipitate glandular.
 9a. Stems green, 9–25 cm tall; phyllaries green, sparsely strigillose, densely short-stipitate glandular 21. *E. pseudotenuicaulis*
 9b. Stems purple, 5–7 cm tall; phyllaries purple, sparsely hirsute-villous, strigillose, often stipitate glandular at base 22. *E. purpurascens*
 7b. Capitula 1.5–3.2 cm in diam.; ray florets 6.5–13.7 mm; phyllaries exceeding or equaling disk florets.
 10a. Phyllaries sparsely to ± densely villous and shortly strigose, ± densely stipitate glandular, outer apex spreading, often squarrose; ray florets purple; lobes of disk florets hairy 15. *E. patensisquama*
 10b. Phyllaries villous to glabrate, strigillose, eglandular, outer appressed; ray florets white or purplish; lobes of disk florets glabrous or hairy at base.
 11a. Cauline leaves 3–6, often crowded at base, upper gradually reduced; stems sparsely long villous, strigillose 19. *E. kunshanensis*
 11b. Cauline leaves 5 to numerous, usually slightly reduced upward; stems densely villous, strigillose.
 12a. Ray florets white, sometimes pink tinged or purplish; phyllaries green, sometimes purple, sparsely to ± densely villous, shortly scabrous; lobes of disk florets glabrous or hairy at base 16. *E. multifolius*
 12b. Ray florets purple; phyllaries ± purple, lanate (crosswalls pale yellow or purple); lobes of disk florets glabrous or hairy.
 13a. Upper cauline leaves and phyllaries lanate (crosswalls yellow or purple); cauline leaves oblanceolate or oblong-oblanceolate to oblong; lobes of disk florets glabrous 17. *E. porphyrolepis*
 13b. Upper cauline leaves and phyllaries villous to lanate (crosswalls purple); cauline leaves elliptic-ovate; lobes of disk florets hairy 18. *E. lanuginosus*
- 1b. Ray floret lamina flat.
 14a. Phyllaries distinctly exceeding disk florets; ray florets lilac to lavender or purple, or sometimes white; disk floret lobes yellow.
 15a. Capitula 1.2–2.5 cm in diam.
 16a. Lower and mid cauline leaf margins entire 12. *E. latifolius*
 16b. Lower and mid cauline leaf margins 3–6-serrate to coarsely serrate above middle 14. *E. kiukiangensis*
 15b. Capitula 2.5–4 cm in diam.
 17a. Phyllaries hirsute, densely stipitate glandular apically only; capitula 3–4 cm in diam. 11. *E. multiradiatus*
 17b. Phyllaries densely stipitate glandular, basally hirsute; capitula 2.5–3 cm in diam. 13. *E. leucoglossus*
 14b. Phyllaries shorter than to equaling or slightly longer than disk florets; ray florets blue, purple, lilac, reddish, white, or rarely orange; disk floret lobes yellow or purplish to purple.
 18a. Leaves mostly basal 10. *E. breviscapus*
 18b. Leaves basal and cauline.
 19a. Ray florets orange, sometimes yellow to brick-red 5. *E. aurantiacus*
 19b. Ray florets pale purple, blue, lilac, or rarely white.
 20a. Capitula 1–2.5 cm in diam.
 21a. Phyllaries dark cork-colored, shorter than or almost equaling disk florets, hirsute-villous and stipitate glandular; disk floret lobes yellow 1. *E. leioreades*
 21b. Phyllaries green or purple to partly purple, longer than or equaling disk florets, villous or scabridulous, eglandular or sparsely glandular; disk floret lobes purplish.
 22a. Plants 5–20(–30) cm tall; basal leaf surfaces glabrate; phyllaries ± densely scabridulous; ray florets 6–7 mm, disk florets 3.8–4.2 mm; inner pappus bristles 3–3.5 mm 8. *E. morrisonensis*

- 22b. Plants 20–35 cm tall; basal leaf surfaces sparsely villous-strigose, strigillose; phyllaries ± densely villous; ray florets 7–8.5 mm, disk florets 5–5.1 mm; inner pappus bristles 5–6 mm 9. *E. taipeiensis*
- 20b. Capitula to 4 cm in diam.
- 23a. Ray florets blue 4. *E. vicarius*
- 23b. Ray florets lilac to pale purple, rarely white.
- 24a. Disk floret lobes purplish 7. *E. alpicola*
- 24b. Disk floret lobes yellow.
- 25a. Phyllaries densely villous to lanate, eglandular 6. *E. allochrous*
- 25b. Phyllaries villous or strigose and stipitate glandular.
- 26a. Ray florets 6.5–8(–13) mm; phyllaries hirsute-villous and margin stipitate glandular 2. *E. seravschanicus*
- 26b. Ray florets 10–12 mm; phyllaries densely stipitate glandular, sparsely strigose (or not) 3. *E. altaicus*

1. *Erigeron leioreades* Popov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 8: 52. 1940.

光山飞蓬 *guang shan fei peng*

Herbs, perennial, 10–37 cm tall, caespitose; rhizome slender. Stems usually several, erect to ascending, green or reddish, branched or rarely simple, hirsute-villous, strigillose, especially in upper parts, stipitate glandular, densely leafy. Leaves: basal withered or present at anthesis, petiolate, petiole hirsute-villous, blade oblanceolate, 0.7–8 × 0.3–1.2 cm, surfaces hirsute-villous or strigillose adaxially only, base attenuate, margin entire, hirsute-villous-ciliate, apex obtuse to acute; mid cauline sessile, blade lanceolate, 0.7–4.5 × 0.1–0.5 cm, base subclasping, apex acute; upper smaller, stipitate glandular. Capitula 1–6 in corymbiform synflorescences, 18–25 mm in diam. Involucre hemispheric; phyllaries linear-lanceolate, 5.5–6 × 0.5–0.7 mm, often shorter than or almost equaling disk florets, apex acute, outer shorter, dark cork-colored, hirsute-villous, stipitate glandular, inner margin scarious. Ray florets lilac, 7–9 mm, tube ca. 2.5 mm, hairy distally, lamina flat; disk florets yellow, 3.5–4 mm, hairy distally, lobes lanceolate, ca. 0.4 mm, glabrous. Achenes tan, oblong, compressed, 2–3 mm, strigose. Pappus 2-seriate, outer bristles short, inner 4.5–5 mm. Fl. Jul–Sep.

Picea forests, alpine meadows; 2100–3400 m. N Xinjiang [Kazakhstan, Russia (W Siberia)].

2. *Erigeron seravschanicus* Popov, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 7: 10. 1948.

泽山飞蓬 *ze shan fei peng*

Herbs, perennial, 4–30 cm tall, often caespitose; rhizome slender. Stems usually several, rarely solitary, erect to ascending, green or purplish in lower part, often branched, hispid-villous, sparsely so in lower part and on lower leaves, more densely so in upper part, stipitate glandular below capitula, loosely leafy. Leaves: basal withered at anthesis, petiolate, petiole base clasping, blade oblanceolate, 1.2–8 × 0.25–1 cm, surfaces glabrous or glabrate, base attenuate, petiole and margin hirsute-villous-ciliate, apex acute; lower cauline shortly petiolate, blade oblanceolate, mid and upper sessile, lanceolate to linear-lanceolate, 1.5–6.5 × 0.1–0.6 cm, base subclasping, apex acute. Capitula 2–14 in corymbiform synflorescences, sometimes solitary, 0.9–1.6 × 1.8–3.3 cm. Involucre hemispheric; phyllaries green, linear-lanceolate, 5.5–9 × 0.5–1 mm, apex

acute, outer slightly shorter, hirsute-villous, inner with margin scarious, stipitate glandular. Ray florets lilac, 6.5–8(–13) mm, tube 1.5–2.5 mm, apically sparsely hairy, lamina ± flat; disk florets yellow, 4.5–5 mm, limb funnelform, lobes lanceolate, ca. 0.5 mm, glabrous. Achenes tan, oblanceoloid, compressed, 2.2–2.6 mm, strigose. Pappus 2-seriate, outer bristles ca. 0.7 mm, inner 4.3–5 mm. Fl. Jul–Sep.

Subalpine meadows; ca. 2600 m. C Xinjiang [Kazakhstan, Uzbekistan].

3. *Erigeron altaicus* Popov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 8: 53. 1940.

阿尔泰飞蓬 *a er tai fei peng*

Herbs, perennial, 15–50 cm tall, caespitose; rhizome erect or ascending. Stems several, sometimes solitary, erect, green or reddish, branched or rarely simple, sometimes glabrate in lower part, strigose, strigillose, especially on upper part, peduncles densely stipitate glandular. Leaves green, margin entire; basal rosulate, often withered at anthesis, long petiolate, blade oblanceolate or spatulate, 2–16 × 0.4–1.2 cm, base attenuate, apex rounded, mucronate; cauline 0.3–1.3 × 0.5–1 cm, lower winged petiolate, oblanceolate, base subclasping, upper sessile, blade lanceolate, apex acute. Capitula 2–5 in corymbiform synflorescences, or solitary, ca. 1.2 × 2.1–3.7 cm. Involucre hemispheric; phyllaries 3-seriate, green, subequal, lanceolate to linear-lanceolate, 6–9 × 0.5–0.75 mm, sparsely strigose (or not), densely stipitate glandular, apex acute, margin of inner scarious. Ray florets lilac, 10–12 mm, tube ca. 2.5 mm, hairy, lamina 0.5–1.2 mm wide, flat; disk florets yellow, 4–4.5 mm, tube 1–1.5 mm, hairy, limb cylindrical-funnelform, lobes triangular, ca. 0.5 mm, glabrous. Achenes (immature) ± strigose. Pappus 2-seriate, outer bristles short, inner 3.5–4 mm (immature). Fl. Jun–Aug.

Subalpine meadows, grasslands; ca. 2500 m. N Xinjiang [Kazakhstan, Russia (Siberia)].

4. *Erigeron vicarius* Botschantzev, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 18: 260. 1957.

蓝舌飞蓬 *lan she fei peng*

Herbs, perennial, 25–28 cm tall; rhizome short, branching. Stems several, 1–3 mm in diam. at base, straight or ascending, simple, moderately to densely curved hirsute, usually moderately to densely stipitate glandular. Leaves green, margin entire;

basal petiolate, blade linear-lanceolate, 2–9 × 0.1–1.1 cm, apex acute; cauline 3–12, sessile, blade linear-lanceolate to lanceolate, apex acute; lowermost shortly petiolate, blade 0.7–6 × 0.1–0.6 cm. Capitula solitary, 1.4–1.8 × 2.1–3.8 cm. Involucre hemispheric; phyllaries 3-seriate, subequal, green, or reddish at tip, linear-lanceolate, 7–9 × 1–1.8 mm, densely lanate. Ray florets blue, 10–15 mm, tube 2.3–3.5 mm, hairy upward, lamina linear, 1–1.5 mm wide, flat; disk florets yellow, 4–4.5 mm, tube hairy upward. Achenes oblanceolate, flattened, 2.5–3 × 0.5–0.6 mm, strigose. Pappus 2-seriate, outer bristles short, inner 4–4.5 mm. Fl. Jul–Sep.

Alpine meadows, stony slopes; 2800–4500 m. Xinjiang [Kazakhstan, Uzbekistan].

No specimen of this species was seen by us.

5. *Erigeron aurantiacus* Regel, Gartenfl. 289. 1879.

橙花飞蓬 cheng hua fei peng

Herbs, perennial, 5–35 cm tall or more, caespitose; rhizome short, branched. Stems several, erect or ascending, simple or rarely branched, green or purplish below, ± densely villous-hirsute, especially in upper part, strigillose, eglandular. Leaves: surfaces strigose, eglandular, margin entire, strigose; basal rosulate, present at anthesis, long petiolate, blade oblong-oblanceolate or oblanceolate, sometimes obovate or elliptic, 1–16 × 0.4–1.6 cm, base attenuate, apex acute to obtuse; cauline 7–17, subclasping, apex acute, lower long winged petiolate, blade lanceolate or oblanceolate, mid and upper sessile, blade lanceolate to linear-lanceolate, 0.7–15 × 1.5–1.7 cm. Capitula 13–15 × 23–35(–42) mm, solitary. Involucre hemispheric, 7–9 × 15–22 mm; phyllaries 3-seriate, subequal, green and apically purplish, linear-lanceolate, 7–9 × 0.7–1 mm, slightly exceeding disk florets, leaflike, apex acute or acuminate, ± densely villous-hirsute, innermost margin narrowly scarious (if at all), erose. Ray florets 3-seriate, orange, sometimes yellow to brick-red, 7.8–12 mm, tube ca. 2.5 mm, sparsely hairy, lamina 1–1.4 mm wide, flat; disk florets yellow, 4–5.5 mm, hairy, tube ca. 0.8 mm, limb narrowly funnelliform to cylindrical-funnelform, lobes triangular, ca. 0.5 mm. Achenes oblong, compressed, ca. 2 mm, strigose. Pappus 2-seriate, outer bristles ca. 0.5 mm, inner 3.5–6 mm. Fl. Jul–Sep.

Forest margins, alpine meadows; 2100–3400 m. N Xinjiang [Kazakhstan].

6. *Erigeron allochrous* Botschantzev, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 18: 259. 1957.

异色飞蓬 yi se fei peng

Herbs, perennial, 7–28 cm tall, caespitose; rhizome short, branched. Stems usually several, erect, simple, 1–3 mm in diam. at base, sparsely villous, more densely so in upper part, also strigillose, eglandular, densely leafy. Leaves petiolate, villous, abaxially or sometimes both surfaces sparsely villous on veins, margin entire, villous-ciliate; basal leaves dense, present at anthesis, blade obovate or oblanceolate, 1.2–12 × 0.3–1.4 cm, base attenuate, apex obtuse or acute, mucronate; lower cauline shortly petiolate, blade oblanceolate, mid and upper sessile, blade lanceolate, 0.8–7 × 0.1–0.8 cm, base cuneate, subclasping, apex acute or acuminate. Capitula solitary, 1.1–1.8 × 2.4–4 cm. Involucre hemispheric; phyllaries green or tip pur-

plish, lanceolate, 6.5–8 × 0.7–1 mm, often exceeding disk florets, apex acute, outer slightly shorter, densely villous to lanate, eglandular. Ray florets 3-seriate, lilac, 9–13 mm, tube 2.5–3 mm, sparsely hairy, lamina flat, ca. 1.3 mm wide; disk florets yellow, 3.5–4.5 mm, tube 0.8–1 mm, limb cylindrical-funnelform, hairy, lobes lanceolate, ca. 0.8 mm, glabrous. Achenes (immature) densely strigose to silky. Pappus 2-seriate, outer bristles short, inner 2.5–5 mm (immature). Fl. Jun–Sep.

Abies forests, subalpine meadows; ca. 2800 m. N Xinjiang (Ürümqi) [Kazakhstan].

7. *Erigeron alpicola* Makino, Bot. Mag. (Tokyo) 28: 339. 1914 [“*alpicolus*”].

山飞蓬 shan fei peng

Aster consanguineus Ledebour, Fl. Ross. 2: 473. 1845; *A. dubius* (Thunberg) Hultén subsp. *glabratus* (A. Gray) Kitamura & H. Hara; *A. dubius* var. *glabratus* (A. Gray) T. Shimizu; *Erigeron consanguineus* (Ledebour) Novopokrovsky (1938), not (Philippi) Cabrera (1937); *E. dubius* (Thunberg) Makino var. *glabratus* (A. Gray) Miquel ex Matsumura; *E. komarovii* Botschantzev; *E. thunbergii* A. Gray subsp. *glabratus* (A. Gray) H. Hara; *E. thunbergii* var. *glabratus* A. Gray; *E. thunbergii* subsp. *komarovii* (Botschantzev) Á. Löve & D. Löve.

Herbs, perennial, 10–35 cm tall; rhizomes short, branched. Stems several, sometimes single, erect to ascending, simple, green, striate, 1–2.5 mm in diam. at base, sparsely villous (yellow crosswalls distally), denser in upper part, strigillose, sparsely stipitate glandular, sometimes glabrate. Leaves crowded; basal rosulate, long, narrowly winged petiolate, blade obovate, spatulate, or oblanceolate, 2–10 × 0.3–1.6 cm, surfaces sparsely villous, sometimes glabrate, conspicuously 3-veined, base attenuate, margin entire or sometimes sparsely mucronate, villous-ciliate (yellow crosswalls), apex obtuse; lower cauline shortly petiolate, blade oblanceolate, apex acute, upper sessile, blade lanceolate or linear-lanceolate, 1–4 × 0.1–0.9 cm, apex acute. Capitula solitary, 0.9–1.7 × 2–4 cm. Involucre hemispheric; phyllaries 3-seriate, linear-lanceolate, 6–10 × 0.8–1.6 mm, membranous, acuminate, outer green, somewhat shorter than inner, densely villous. Ray florets 2-seriate, lilac, rarely white, 8–14 × 1–2 mm, tube 2–2.7 mm, hairy, lamina spreading, flat when dry; disk florets yellow, 3–4.5 mm, tube 1.2–1.8 mm, hairy from middle onto limb base, limb funnelliform, lobes triangular, 0.4–0.6 mm, purplish. Achenes oblanceolate, flattened, sparsely strigose. Pappus 2-seriate, cinnamon, outer bristles short, inner 2.5–4.7 mm. Fl. Jul–Sep.

Alpine lawns or forest margins, riverbanks, lakeshores; 1700–2600 m. Jilin (Changbai Shan) [Japan, Russia (Kamchatka, E Siberia)].

8. *Erigeron morrisonensis* Hayata, J. Coll. Sci. Imp. Univ. Tokyo 25(19): 126. 1908.

玉山飞蓬 yu shan fei peng

Herbs, perennial, 5–20(–30) cm tall, ± caespitose; rhizome short. Stems single to several, erect to ascending (procumbent), 0.8–1.5 mm in diam. at base, simple or sparsely branched above, branches ascending, sparsely villous-hirsute, moderately to densely strigillose, more densely so upward. Leaves: basal persistent at anthesis, rosulate, long petiolate, blade oblanceolate to narrowly spatulate, 2–6 × 0.2–0.7 cm, surfaces glabrate,

base attenuate, margin sparsely mucronulate or entire, sometimes remotely narrowly serrate-mucronulate, scabrous, apex obtuse, mucronate; cauline sessile, blade linear or oblong-lanceolate, 1–3(–5) × 0.15–5 mm, surfaces strigillose to glabrate, base cuneate to rounded, margin entire, villous-ciliate, apex obtuse to acuminate; upper gradually reduced; uppermost linear, 3–5 mm. Capitula 2–6, in corymbose synflorescences terminal on stems and branches, sometimes solitary, 1–2 cm in diam.; peduncle long. Involucre hemispheric, 5–7 × 11–15 mm; phyllaries 3-seriate, green (outer) to purple, linear-lanceolate, slightly exceeding or equaling disk florets, moderately to densely scabridulous, sparsely glandular or eglandular, membranous, margin villous-ciliate and/or glandular (distally), apex acuminate, outer 2.7–4.2 mm, inner 4.8–6.8 mm, margin narrowly scarious, erose. Ray florets 3-seriate, lilac to pale purple, 6–7 × ca. 0.5 mm, tube 2.7–3.2 mm, ± hairy onto base of lamina, lamina spreading, flat when dry; disk florets yellow to greenish, 3.8–4.2 mm, tubes 1.6–1.7 mm, limb narrowly funnellform, lobes ovate, 0.4–0.6 mm, purplish. Achenes greenish straw-colored, oblong, flattened, 2–2.5 mm, densely strigose, veins orange. Pappus yellowish, outer scales 0.15–0.25 mm, inner bristles 3–3.5 mm. Fl. May–Nov.

- Alpine meadows, montane coniferous–broad-leaved forests, rocky summits, streamsides, open rocky slopes, mountain ridge grasslands, roadsides, trailsides; 1500–3600 m. Taiwan.

9. *Erigeron taipeiensis* Y. Ling & Y. L. Chen, Acta Phytotax. Sin. 11: 406. 1973.

太白飞蓬 tai bai fei peng

Herbs, perennial, 20–35 cm tall, caespitose; rhizome vertical, ascending, branching. Stems several or solitary, erect, 1–2.5 mm in diam. at base, simple, green, hirsute-villous, stipitate glandular below capitula. Leaves green; basal dense, rosulate, long petiolate, blade oblanceolate, (specimen too damaged to provide dimensions), surfaces sparsely villous-strigose, strigillose, conspicuously 3-veined, base attenuate, margin entire or 1- or 2-serrulate, villous-ciliate; lower cauline shortly petiolate, blade oblanceolate, mid and upper sessile, blade lanceolate or linear-lanceolate, 0.8–5 × 0.3–1.4 cm, base ± rounded, subclasping, margin entire, apex acute or acuminate; uppermost with surfaces villous, margin villous-ciliate. Capitula solitary, 10–13 × 20–25 mm. Involucre hemispheric, 7–10 × 15–20 mm; phyllaries 3-seriate, green, apex and midvein purplish, linear-lanceolate, acuminate, ± densely villous, outer shorter, inner slightly longer than or rarely equaling disk florets, ca. 0.5 mm wide, 1-veined. Ray florets 3-seriate, lilac, 7–8.5 mm, tube ca. 3 mm, hairy, lamina ca. 0.4 mm wide, flat; disk florets yellow, 5–5.1 mm, tube ca. 2.5 mm, hairy, limb narrowly funnellform, lobes triangular, ca. 0.4 mm, purplish. Achenes tan, narrowly oblong, compressed, 2–2.5 mm, strigose. Pappus 2-seriate, yellowish, outer bristles ca. 0.5 mm, inner 5–6 mm. Fl. Jul.

- Alpine meadows; ca. 3200 m. S Shaanxi (Taibai Shan).

10. *Erigeron breviscapus* (Vaniot) Handel-Mazzetti, Symb. Sin. 7: 1093. 1936.

短葶飞蓬 duan ting fei peng

Aster breviscapus Vaniot, Bull. Acad. Int. Géogr. Bot. 12:

495. 1903; *Erigeron breviscapus* var. *alboradiatus* Y. Ling & Y. L. Chen; *E. breviscapus* var. *leucanthus* X. D. Dong & Ji H. Li; *E. breviscapus* var. *tibeticus* Y. Ling & Y. L. Chen; *E. dielsii* H. Léveillé; *E. praecox* Vierhapper & Handel-Mazzetti.

Herbs, perennial, 1–50 cm tall (sometimes less than 1 cm), sometimes ± caespitose; rhizome woody, thick. Stems several or solitary, or less than 1 cm, 1–1.5 mm in diam. at base, erect or ascending, sometimes procumbent, green or rarely purplish, simple or sometimes 2–4 branched, sparsely to densely hirsute, strigillose, sparsely to moderately stipitate glandular, denser distally. Leaves mostly basal, basal rosulate, present at anthesis, winged petiolate, blade oblanceolate to obovate-lanceolate or broadly spatulate, 1.5–4 × 0.5–2.5 cm, surfaces sparsely to densely scabrous-hirsute, sparsely scabridulous, sparsely minutely glandular, sometimes glabrate, ± 3-veined, base ± gradually attenuate, margin entire, hirsute-ciliate, apex obtuse or rounded, mucronate; cauline 2–4, rarely absent, sessile, blade narrowly ovate-lanceolate to narrowly lanceolate, 1–4 × 0.5–1 cm, base subclasping, apex obtuse to acute; upper reduced, linear. Capitula solitary at ends of stems or branches, 1.8–2.8(–3.5) cm in diam. Involucre hemispheric, 0.5–0.8 × 1–1.5 cm; phyllaries 3-seriate, slightly exceeding or equaling disk florets, green or purplish at margin and apex, linear-lanceolate, ca. 8 × 1 mm, membranous, acute to acuminate, outer 3.8–5.6 × 0.6–0.8 mm, abaxially densely to sparsely hirsute, ± densely strigillose, short-stipitate glandular, inner 5.6–7.3 × 0.6–0.85 mm, margin narrowly scarious, erose, sparsely ciliate. Ray florets 3-seriate, blue to purple or white, 9–12 × 0.8–1.1 mm, tube 2–3 mm, sparsely hairy in upper part and onto lamina base, lamina spreading, flat when dry; disk florets yellow, 3.5–4 mm, tube 1.2–1.5 mm, limb funnellform, sparsely hairy, lobes ovate, 0.55–0.6 mm, glabrous, tips sometimes reddish. Achenes narrowly oblong to oblanceolate, flattened, ca. 2.2 mm, densely strigose, often 1-ribbed abaxially. Pappus 2-seriate, brownish, outer bristles ca. 0.4 mm, inner 3.7–4 mm. Fl. Mar–Oct.

- Mid-elevation mountains, alpine to montane meadows, forest margins, *Pinus* forests, streamsides, grasslands, disturbed slopes, roadsides; 1200–3600 m. Guangxi, Guizhou, Hunan, Sichuan, E and S Xizang, Yunnan.

In addition to the typical variety, three varieties have been recognized. *Erigeron breviscapus* var. *tibeticus* (S Xizang: Qüxü; ca. 3600 m) is a high-elevation, shortly stemmed (sometimes less than 1 cm) morphotype; this extreme may represent phenotypic plasticity at the extreme limit of the species range. *Erigeron breviscapus* var. *alboradiatus* (EC Yunnan: Songming) is a white-rayed form with slender stems. The recently described *E. breviscapus* var. *leucanthus* is another pale-rayed form. Color forms frequently occur in *Erigeron* through a simple mutation within the flavonoid pathway. A biosystematic study of the complex is required to evaluate the value of these varieties.

11. *Erigeron multiradiatus* (Lindley ex Candolle) Bentham ex C. B. Clarke, Compos. Ind. 56. 1876 [“*multiradiatum*”].

多舌飞蓬 duo she fei peng

Stenactis multiradiata Lindley ex Candolle, Prodr. 5: 299. 1836; *Aster inuloides* D. Don; *A. roylei* Onno; *Erigeron multiradiatus* var. *glabrescens* Y. Ling & Y. L. Chen; *E. multiradiatus* var. *ovatifolius* Y. Ling & Y. L. Chen; *E. multiradiatus* var. *salicifolius* C. C. Chang ex Y. Ling & Y. L. Chen.

Herbs, perennial, 20–60 cm tall; rhizome woody. Stems several or single, 2–4 mm in diam. at base, erect, ascending or procumbent, branched or sometimes simple, purplish at base, rarely green, sparsely or ± densely hirsute, scabridulous, base sometimes glabrate, long-stipitate glandular. Leaves: basal rosulate, often withered at anthesis, long winged petiole, blade oblong-ob lanceolate to oblanceolate, sometimes ovate to ovate-elliptic, (4–)5–15 × 0.6–1.5(–2.6) cm, surfaces scabrous or rarely sparsely long hairy, or rarely glabrate or glabrous, glandular, 3–5-veined, base attenuate, sometimes broad, margin entire or remotely serrate, hirsute-ciliate, apex acute or obtuse, rarely rounded or acuminate; lower cauline similar, shortly petiole, mid sessile, blade ovate-lanceolate to oblong-lanceolate or lanceolate, rarely narrowly lanceolate, 3–6(–8.5) × 0.6–2.2 cm, base subclasping, margin entire or remotely serrate, apex acute or acuminate, upper sessile, reduced, linear or linear-lanceolate, 1–2 cm, apex acuminate. Capitula usually 2 to several in corymbiform synflorescences, or solitary, 3–4 cm in diam. or more. Involucre hemispheric, 8–10 × 15–20 mm; phyllaries 3-seriate, green, apex or entire surface purplish, linear-lanceolate, distinctly exceeding disk florets, 0.6–1 mm wide, abaxially sparsely to densely hirsute, densely stipitate glandular apically, leaflike (outer and inner), margin stipitate glandular, apex acuminate, outer 5–5.4 mm, innermost 6.8–7.6 mm, membranous, margin not or narrowly scarious and hyaline, long acuminate. Ray florets lilac or lavender to purple, spreading, 8.8–17 × 0.4–1 mm, 2 × as long as involucre, tube 1.5–2 mm, sparsely hairy in upper part to lamina base, lamina ± flat when dry; disk florets yellow, 2.9–4.5 mm, tube 0.7–1.5 mm, sparsely hairy above to limb base, limb narrowly funnelform, 2.1–2.3 mm, lobes ovate, 0.4–0.6 mm, glabrous. Achenes oblong to lanceolate, flattened, ca. 2 mm, sparsely strigose, 1-veined abaxially. Pappus 2-seriate, dirty white or yellowish to brownish, outer bristles short, inner ca. 4 mm. Fl. May–Sep.

Alpine or subalpine meadows, slopes, forest margins, forests, open hillsides; 2300–4600 m. Sichuan, Xizang, Yunnan [Afghanistan, Bhutan, India, Kashmir, Nepal; SW Asia (Iran)].

In addition to the typical variety, three varieties have been recognized in this species. *Erigeron multiradiatus* var. *ovatifolius* (SW Sichuan: Muli) is characterized by ovate to ovate-elliptic leaves with a rounded-obtuse, mucronate apex. *Erigeron multiradiatus* var. *salicifolius* (NW Yunnan: Weixi; ca. 2900 m, in forests) has thin, narrowly lanceolate, sparsely long hairy leaves with an attenuate, somewhat clasping base and an acute or acuminate apex. These may represent extremes of leaf variation of the species or distinct forms or even the result of phenotypic plasticity in the case of *E. multiradiatus* var. *salicifolius*, which is found in forests; a morphometric study of the complex would be needed to address this issue. *Erigeron multiradiatus* var. *glabrescens*, found in alpine meadows of NW Yunnan (Zhongdian; ca. 3200 m), has glabrate or glabrous, entire leaves; other reported features appear to fall within the range of variation of the species.

12. *Erigeron latifolius* Hao Zhang & Zhi F. Zhang, *Novon* 20: 117. 2010.

宽叶飞蓬 kuan ye fei peng

Herbs, perennial, 25–50 cm tall; rhizome erect or ascending, caudices simple or branched, fibrous-rooted, with marcescent leaf bases. Stems single (or ?several), erect, simple or

branched from base, sparsely strigose, sparsely villous, sometimes hirtellous, sometimes stipitate glandular. Leaves: basal rosulate, usually withering at anthesis, petiole, blade oblong-ob lanceolate to oblanceolate, 7–13 × 0.7–1.5 cm, sparsely strigose to villous, stipitate glandular, 3–5-veined, margin entire, apex acute to obtuse; lower and mid cauline sessile, blade lanceolate to oblong-lanceolate, 8–15 × 1–2.5 cm, base auriculate-clasping, margin entire, apex acute to obtuse, upper blade lanceolate, 2–5 × 0.5–1 cm, densely white villous, apex acuminate. Capitula 1 or 2–7 in corymbiform synflorescences, 1.2–2.5 cm in diam. Involucre 0.8–1.5 × 0.8–1.2 cm; phyllaries 3-seriate, lustrous green, linear-lanceolate, 8–10 × 1–2 mm, exceeding disk florets, moderately villous, apex acuminate, purple, outer shorter than inner. Ray florets 3-seriate, outer 150–250(–400), usually purple, 5–10 mm, lamina flat; disk florets 250–450, 5–7 mm, tube 1.5–2 mm, limb campanulate, lobes shortly triangular, 0.5–1 mm, purple. Achenes tan, oblong, compressed, 2–3 mm, sparsely hispidulous, 1-veined. Pappus 2-seriate, white, outer bristles short, inner ca. 4 mm. Fl. Jun–Sep.

• Mountain meadows, scrub margins; ca. 3100 m. Sichuan (Zhegu Shan).

This description is adapted from the protologue. Only a photograph of a paratype has been seen by the present authors. It is close to *Erigeron multiradiatus*.

13. *Erigeron leucoglossus* Y. Ling & Y. L. Chen, *Acta Phytotax. Sin.* 11: 411. 1973.

白舌飞蓬 bai she fei peng

Herbs, perennial, to 35 cm tall; rhizome short, woody. Stems single, erect or ascending, stout, 3–4 mm in diam. at base, often branched, sparsely to moderately hirsute-villous, strigillose, ± densely stipitate glandular above. Leaves: basal withered or present at anthesis, narrowly winged long petiole, petiole base clasping, blade oblanceolate to oblanceolate-spatulate, 6–9 × 1–1.6 cm, surfaces sparsely hirsute, 3-veined, base attenuate, margin entire, hirsute-ciliate, apex obtuse, mucronate; lower cauline similar, shortly petiole, margin entire or with 1–3 fine serrations, mid and upper sessile, blade ovate-elliptic to lanceolate, 2.5–5 × 1–1.8 cm, surfaces abaxially hirsute on veins or glabrate, 3–5-veined, base cuneate, ± subclasping, margin entire, hirsute-ciliate, apex acute, mucronate, uppermost blade narrowly lanceolate to linear-lanceolate, 1–2 × 0.2–0.4 cm, surfaces and margin also distally stipitate glandular, adaxially strigillose, 1-veined. Capitula 3–7 in corymbiform synflorescences, 2.5–3 cm in diam. Involucre hemispheric, ca. 6 × 12–17 mm; phyllaries 3-seriate, dark green, purplish at apex and margin, lanceolate, ca. 0.3 mm wide, distinctly exceeding disk, abaxially basally hirsute, densely stipitate glandular, apex acuminate, outer ones short, inner 5–6 mm, margin scarious, erose. Ray florets 3-seriate, 10–11 mm, tube 1.5–2 mm, sparsely hairy distally, lamina white, flat and patent, 1–1.2 mm wide; disk florets yellow, ca. 4.2 mm, tube ca. 1.2 mm, sparsely hairy in middle part, limb narrowly funnelform, lobes triangular, 0.4–0.5 mm, purple, glabrous. Achenes (immature) oblong, compressed, ± strigose. Pappus 2-seriate, (immature) outer bristles short, inner ca. 3.8 mm. Fl. Aug.

• Alpine grasslands; ca. 3400 m. Xizang (Gongbo'gyamda).

14. *Erigeron kiukiangensis* Y. Ling & Y. L. Chen, Acta Phytotax. Sin. 11: 412. 1973.

依江飞蓬 qiu jiang fei peng

Herbs, perennial, to 55 cm tall, caespitose; rhizome woody. Stems several or solitary, erect or ascending, often branched above, green, strigillose, densely hirsute, especially upper part, densely stipitate glandular in upper part. Leaves: basal crowded, rosulate, withered or present at anthesis, narrowly winged petiolate, blade oblanceolate or oblanceolate-spatulate, 4–8 × 0.8–1.2 cm, 3–5-veined, base attenuate, margin entire or 1- or 2-serulate, strigose-ciliate, apex obtuse, mucronate; lower and mid cauline ± petiolate, blade oblanceolate, 3.5–6 × 0.6–1.5 cm, surfaces strigose, base attenuate to cuneate, margin 3–6-serrate to coarsely serrate above middle, rarely entire, upper gradually reduced, sessile, blade narrowly lanceolate or linear, surfaces strigose, stipitate glandular, 1–3-veined, base subclasping. Capitula several in corymbiform synflorescences, sometimes solitary, 2–2.5 cm in diam. Involucre hemispheric, 6–8 × 12–15 mm; phyllaries 3-seriate, green, linear-lanceolate, ca. 0.8 mm wide, often overtopping disk florets, densely stipitate glandular, rarely strigose or strigillose, inner margin scarious, apex acuminate. Ray florets 2- or 3-seriate, 9–10 mm, tube 2–2.5 mm, sparsely hairy, lamina reddish, ca. 0.6 mm wide, spreading, flat; disk florets yellow, 3.5–4 mm, hairy, tube ca. 1 mm, limb funnelform, lobes lanceolate, ca. 0.6 mm, glabrous. Achenes (immature) oblong, compressed, ca. 2 × 0.6 mm, densely strigose. Pappus (immature) yellowish, 2-seriate, outer bristles short, inner ca. 3.5 mm. Fl. Jul–Sep.

• Open mountain slopes, rocky places; 3000–3200 m. SE Xizang (Zayü), NW Yunnan (Gongshan).

15. *Erigeron patentisquama* Jeffrey ex Diels, Notes Roy. Bot. Gard. Edinburgh 5: 185. 1912.

展苞飞蓬 zhan bao fei peng

Herbs, perennial, 20–45 cm tall; rhizome woody. Stems solitary or several, erect to ascending, sometimes procumbent, ca. 3 mm in diam., purplish or green, branched from middle or upper part, rarely simple, moderately to densely hirsute and strigose, often ± densely long-stipitate glandular in upper part. Leaves: surfaces sparsely to ± densely hirsute and shortly strigose, densely stipitate glandular, sometimes sparsely so; basal dense, rosulate, long winged petiolate, blade spatulate or oblanceolate-spatulate, 4–15 × 0.6–2 cm, 3-veined and with 2–4 lateral veins, base attenuate, margin entire, apex obtuse, mucronulate; mid and upper sessile, blade narrowly lanceolate or lanceolate to lanceolate-ovate, 2–7 × 0.5–1 cm, base semi-clasping, apex acuminate or acute, uppermost reduced, linear or linear-lanceolate. Capitula solitary or 2–4 in corymbiform synflorescences, ca. 2.5 cm in diam. Involucre hemispheric, 1–1.5 × 1.5–2 cm; phyllaries 3-seriate, subequal or inner somewhat longer, lanceolate, 0.8–1 mm wide, exceeding disk florets, sparsely to ± densely villous and shortly strigose, ± densely stipitate glandular, margin stipitate glandular, apex spreading, often squarrose, outer leaflike, green, inner membranous, margin narrowly scarious. Ray florets 3-seriate, purple, 8–13.7 mm, ± exceeding involucre, tube 2–3.3 mm, sparsely hairy above, lamina linear, 0.4–0.6 mm wide, involute; disk florets yellow to

orange, limb or lobes sometimes purplish, ca. 4.3 mm, tube 1–1.5 mm, limb narrowly funnelform, lobes hairy, anthers and style branches often exerted from corolla. Achenes straw-colored, oblong or lanceoloid, compressed, 2.5–3 mm, ± densely strigose, particularly at base, 1-veined on back, veins orange. Pappus yellowish, 2-seriate, outer bristles 0.2–0.7 mm, inner 3.6–4.5 mm. Fl. Jul–Sep.

• Forest margins, alpine or subalpine meadows, grassy slopes, ridges; 2400–4100 m. SW and W Sichuan, Xizang, NE and NW Yunnan.

16. *Erigeron multifolius* Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 627. 1937.

密叶飞蓬 mi ye fei peng

Erigeron multifolius var. *amplisquamus* Y. Ling & Y. L. Chen; *E. multifolius* var. *pilanthus* Y. Ling & Y. L. Chen.

Herbs, perennial, (3–)6–25 cm tall; rhizome thick, ca. 10 mm in diam. Stems single or several, erect to ascending, sometimes decumbent, 2–3 mm in diam. at base, simple, rarely branched, densely villous, strigillose, more densely so upward, ± stipitate glandular, densely leafy. Leaves: surfaces villous-scabrous and scabridulous (particularly on veins), margin entire, rarely sparsely serrate; basal often withered at anthesis, blade spatulate to oblanceolate, subequal; cauline numerous, lower petiolate, petiole narrowly winged, blade oblong or oblanceolate-oblong, 3–7 × 0.3–0.7 cm, slightly reduced upward, base attenuate, apex rounded or obtuse, mid and upper sessile, lanceolate or oblong-lanceolate to linear-lanceolate, 2–6 × 0.5–1 cm, subclasping, apex obtuse or acute. Capitula solitary, or sometimes 2–4 in corymbose synflorescences, 2–3 cm in diam. Involucre hemispheric, 0.6–0.8 × 1.5–2.5 cm; phyllaries 3-seriate, equaling or exceeding disk florets, outer slightly shorter (sometimes broad, 1.5–2 mm wide), green, sometimes purple, lanceolate, abaxially sparsely to ± densely villous (particularly at base), shortly scabrous (particularly along midvein), eglandular, leaflike, inner narrowly oblong, 7–10 × 0.5–1 mm, membranous, margin ± villous-ciliate, apex acuminate, often purplish, innermost margin narrowly scarious. Ray florets 3-seriate, white, sometimes pink tinged or purplish, 8–10 mm, tube 2.5–3 mm, sparsely puberulent above, lamina linear, 0.3–0.6 mm wide, involute when dry, glabrous or sparsely hairy; disk florets yellow, veins orange, (4–)4.6–4.8 mm, tube 2.5–2.9 mm, sparsely hairy above, also sometimes on limb and lobe base, limb narrowly funnelform, lobes ovate, 0.5–0.6 mm, anthers and style branches often exerted from disk corolla. Achenes oblong to oblanceolate, flattened (immature), 2–3 mm, sparsely to ± densely strigillose. Pappus 2-seriate, yellowish, outer bristles 0.2–0.3 mm, inner 3.7–4.7 mm. Fl. Jun–Aug.

• Forest margins, alpine or subalpine meadows, rocky slopes; 2600–4100 m. SE Xizang, NW Yunnan.

Two varieties have been recognized in *Erigeron multifolius* in addition to the typical variety, both from NW Yunnan. *Erigeron multifolius* var. *pilanthus* (Weixi; 3500–3600 m) has a hairy disk corolla limb and lobe base, an extension of hairiness from the sparsely hairy tube; more data on this feature in other populations are needed before recognition of the variety is warranted. *Erigeron multifolius* var. *amplisquamus*, from alpine meadows at 3400–3800 m, has broad outer phyl-

laries (1.5–2 mm wide) equaling or exceeding the purplish ray florets. This variety may deserve recognition upon further study.

17. *Erigeron porphyrolepis* Y. Ling & Y. L. Chen, Acta Phytotax. Sin. 11: 416. 1973.

紫苞飞蓬 zi bao fei peng

Herbs, perennial, 8–27 cm tall, caespitose; rhizome robust, woody. Stems numerous or single, erect, 1.5–2 mm in diam. at base, simple, long villous (crosswalls yellow), strigillose, stipitate glandular below capitula. Leaves: basal rosulate, withered or present at anthesis, narrowly winged petiolate, blade spatulate to oblanceolate, 1.5–3 × 0.5–1 cm, 3-veined, base attenuate, margin entire or 1–3-serrulate, villous-ciliate, apex obtuse, mucronate; cauline 5–7, lower shortly petiolate or subsessile, blade oblanceolate or oblong-oblanceolate to oblong, 2–3.5 × 0.3–0.4 cm, surfaces villous, subclasping, uppermost lanate (crosswalls yellow or purple). Capitula solitary, 2–3.2 cm in diam. Involucre hemispheric, 9–20(–25) mm; phyllaries 3- or 4-seriate, purple, appressed, lanceolate, acuminate, abaxially lanate (crosswalls yellow or purple), stipitate glandular, outer 5.5–8.5 mm, mid and inner subequal, 9–11 mm, often exceeding disk florets. Ray florets 2- or 3-seriate, purple, 6.5–7 mm, tube 2.5–2.8 mm, hairy, lamina ca. 0.3 mm wide; disk florets yellow, 4.5–5 mm, tube 2.1–2.6 mm, tube and limb hairy, limb cylindrical-funnelform, lobes triangular, ca. 0.5 mm, purple, glabrous, anthers and style branches often exerted from corolla. Achenes narrowly oblong, flattened, 2–2.5 mm, strigose. Pappus yellowish or brownish, 2-seriate, outer bristles 0.4–0.5 mm, inner ca. 5 mm. Fl. Aug.

- Alpine meadows; 3900–4700 m. Sichuan, E Xizang (Bomi).

18. *Erigeron lanuginosus* Y. L. Chen, Acta Phytotax. Sin. 19: 89. 1981.

棉毛飞蓬 mian mao fei peng

Herbs, perennial, 18–25 cm tall, caespitose; rhizome woody, thick, ascending. Stems numerous, green, purplish striate, simple or branched above, villous, strigillose, more densely so upward. Leaves: basal rosulate, withered or present at anthesis, narrowly winged petiolate, petiole base clasping, blade spatulate or oblanceolate, 2–7 × 0.5–0.8 cm, 3-veined, base attenuate, margin entire or 1–3-serrulate, villous-ciliate, apex obtuse, mucronate; cauline numerous, lower shortly petiolate or subsessile, blade oblong-oblanceolate or oblong, 3–5 × ca. 0.7 cm, surfaces sparsely villous, mid and upper blade elliptic-ovate, slightly reduced upward, surfaces villous, base cuneate, subclasping, margin villous-ciliate, apex acuminate, uppermost lanate (crosswalls purple). Capitula solitary or few in corymbose synflorescences, 1.5–2 cm in diam. Involucre hemispheric, 8–10 mm; phyllaries 3-seriate, ± purple, appressed, linear-lanceolate or linear, exceeding disk florets, 1–1.5 mm wide, apex acuminate, outer 7.5–8 mm, abaxially and marginally lanate (crosswalls purple), mid and inner subequal, longer, margin scarios, purplish, apex often reflexed. Ray florets 2- or 3-seriate, bright purple, 7–8 mm, tube hairy, lamina 0.3–0.4 mm wide, ± exceeding involucre, involute when dry; disk florets yellow, 4–4.8 mm, sparsely hairy, tube 2–2.3 mm, limb cylindrical-funnelform, lobes triangular, ca. 0.5 mm, purplish, hairy,

anthers and style branches often exerted from corolla. Achenes narrowly oblong, 2–2.5 mm, strigose, glandular. Pappus 2-seriate, outer bristles flattened, ca. 0.5 mm, inner ca. 5.5 mm. Fl. Aug.

- Alpine grasslands on slopes; 3200–4200 m. SE Xizang (Bomi, Zayü).

19. *Erigeron kunshanensis* Y. Ling & Y. L. Chen, Acta Phytotax. Sin. 11: 417. 1973.

贡山飞蓬 gong shan fei peng

Herbs, perennial, 10–20 cm tall, caespitose; rhizome woody, rather thick. Stems numerous, rarely 1 or 2, 1–1.5 mm in diam., erect or ascending, purplish, rarely green, simple, sparsely long villous, strigillose. Leaves: basal withered at anthesis, long winged petiolate, petiole villous and villous-ciliate, blade spatulate to oblanceolate, 2–6 × 0.5–1.2 cm, 3-veined, conspicuously reticulate, base attenuate, margin entire, villous-ciliate, apex obtuse to acute; cauline 3–6, often crowded at base, lower and mid sessile, blade lanceolate or linear-lanceolate, 1.3–3.5 × 0.4–0.7 cm, subclasping, apex acute, upper gradually reduced, blade lanceolate to linear-lanceolate, abaxial surface with veins sparsely villous, adaxial villous, strigillose. Capitula solitary, ca. 2 cm in diam. Involucre hemispheric, ca. 8 × 15–20 mm; phyllaries 3-seriate, ± equaling disk florets, purplish or green, appressed, subequal, 1–1.5 mm wide, outer linear-oblanceolate, abaxially villous, strigillose, eglandular, reticulate, apex ± acute, inner linear-lanceolate, villous or glabrate, 1–3-veined, margin narrowly scarios, apex acuminate. Ray florets 3-seriate, purplish, 7–8 mm, tube 2–2.5 mm, hairy above, lamina ca. 0.5 mm wide, flat, involute when dry; disk florets yellow, 3.5–4 mm, sparsely hairy, limb cylindrical-funnelform, lobes ovate, ca. 0.5 mm, glabrous, purplish, anthers and style branches often exerted from corolla. Achenes tan, narrowly oblong, compressed, 2–2.5 mm, densely strigose, 2-veined. Pappus 2-seriate, brownish, outer bristles ca. 0.6 mm, inner ca. 4 mm. Fl. Aug–Oct.

- Alpine meadows, rocky slopes; 3000–3800 m. NW Yunnan (Gongshan).

20. *Erigeron himalajensis* Vierhapper, Beih. Bot. Centralbl., Abt. 2, 19: 491. 1906.

珠峰飞蓬 zhu feng fei peng

Herbs, perennial, 15–50(–60) cm tall, sometimes caespitose; rhizome woody, simple. Stems single or several, 1.5–2 mm in diam., erect or ascending, purple or green above, branched in middle or upper part, sparsely to moderately hirsute-villous, strigillose, base often glabrate, eglandular. Leaves: surfaces sparsely hirsute-villous, sparsely strigillose, sometimes glabrate, eglandular; basal rosulate, withered and fallen at anthesis, long petiolate, blade oblanceolate to oblong; cauline relatively numerous, thin, lower narrowly winged shortly petiolate, blade oblanceolate to oblong, 2–3.5 × 0.2–0.4 cm, ± distinctly 3-veined, base attenuate, margin entire, ciliate, apex obtuse or sometimes acute, mid and upper sessile, blade narrowly oblong, 2–5 × 0.2–0.3 cm, base subclasping, margin entire or with 1 or 2 small teeth, ciliate, apex rounded to obtuse, uppermost reduced, linear. Capitula 2 to many in corymbiform

synflorescences, 1–1.5 cm in diam.; peduncles slender; bracts 1 or 2, linear. Involucre campanulate, 5–7 × 10–15 mm; phyllaries 3-seriate, abaxially sparsely hirsute-villous, strigillose, or glabrate, eglandular. Ray florets 2- or 3-seriate, slightly exceeding or equaling disk florets, 5–6 mm, tube 3–3.5 mm, hairy distally, lamina pink to purple, linear to narrowly oblanceolate, 1–2 mm, involute when dry; disk florets yellow, 4.8–5.3 mm, tube 2.2–2.3 mm, limb cylindric to narrowly funnelform, lobes lanceolate, 0.4–0.5 mm, purplish, glabrous. Achenes straw-colored, oblong, flattened, 2–2.2 mm, strigose, 4-veined. Pappus yellowish to brownish, 2-seriate, outer bristles 0.3–0.4 mm, inner 4.8–5 mm. Fl. Jul–Sep.

Forest margins, stony slopes; 2000–3600 m. W Sichuan, E Xizang, NW Yunnan [Afghanistan].

21. *Erigeron pseudotenuicaulis* Brouillet & Y. L. Chen, *nom. nov.*

细茎飞蓬 xi jing fei peng

Replaced synonym: *Erigeron tenuicaulis* Y. Ling & Y. L. Chen, *Acta Phytotax. Sin.* 11: 418. 1973, not *Erigeron tenuicaulis* M. E. Jones, *Contr. W. Bot.* 12: 44. 1908.

Herbs, perennial, 9–25 cm tall; rhizome woody, tortuous or crowded in tuber, collar clad with marcescent petiole bases, simple or branched. Stems slender, 0.6–1.5 mm in diam., erect or ascending, branched in middle or simple, green, sparsely strigose and strigillose, denser in upper part, sometimes glabrate below, sometimes short-stipitate glandular in upper part. Leaves: basal rosulate, present at anthesis, narrowly winged long petiolate, blade narrowly oblanceolate or oblanceolate-spatulate, 1.5–9 × 0.2–0.4 cm, surfaces strigillose, 3-veined, base attenuate, margin entire or sometimes 2–4-serrulate, strigillose-ciliate, apex obtuse or rounded; lower cauline identical to basal, shortly petiolate, mid and upper sessile, blade linear or linear-lanceolate, 1–2 × 0.1–0.2 cm, surfaces strigillose, short-stipitate glandular, 1–3-veined, margin strigillose-ciliate, apex shortly acuminate. Capitula solitary or 2 or 3 in corymbiform synflorescences, 1–1.5 mm in diam.; peduncles slender; bracts 1–3, linear or subulate. Involucre hemispheric, 3–4 × 8–10 mm; phyllaries 3-seriate, green, linear-lanceolate, ca. 0.5 mm wide, shorter than disk florets, abaxially sparsely strigillose, densely short-stipitate glandular, apex acute to acuminate, outer ca. 1/2 as long as inner, inner 3–4 mm, margin narrowly scarious. Ray florets 2- or 3-seriate, reddish, 6–7 mm, equaling or ± longer than disk florets, tube 2.5–3 mm, hairy, lamina ca. 0.3 mm wide, involute; disk florets yellow, 3.5–4 mm, tube 1–1.5 mm, limb narrowly funnelform, lobes lanceolate, ca. 0.4 mm, reddish. Achenes oblong, compressed, ca. 2 mm (immature), sparsely strigose, 2-veined. Pappus (immature) yellowish brown, 2-seriate, outer bristles very short, inner ca. 4 mm. Fl. Jul–Sep.

• Stony open slopes; ca. 2200 m. SW and W Sichuan (Kangding, Muli).

This species differs from *Erigeron himalajensis* by its slender stems, strigose-ciliate leaf margin, and glandular upper leaf surface.

22. *Erigeron purpurascens* Y. Ling & Y. L. Chen, *Acta Phytotax. Sin.* 11: 419. 1973.

紫茎飞蓬 zi jing fei peng

Herbs, perennial, 5–7 cm tall, caespitose; rhizome subwoody or tuberiform, collar clad with marcescent leaf bases. Stems several or single, ca. 1 mm in diam., erect or ascending, purple, branched in middle part, rarely simple, sparsely hirsutulous, strigillose, short-stipitate glandular below capitula. Leaves: basal rosulate, present at anthesis, narrowly winged petiolate, blade spatulate to oblanceolate, 1.5–2.5 × 0.3–0.6 cm, surfaces glabrous, 3-veined, base attenuate, margin entire or 2- or 3-serrulate, ciliate, apex obtuse or rounded; cauline 3–5, sessile, blade linear-lanceolate or linear, 0.5–2 × 0.1–0.3 cm, surfaces strigillose, often stipitate glandular (not seen), 1- or inconspicuously 3-veined, margin strigose-ciliate, apex acute. Capitula 2 or 3 in corymbiform synflorescences, rarely solitary, 0.8–1.5 cm in diam. Involucre hemispheric, 5–8 × 5–12 mm; phyllaries 3-seriate, purple, linear-lanceolate, ca. 0.5 mm wide, apex acuminate, inner shorter than to equaling disk florets, abaxially sparsely hirsute-villous, strigillose, often stipitate glandular at base (not seen), outer 2–3 mm, inner ca. 8 mm, margin narrowly scarious. Ray florets laminate, 2- or 3-seriate, 6–7 mm, tube ca. 3 mm, hairy, lamina almost filiform, purple, ca. 0.3 mm wide, not patent, involute when dry; disk florets yellow, 4–4.5 mm, tube ca. 1.7 mm, limb narrowly funnelform, sparsely hairy, lobes triangular, ca. 0.5 mm, purplish. Achenes oblong, compressed, ca. 2 mm (immature), strigose. Pappus yellowish, 2-seriate, outer bristles ca. 0.5 mm, inner ca. 5 mm. Fl. Aug–Sep.

• Grasslands on mountain slopes. Sichuan (Kangding).

23. *Erigeron petiolaris* Vierhapper, *Beih. Bot. Centralbl., Abt.* 2, 19: 522. 1906.

柄叶飞蓬 bing ye fei peng

Erigeron pseudoneglectus Popov.

Herbs, perennial, 5–28 cm tall, sometimes caespitose; rhizome short. Stems several, erect, simple, green or reddish, moderately to densely hirsute-villous, sparsely strigillose. Leaves: petiole, margin, and surfaces hirsute-villous, sometimes glabrate or only margin ciliate; basal present at anthesis, long petiolate, blade oblanceolate or oblanceolate-spatulate, 1.5–2 × 0.2–0.4 cm, 3-veined, base attenuate, margin entire or sometimes 2–4-serrulate, apex obtuse, mucronate; cauline 3–12, 0.7–7.2 × 0.1–0.8 cm, lower petiolate, blade oblanceolate, apex obtuse or acuminate, upper sessile, lanceolate, base subclasping, apex acute. Capitula solitary or 2 or 3 in corymbose synflorescences, 1–1.5 cm in diam.; peduncles slender; bracts 1–3, linear or subulate. Involucre hemispheric, 3–4 × 8–10 mm; phyllaries 3-seriate, green, apex purplish, linear-lanceolate, ca. 0.5 mm wide, abaxially hirsute-villous, shorter than disk, apex acuminate, outer ca. 1/2 as long as inner, inner 3–4 mm, margin narrowly scarious. Ray florets 2- or 3-seriate, pink, rarely white, 8–9 mm, tube ca. 2.5 mm, sparsely hairy, lamina ca. 0.4 mm wide, involute when dry; disk florets yellow, ca. 4 mm, hairy, tube ca. 1.5 mm, limb cylindric-funnelform, lobes lanceolate, ca. 0.5 mm, tip purple, anthers and style branches not exerted from corolla. Achenes (immature) oblong, compressed, ca. 2 mm, strigose. Pappus 2-seriate, outer bristles ca. 0.5 mm, inner ca. 4 mm (immature). Fl. Jul–Sep.

Alpine or subalpine meadows, rocky slopes; 2700–3100 m. N Xinjiang (Qinghe) [Kazakhstan, Russia (N Siberia), Uzbekistan].

24. *Erigeron eriocalyx* (Ledebour) Vierhapper, Beih. Bot. Centralbl., Abt. 2, 19: 521. 1906.

棉苞飞蓬 mian bao fei peng

Erigeron alpinus Linnaeus var. *eriocalyx* Ledebour, Fl. Altaic. 4: 91. 1833.

Herbs, perennial, 5–25 cm tall, ± caespitose; caudex branched. Stems several, sometimes single, erect or ascending, green or reddish, simple, sometimes branched, hirsute-villous (at least some crosswalls purple in upper part), strigillose, more densely so upward, eglandular. Leaves green, surfaces sparsely hirsute-villous, margin entire, sparsely villous-ciliate (some crosswalls yellow); basal rosulate, withered at anthesis, long petiolate, blade oblanceolate, 1.5–9.5 × 0.2–0.8(–1.3) cm, base attenuate, apex obtuse; cauline 2–8, lower identical to basal, short-winged petiolate, mid and upper sessile, blade lanceolate to linear-lanceolate, 1–5(–7.5) × 0.2–0.8 cm, base ± subclasping, apex acute. Capitula solitary, rarely 2 or 3 in corymbiform synflorescences, 9–14 × 19–25 mm. Involucre hemispheric; phyllaries 3-seriate, apex purple, appressed, ± equaling disk florets, lanceolate to linear-lanceolate, densely hirsute-villous at base (at least some with purple crosswalls), distally sparsely villous to glabrate, eglandular, membranous, apex acuminate, outer 4.2–5.2 × 0.5–0.6 mm, inner 5–9 × 0.6–1 mm, margin narrowly scarious. Ray florets purple, violet, or lilac, rarely white, 6.6–10 mm, tube 2–2.5 mm, lamina ca. 0.5 mm wide, hairy proximally, involute when dry; disk florets yellow, 3.5–4 mm, tube 1.5 mm, limb cylindric, abruptly ampliate, tube and limb hairy, lobes lanceolate, 0.3–0.4 mm, tip pink, anthers and style branches not exerted from corolla. Achenes narrowly oblong, ± compressed, 2–2.5 × ca. 0.6 mm, strigose. Pappus whitish, 2-seriate, outer bristles 0.2–0.4 mm, inner 3.6–4.5 mm. Fl. Jul–Sep.

Alpine or subalpine meadows; 2400–2600 m. Nei Mongol, W Xinjiang [Kazakhstan, Mongolia, Russia (Siberia); Europe].

A specimen at A from Sichuan (Dêgê Xian, *D. E. Boufford et al.* 36776), determined as *Erigeron porphyrolepis*, keys out here but appears distinct. No other material of this entity was seen at other herbaria. It may represent an unrecognized species.

25. *Erigeron lachnocephalus* Botschantzev, Fl. URSS 25: 230. 1959.

毛苞飞蓬 mao bao fei peng

Erigeron turkestanicus Vierhapper, Beih. Bot. Centralbl., Abt. 2, 19: 522. 1906, not (Regel & Schmalhausén) O. Fedtschenko (1903).

Herbs, perennial, 5–10(–15) cm tall, caespitose; caudex short, branched. Stems several, rarely single, erect or ascending, ca. 2 mm in diam. at base, simple, green or reddish, ± densely yellowish hirsute-villous, more so under capitulum, strigillose, eglandular. Leaves green or grayish, surfaces hirsute-villous, rarely glabrate, margin entire, villous-ciliate; basal present at anthesis, petiolate, blade oblanceolate, 1–7 × 0.2–0.9 cm, base attenuate, apex obtuse or rounded; cauline 4–8, sessile, blade lanceolate to oblong, 0.7–4 × 0.1–0.8 cm, base subclasping,

apex acute. Capitula solitary, sometimes 2, 1–1.7 × 2–3 cm. Involucre hemispheric; phyllaries 3-seriate, equal, exceeding disk florets, ± loose, purplish or rarely green, lanceolate, 7–9.5 × 0.8–1 mm, densely yellowish villous at base to glabrate apically, apex acute, sometimes ± reflexed. Ray florets pink or lilac, 6.5–8.5 mm, tube 2–2.7 mm, hairy above, lamina ca. 0.5 mm wide, involute when dry; disk florets yellowish, ca. 4.9 mm, tube ca. 1.5 mm, limb cylindric, abruptly ampliate, tube and limb hairy, lobes triangular, 0.3–0.5 mm, pink or lilac, anthers and style branches not exerted from corolla. Achenes narrowly oblong, flattened, 2–2.7 mm, strigose, 2-veined. Pappus brownish, 2-seriate, outer bristles 0.4–0.5 mm, inner 3.6–4 mm. Fl. Jun–Aug.

Alpine or subalpine meadows, stony slopes; 2500–3600 m. N Xinjiang [Kazakhstan, Uzbekistan].

26. *Erigeron lonchophyllus* Hooker, Fl. Bor.-Amer. 2: 18. 1834.

矛叶飞蓬 mao ye fei peng

Erigeron armeriifolius Turczaninow ex Candolle; *E. armeriifolius* var. *elatior* Ledebour; *E. armeriifolius* var. *humilis* Ledebour; *E. podolicus* Besser var. *pusillus* Ledebour; *Trimorpha armeriifolia* (Turczaninow ex Candolle) Vierhapper; *T. lonchophylla* (Hooker) G. L. Nesom.

Herbs, biennial or short-lived perennial, 3–30 cm, caespitose; rhizome weak. Stems usually several, 1–1.5 mm in diam., erect or ascending, slenderly branched, green or purplish tinged, sparsely hirsute, especially upward. Leaves basal, rosulate, petiolate or subsessile, blade linear-lanceolate to oblanceolate or spatulate, 1–10 cm × 0.15–6 mm, surfaces sparsely hirsute, margin entire, hirsute-ciliate, apex acute; cauline few, sessile, ± subclasping, blade linear, upper reduced gradually. Capitula 8–10 × 15–20 mm, solitary or several in racemiform, rarely paniculiform synflorescences, long pedunculate. Involucre hemispheric; phyllaries 3-seriate, linear-lanceolate, abaxially hirsute, apex acuminate, outer almost 1/2 as long as inner, inner yellowish green, purple at apex, often exceeding or sometimes equaling disk florets, 5.5–8.5 × 0.5–0.75 mm, margin narrowly scarious. Ray florets 3- or 4-seriate, lilac or pink to pale violet, 5–7 mm, tube 2.5–3 mm, hairy distally, lamina involute; disk florets pale yellow, ca. 4.2 mm, hairy, tube ca. 2 mm, limb narrowly cylindric, lobes lanceolate, ca. 0.2 mm, glabrous, often purplish tinged, anthers and style branches not exerted from corolla. Achenes straw-colored, narrowly oblong, 1.5–2 × ca. 0.3 mm, sparsely strigose. Pappus yellowish, 2-seriate, outer bristles ca. 0.6 mm, inner 4.5–5 mm. Fl. Jul–Sep.

Meadows on banks of rivers, lakes, and marshes, lower mountain plains. N Xinjiang [Kazakhstan, Mongolia, Russia (Siberia); SW Asia (Iran), North America].

27. *Erigeron oreades* (Schrenk ex Fischer & C. A. Meyer) Fischer & C. A. Meyer, Index Sem. Hort. Petrop. 11(Suppl.): 17. 1846.

山地飞蓬 shan di fei peng

Erigeron uniflorus Linnaeus var. *oreades* Schrenk ex Fischer & C. A. Meyer, Enum. Pl. Nov. 2: 39. 1842; *E. alpinus* Linnaeus var. *oreades* (Schrenk ex Fischer & C. A. Meyer) Trautvetter.

Herbs, biennial or short-lived perennial, 2.5–25 cm tall; rhizome weak. Stems solitary, 1–2.5 mm in diam. at base, erect or ascending, simple, or rarely branched, green or sometimes purple-red, densely hirsute, strigillose. Leaves few, margin and petiole hirsute-ciliate, surfaces glabrous or glabrate to sparsely hirsute; basal withered at anthesis, long petiole, petiole base subclasping, blade oblanceolate, 1–3(–7) × 0.2–0.4 cm, base attenuate, apex obtuse to rounded, mucronate; cauline 4–7, sessile, blade linear or linear-lanceolate, 1–4 × 0.1–0.3 cm, apex acute, uppermost often overtopping capitula. Capitula usually solitary, or sometimes 2–8 in racemose synflorescences, ca. 0.8 × 1.5–1.8 cm. Involucre hemispheric; phyllaries 3-seriate, green

or purple at apex, linear-lanceolate, (5–)8–9 × 0.6–1 mm, abaxially sparsely villous-hirsute, outer 1/2 as long as inner or less, inner conspicuously exceeding disk florets, margin scarious. Ray florets 2- or 3-seriate, pale violet, 6–7 mm, tube ca. 2 mm, hairy above, lamina involute when dry; disk florets yellowish, 4–4.5 mm, hairy, tube ca. 1.5 mm, limb cylindrical, lobes lanceolate, ca. 0.6 mm, purple tinged, anthers and style branches not exerted from corolla. Achenes narrowly oblong, compressed, 2–2.5 × ca. 0.6 mm, strigose. Pappus 2-seriate, yellowish, outer bristles ca. 0.5 mm, inner 4.5–5 mm. Fl. Jul–Sep.

Subalpine meadows, moist places on slopes; ca. 2500 m. N Xinjiang (Qinghe) [Kazakhstan, Mongolia, Russia (Siberia)].

2. *Erigeron* sect. *Karvinskia* G. L. Nesom, *Phytologia* 67: 79. 1989.

加勒比飞蓬组 *jia le bi fei peng zu*

Herbs, perennial [or rarely annual], taprooted; caudex simple [or rhizomatous]; herbage strigose to hirsute. Stems branched. Leaves basal (withered at anthesis) and cauline, spatulate to oblanceolate or linear, base not clasping, margin [entire or] serrate or lobed. Capitula erect in bud, 1–5 from upper branches. Ray florets white, becoming lavender, lamina strap-shaped, spreading, not or slightly coiling. Achenes 1–1.9 mm, 2-veined. Pappus 2-seriate, outer of short setae, inner of 10–27 bristles, not accrescent.

Seven species: Central and North America; one species (introduced) in China.

28. *Erigeron karvinskianus* Candolle, *Prodr.* 5: 285. 1836.

加勒比飞蓬 *jia le bi fei peng*

Herbs, short-lived perennial, caespitose, [10–]15–40+[–100] cm tall; caudex short, simple or few branched, taprooted. Stems creeping or prostrate to ascending or erect, sometimes rooting at nodes, branched upward, sometimes with axillary leaf tufts, sparsely strigose to glabrate, eglandular. Leaves: basal and lower usually withered at anthesis, petiolate, petiole narrowly winged, blade elliptic or obovate; cauline shortly petiolate, elliptic to obovate or oblanceolate, 1–4 × 0.3–1.4 cm, even sized, surfaces sparsely strigose to glabrate, eglandular, base attenuate to cuneate, margin 2–4-lobed or entire, slightly revolute, strigose, apex acute or acuminate, mucronulate. Capitula 1 or 2[–5] at ends of upper branches, 5–7 × 10–13 mm. Involucre campanulate; phyllaries 3- or 4-seriate, membranous, linear to

lanceolate, 1.5–3.3 × 0.3–0.6 mm, sparsely strigose, apex acuminate, outer slightly shorter, green along midvein, inner margin narrowly scarious, erose. Ray florets female, 1- or 2-seriate, 45–80, 6–8 mm, tube 1–1.5 mm, lamina flat or slightly coiling, white, sometimes pinkish upon drying, linear, ca. 5 × 0.6 mm, 2-denticulate at apex, glabrous; disk florets bisexual, yellow, narrowly funnelliform, tube ca. 2 mm, sparsely hairy, veins orange, lobes glabrous, apex papillate. Achenes oblong, flattened, ca. 0.8 mm (immature), sparsely strigose, 2-veined. Pappus 2-seriate, outer of short setae, inner bristles 15–27, ca. 2.5 mm. Fl. Mar–Nov.

Hillsides, escaped from cultivation; ca. 700 m. Naturalized in Hong Kong [native to Central America and North America (Mexico)].

Erigeron karvinskianus has become a pantropical and subtropical weed.

3. *Erigeron* sect. *Phalacroloma* (Cassini) Torrey & A. Gray, *Fl. N. Amer.* 2: 175. 1841.

一年蓬组 *yi nian peng zu*

Phalacroloma Cassini in F. Cuvier, *Dict. Sci. Nat.* 39: 404. 1826; *Achaetogeron* A. Gray; *Polyactidium* Candolle; *Stenactis* Cassini.

Herbs, annual or biennial [or short-lived perennial], fibrous-rooted [rarely rhizomatous, caudex simple]; herbage strigose to sparsely hirsute. Stems branched. Leaves basal and cauline, oblanceolate, base not clasping, margin serrate. Capitula nodding in bud, numerous in loosely corymbiform or paniculiform synflorescences. Ray floret lamina narrowly strap-shaped, white, spreading, not coiling or reflexed. Achenes (0.5–)0.8–1.2 mm, 2(–4)-veined. Pappus 2-seriate, outer of scales, bristles of ray florets absent [or present], of disk florets 8–15, not accrescent.

Twenty-one species: Asia, North America; two species (both introduced) in China.

- 1a. Stems sparsely hispid, strigose above; basal leaves withered at anthesis, lower cauline similar; leaf margin coarsely serrate to sometimes entire 29. *E. annuus*
 1b. Stems sparsely to moderately strigose to strigillose or hirsute-strigillose; basal leaves persistent at anthesis, cauline gradually reduced; leaf margin entire or ± deeply serrate to crenate 30. *E. strigosus*

29. *Erigeron annuus* (Linnaeus) Persoon, *Syn. Pl.* 2: 431. 1807 [“*annuum*”].

一年蓬 *yi nian peng*

Aster annuus Linnaeus, *Sp. Pl.* 2: 875. 1753; *Erigeron heterophyllus* Muhlenberg ex Willdenow; *Stenactis annua* (Linnaeus) Cassini ex Lessing.

Herbs, annual, [10–]30–100[–150] cm tall. Stems erect, branched in upper part, sparsely hispid, strigose above (hairs spreading). Leaves: surfaces strigose-hirsute or sometimes glabrate, eglandular; basal withered at anthesis, winged petiolate, blade elliptic or broadly ovate, rarely spatulate, 4–17 × 1.5–4 cm or more, base attenuate, margin coarsely serrate, scabrous, apex acute or obtuse; lower cauline similar, shortly petiolate, mid and upper shortly petiolate or sessile, blade oblong-lanceolate or lanceolate, 1–9 × [0.3–]0.5–2 cm, margin irregularly serrate to subentire, apex acute, uppermost linear. Capitula 5–50+, in loose paniculiform or corymbiform synflorescences, 6–8 × 10–15 mm. Involucre hemispheric; phyllaries 2- or 3(or 4)-seriate, greenish or ± brownish, abaxially sparsely hirsute, minutely glandular, subequal or outer shorter, lanceolate, 3–5 × 0.5–1 mm, herbaceous. Ray florets 80–125, 2-seriate, [4–]6–8[–10] mm, tube 1–1.5 mm, sparsely hairy above, lamina white or sometimes bluish, linear, ca. 5 × 0.6 mm, flat, tardily coiling; disk florets yellow, 2–2.8 mm, sparsely hairy, lobes glabrous. Achenes lanceolate, flattened, [0.8–]1.2 mm, sparsely strigillose. Pappus 2-seriate, outer of scales or setae, inner absent in ray florets, in disk florets of [8–]10–15 long bristles. Fl. Jun–Sep.

Wastelands, roadsides; sea level to 1100 m. Naturalized in Anhui, Fujian, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Shandong, Sichuan, Xizang [native to E North America; widely introduced worldwide].

This species is spreading in China and is probably more widespread than shown here.

30. *Erigeron strigosus* Muhlenberg ex Willdenow, Sp. Pl. 3: 1956. 1803 [*“strigosum”*].

糙伏毛飞蓬 cao fu mao fei peng

Erigeron annuus (Linnaeus) Persoon subsp. *strigosus* (Muhlenberg ex Willdenow) Wagenitz.

Herbs, annual, sometimes biennial or weakly perennial, 30–70 cm tall. Stems erect to ascending, branched in upper part, sparsely to moderately strigose to strigillose or hirsute-strigillose (hairs not spreading). Leaves: surfaces glabrous or glabrate to sparsely strigose or hirsute-strigose; basal usually persistent at anthesis, blade spatulate to oblanceolate or linear, 3–15 × 0.5–2 cm or more, base attenuate, margin entire or shallowly to deeply serrate or crenate, apex acute or obtuse; cauline gradually reduced to near capitula. Capitula 10–200+, in loose corymbiform to paniculate-corymbiform synflorescences. Involucre hemispheric; phyllaries 2–4-seriate, subequal or outer ones shorter, glabrous, strigose, or sparsely hirsute, sometimes minutely glandular, lanceolate, herbaceous. Ray florets 50–100, 2-seriate, 4–6 mm, lamina white, sometimes pinkish or bluish, linear, flat; disk florets yellow, 1.5–2 mm. Achenes lanceolate, flattened, 0.9–1.2 mm, sparsely strigillose. Pappus 2-seriate, outer of scales or setae, inner absent in ray florets, in disk florets of 8–15 long bristles. Fl. Jun–Sep.

Wastelands, roadsides. Naturalized in Anhui, Fujian, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Shandong, Sichuan, Xizang [native to North America].

The variety introduced to China appears to be *Erigeron strigosus* var. *strigosus*. This species has been confused with *E. annuus*, which explains why it is poorly known in China. Its distribution is likely more widespread than shown here.

4. *Erigeron* sect. *Trimorpha* (Cassini) Candolle, Prodr. 5: 290. 1836 [*“Trimorphaea”*].

三型花飞蓬组 san xing hua fei peng zu

Trimorpha Cassini, Bull. Sci. Soc. Philom. Paris 1817: 137. 1817.

Herbs, annual, biennial, or perennial, taprooted or fibrous-rooted; caudex simple. Stems usually branched. Leaves basal and cauline, oblanceolate or oblong to lanceolate or linear-lanceolate, base not clasping, margin entire or sparsely serrate. Capitula erect in bud, few or numerous, in corymbiform or broadly racemiform synflorescences. Ray florets 3–5-seriate, in 2 zones, outer 1–3 lamina filiform, white to pink or purplish, erect, not coiling or reflexed, inner 2 elaminate. Achenes 2–2.4 mm, 2-veined. Pappus of 12–35 bristles, accrescent.

About 30 species: Asia, C and N Europe, North America; six species (one endemic) in China.

- 1a. Ray floret lamina equaling or slightly longer than disk florets; phyllaries shorter than disk; biennial or perennial herbs 31. *E. acris*
- 1b. Ray floret lamina longer than disk florets, rarely only slightly so; phyllaries shorter than or almost equaling disk; perennial herbs.
 - 2a. Ray florets blue 34. *E. tianschanicus*
 - 2b. Ray florets pink or lilac.
 - 3a. Stems and phyllaries stipitate glandular and hirsute-villous; leaves lanceolate to oblanceolate.
 - 4a. Stems densely stipitate glandular at least below capitula and sparsely hirsute-villous; ray florets pink 32. *E. krylovii*
 - 4b. Stems sparsely stipitate glandular and densely villous, lower part almost entirely densely villous; ray florets pink or lilac 33. *E. pseudoseravschanicus*
 - 3b. Stems strigillose or strigose, or glabrate at base, phyllaries villous or strigillose, sometimes sparsely short-stipitate glandular; leaves linear-lanceolate or linear.
 - 5a. Stems reddish; leaf blade linear-lanceolate to linear, margin entire; phyllaries reddish or rarely green, villous, inner shorter than disk florets 35. *E. schmalhauseni*
 - 5b. Stems green; leaf blade linear, margin serrate or subentire; phyllaries green or reddish at apex, strigillose, inner slightly longer than or almost equaling disk florets 36. *E. fukuyamae*

31. *Erigeron acris* Linnaeus, Sp. Pl. 2: 863. 1753 [“*acer*”].

飞蓬 fei peng

Herbs, biennial or perennial, 5–70(–100) cm, taprooted or woody rhizomatous. Stems solitary or sometimes several, 1–6 mm in diam. at base, erect, branched in upper part, strigillose, ± hirsute or hispid, or sometimes glabrate, short-stipitate glandular below capitula. Leaves thin, surfaces sparsely to ± densely strigose-villous, glabrate, or glabrous, margin entire or remotely serrulate or serrate, strigose- or villous-ciliate; basal present or absent at anthesis, long petiolate, oblanceolate or oblong, 1.5–13 × 0.3–1.8 cm, inconspicuously 3-veined, base attenuate, apex obtuse or acute; mid and upper cauline sessile, blade lanceolate or oblong, 0.3–8.5 × 0.1–1 cm, base subclasping, apex acute, arcuate, or obtuse. Capitula numerous, in dense and narrow, or rarely loose and broad, paniculiform or sometimes corymbiform synflorescences, sometimes few in corymbiform synflorescences, 6–13 × 10–25 mm. Involucre hemispheric; phyllaries 3-seriate, green or purple, lanceolate to linear-lanceolate, abaxially ± densely villous or sparsely strigose, sometimes ± densely short-stipitate glandular, apex acute to acuminate, outer almost 1/2 as long as inner, inner shorter than disk florets, 5–7.5 × 0.5–1 mm, margin scarious. Ray florets 4- or 5-seriate, outer 2 or 3 series laminate, 5–7 mm, tube 2.5–3.5 mm, sparsely hairy, lamina pink or lilac, rarely white, ca. 0.25 mm wide, inner 2 series reduced to tube, uncolored, 2.5–3.5 mm, style exceeding tube by 1–2.2 mm, sometimes with rudimentary lamina; disk florets yellow, lobes sometimes ± purplish or dark lilac, 3.6–5.4 mm, sparsely hairy, tube 1.5–2.9 mm, limb cylindrical or cylindrical-funnelform, lobes lanceolate, 0.4–0.5 mm. Achenes straw-colored, oblong to oblong-lanceoloid, ± compressed, 1.6–2.5 mm, ± strigose, 2-veined. Pappus 1- or 2-seriate, white or whitish, outer bristles 0.2–0.5 mm, inner 4–6 mm. Fl. Jun–Sep.

Meadows, pastures, grasslands on slopes, forest margins; 700–3500 m. Gansu, Guangdong, Guangxi, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Afghanistan, Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Russia (Kamchatka, Siberia), Uzbekistan; SW Asia, Europe, North America].

“*Erigeron acer*” is an alternate spelling.

- 1a. Stems and phyllaries purple, rarely green; phyllaries densely stipitate glandular, sometimes also sparsely hispid; capitula many, in corymbose-paniculiform synflorescences 31c. subsp. *politus*
- 1b. Stems and phyllaries green, rarely purplish; phyllaries densely or sparsely villous, mixed with appressed short hairs; capitula numerous, in paniculiform or racemiform synflorescences.
- 2a. Basal and lower cauline leaf margin entire or remotely serrulate; phyllaries abaxially ± densely villous, often short-stipitate glandular; capitula usually in dense, narrow, paniculiform synflorescences 31a. subsp. *acris*

- 2b. Basal and lower cauline leaf margin remotely serrate; phyllaries abaxially sometimes sparsely strigose, densely short-stipitate glandular; capitula usually in loose, broad, paniculiform synflorescences 31b. subsp. *kamtschaticus*

31a. *Erigeron acris* subsp. *acris*

飞蓬(原亚种) fei peng (yuan ya zhong)

Erigeron kamtschaticus Candolle var. *hirsutus* Y. Ling; *Trimorpha acris* (Linnaeus) Gray; *T. vulgaris* Cassini, nom. illeg. superfl.

Herbs, 5–60 cm tall. Stems solitary, sometimes several, 1–4 mm in diam. at base, green or rarely purplish, moderately to densely hirsute-villous, strigillose, or sometimes glabrate. Leaves: surfaces ± densely strigose-villous, thin, margin entire or rarely remotely serrulate, strigose-villous-ciliate; basal dense, often present at anthesis, blade oblanceolate, 1.5–10 × 0.3–1.2 cm, apex obtuse or acute; mid and upper cauline lanceolate, 0.5–8 × 0.1–0.8 cm, uppermost and branch leaves small, linear. Capitula numerous, in dense, narrow, or rarely loose and broad, paniculiform or sometimes corymbiform synflorescences, 6–10 × 11–21 mm. Phyllaries abaxially ± densely villous, often short-stipitate glandular, apex acute, inner 5–7 × 0.5–0.8 mm. Ray florets: outer series 5–7 mm, tube 2.5–3.5 mm; inner series 3–3.5 mm, style exceeding tube by 1–1.5 mm; disk florets 3.6–5 mm, tube 1.5–2 mm, limb cylindrical. Achenes oblong-lanceolate, ca. 1.8 mm, sparsely strigose. Pappus 2-seriate, inner 4–6 mm. Fl. Jul–Sep.

Meadows, pastures, forest margins; 1400–3500 m. Gansu, Guangxi, Hebei, Hubei, Hunan, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Afghanistan, Japan, Kazakhstan, Korea, Mongolia, Russia (W Siberia), Uzbekistan; SW Asia, Europe].

31b. *Erigeron acris* subsp. *kamtschaticus* (Candolle) H. Hara, J. Jap. Bot. 15: 317. 1939.

堪察加飞蓬 kan cha jia fei peng

Erigeron kamtschaticus Candolle, Prodr. 5: 290. 1836; *E. acris* var. *kamtschaticus* (Candolle) Herder; *E. acris* var. *manshuricus* Komarov; *E. angulosus* Gaudin var. *kamtschaticus* (Candolle) H. Hara; *E. kamtschaticus* var. *manshuricus* (Komarov) Koidzumi; *Trimorpha acris* var. *kamtschatica* (Candolle) G. L. Nesom.

Herbs, 30–70(–100) cm. Stems solitary or several, 1–6 mm in diam. at base, green or sometimes purplish, strigillose, densely so below capitula, sometimes sparsely hirsute (sometimes only in basal part). Leaves: surfaces sparsely strigose or strigillose, or glabrate or glabrous, thin; basal often withered at anthesis, blade oblanceolate, 2–13 × 0.3–1.8 cm, margin remotely serrate, strigose-ciliate, apex acute; mid and upper cauline blade lanceolate, 0.3–8.5 × 0.4–1 cm, margin entire, sparsely strigose-ciliate. Capitula numerous in loose, broad, paniculiform or sometimes few in corymbiform synflorescences, 6–10 × 10–19 mm. Phyllaries abaxially sometimes

sparsely strigose, densely short-stipitate glandular, apex acute to acuminate, inner 5–6.5 × 0.6–0.7 mm, margin scarious. Ray florets: outer series 5–6.2 mm, tube 3–3.5 mm; inner 2.5–3 mm, style exceeding tube by 1.5–2.2 mm, sometimes with reduced lamina and pink tipped; disk florets lobes purplish, 4–5.4 mm, tube 2–2.9 mm, limb cylindrical-funnelform. Achenes oblong, 1.6–2.5 mm, strigose. Pappus whitish, 2-seriate, inner 5.5–6 mm. Fl. Jun–Sep.

Grasslands on slopes, forest margins; 700–1200 m. Gansu, Guangdong, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shanxi [Mongolia, Russia (Kamchatka, W Siberia); North America].

31c. *Erigeron acris* subsp. *politus* (Fries) H. Lindberg, Enum. Pl. Fennoscandia, 56. 1901.

长茎飞蓬 chang jing fei peng

Erigeron politus Fries, Summa Veg. Scand. 1: 184. 1845; *E. elongatus* Ledebour (1833), not Moench (1802); *Trimorpha elongata* Vierhapper; *T. polita* (Fries) Vierhapper.

Herbs, 10–50 cm tall, sometimes ± caespitose; rhizome woody, ascending. Stems usually several, 1–4 mm in diam. at base, purple, rarely green, strigillose, sparsely hispid. Leaves green or with reddish petioles, glabrous, rigid, margin entire, strigose-ciliate; basal and lower cauline long petiolate, blade oblanceolate or oblong, 1–10 × 0.1–1.1 cm, apex obtuse; mid and upper sessile, blade oblong or lanceolate, 0.5–7 × ca. 0.8 cm, apex arcuate or obtuse. Capitula many, in corymbiform or corymbose-paniculiform synflorescences, often on long branches, 9–13 × 17–25 mm. Phyllaries 3-seriate, purple, rarely green, densely short-stipitate glandular, sometimes also sparsely hispid, apex acuminate, inner 5.5–7.5 × 0.7–1 mm. Ray florets: outer 6–8 mm, tube 3–4.3 mm, lamina pink or lilac, 0.3–0.5 mm wide, inner 2.5–4.5 mm, style exceeding tube by 1–1.7 mm, sometimes with rudimentary lamina; disk florets yellow, lobes dark lilac, 3.5–5 mm, tube ca. 2.3 mm. Achenes 2–2.5 mm. Pappus white, 1- or 2-seriate, inner 4.5–6 mm. Fl. Jul–Sep.

Meadows on slopes of low mountains, forest margins; 1900–2600 m. Gansu, Hebei, Heilongjiang, Jilin, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang [Kazakhstan, Kyrgyzstan, Russia (Siberia); C and N Europe].

32. *Erigeron krylovii* Sergievskaya, Sist. Zametki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kuybysheva 1945(1): 2. 1945.

新疆飞蓬 xi jiang fei peng

Herbs, perennial, (5–)14–60 cm tall, caespitose; rhizome woody; caudex branched. Stems several, 1–4 mm in diam. at base, erect or ascending, green or reddish, branched in upper part, sparsely hirsute-villous, more densely so above, ± densely short-stipitate glandular at least below capitula. Leaves green, surfaces densely short-stipitate glandular, sometimes eglandular, hirsute-villous, strigillose, margin entire, hirsute-villous-ciliate; basal long petiolate, blade oblanceolate, 3–13 × 0.4–1.4 cm, apex obtuse to acute; cauline 0.5–10 × 0.7–1 cm, lower similar to basal, narrowly to broadly winged petiolate, petiole base subclasping, blade base attenuate, upper oblanceolate to

lanceolate, sessile, subclasping, apex acute. Capitula 2–6 in corymbose-racemiform synflorescences, sometimes solitary, 9–13 × 17–25 mm. Involucre hemispheric; phyllaries 3-seriate, green, linear-lanceolate, densely stipitate glandular, sometimes hirsute-villous, apex acute, outer almost 1/2 as long as inner, inner shorter than or sometimes equaling disk florets, 5.5–7.5 × 0.7–1 mm, margin narrowly scarious. Ray florets 3-seriate, outer laminate, (4–)7.5–10 mm, longer than disk florets, tube 2.5–3.3 mm, hairy distally, lamina pink, filiform, 0.4–0.6 mm wide, inner 2 series reduced to tube, uncolored, 2–3.8 mm; disk florets yellow, lobes pink, tube hairy above. Achenes lanceoloid, slightly flattened, 2.2–2.5 mm, densely strigose. Pappus 2-seriate, outer bristles 0.3–0.5 mm, inner 4–5 mm. Fl. Jul–Sep.

Open grasslands on slopes, subalpine meadows; 1700–2800 m. N Xinjiang [Kazakhstan, Russia (Siberia)].

33. *Erigeron pseudoseravschanicus* Botschantzev, Fl. URSS 25: 585. 1959.

假泽山飞蓬 jia ze shan fei peng

Herbs, perennial, 5–60 cm tall, sometimes caespitose; rhizome woody; caudex branched. Stems several, 1–3 mm in diam. at base, erect, branched, green, sometimes reddish, ± densely hirsute-villous, sometimes also strigillose, sparsely glabrate, sparsely stipitate glandular. Leaves green, surfaces sparsely hirsute-villous, sometimes also sparsely stipitate glandular, notably on petioles, margin entire or sparsely serrate, hirsute-ciliate; basal long petiolate, petiole base clasping, blade lanceolate to oblanceolate, 1–15 × 0.3–1.6 cm, base attenuate, apex acute or obtuse; cauline 0.3–13 × 0.5–1.1 cm, lower similar to basal, upper lanceolate, sessile, apex acute. Capitula usually many, in corymbose-racemiform synflorescences, sometimes solitary, 7–14 × 13–30 mm. Involucre hemispheric; phyllaries 3-seriate, green, sometimes reddish, slightly shorter than disk florets, linear-lanceolate, hirsute-villous or rarely glabrous, stipitate glandular, apex acute, outer ca. 1/2 as long as inner, inner 5–7 × ca. 0.8 mm, margin scarious. Ray florets 3-seriate, outer 2 series laminate, 5.8–8.5 mm, tube 2.2–3.5 mm, lamina pink or lilac, ca. 0.3 mm wide, inner tubular, uncolored, tube 2.2–3 mm, apex hairy, style exceeding tube by 1–1.5 mm, uncolored; disk florets yellow, lobe tips purple, 4–4.7 mm, tube 1.5–2 mm, hairy, limb cylindrical-funnelform, lobes lanceolate, ca. 0.4 mm. Achenes tan, oblanceoloid, compressed, 2–2.2 mm, strigose. Pappus 2-seriate, outer bristles very short, 0.4–0.6 mm, inner 4–5.3 mm. Fl. Jul–Sep.

Subalpine or alpine meadows, forest margins; 1700–2800 m. N Xinjiang [Kazakhstan, Russia (Siberia), Uzbekistan].

Two forms have been recognized in China: *Erigeron pseudoseravschanicus* f. *pseudoseravschanicus* and *E. pseudoseravschanicus* f. *glabrescens* Y. Ling & Y. L. Chen (Acta Phytotax. Sin. 11: 426. 1973). The latter, described from Qinghe, has stems and leaves glabrous or glabrate, only upper part and phyllaries stipitate glandular.

34. *Erigeron tianschanicus* Botschantzev, Fl. URSS 25: 259. 1959.

天山飞蓬 tian shan fei peng

Erigeron coeruleus Popov, Trudy Bot. Inst. Akad. Nauk

S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 7: 11. 1948, not *E. caeruleus* Urban (1912).

Herbs, perennial, 5–60 cm tall, caespitose; rhizomes woody; caudex branched. Stems several, 1–3 mm in diam., green or reddish, branched, hirsute-villous, stipitate glandular, sometimes also strigillose. Leaves green, surfaces sparsely hirsute-villous or glabrous, sparsely to densely stipitate glandular (or rarely eglandular), margin entire, hirsute-ciliate; basal long petiolate, petiole base clasping, blade oblanceolate or lanceolate, 2–15 × 0.2–0.8(–1.7) cm, base attenuate, apex acute to obtuse, mucronate; cauline 0.5–2 × 0.1–0.3 cm, lower similar to basal, upper sessile, blade lanceolate to linear-lanceolate, subclasping, apex acute. Capitula several, in corymbose-racemiform synflorescences, 7–11 × 14–23 mm. Involucre hemispheric; phyllaries 3-seriate, green, slightly shorter than disk florets, linear-lanceolate, sparsely hirsute-villous, moderately to densely stipitate glandular, apex acute, outer ca. 1/2 as long as inner, inner 5–7 × 0.5–0.8 mm, margin narrowly scarious. Ray florets 2- or 3-seriate, outer laminate, 5.9–8 mm, tube 2.5–3 mm, blue, ca. 0.5 mm wide, inner reduced to tube, 2.3–2.9 mm; disk florets yellow, lobes becoming reddish, 3.4–4.1 mm, tube ca. 3 mm, hairy distally, limb cylindrical-funnelform, lobes ovate, ca. 4 mm. Achenes oblong-lanceoloid, slightly compressed, 2–2.2 mm, strigose. Pappus yellowish, 2-seriate, outer bristles short, ca. 0.5 mm, inner 4–4.8 mm. Fl. Jul–Sep.

Open slopes; ca. 2900 m. W Xinjiang [Kazakhstan].

35. *Erigeron schmalhauseni* Popov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 8: 51. 1940.

革叶飞蓬 ge ye fei peng

Erigeron eriocephalus Regel & Schmalhausen, Trudy Imp. S.-Peterburgsk. Bot. Sada 5: 613. 1877, not J. Vahl (1840).

Herbs, perennial, 10–45 cm tall, caespitose; rhizome long, woody; caudex branched. Stems usually many, 1–3 mm in diam., ascending or erect, sinuate especially in upper part, reddish, rarely green, branched, strigillose or glabrate at base, sometimes also villous below capitula. Leaves green or reddish, surfaces glabrous, membranous, margin entire, strigillose- or villous-ciliate; basal long petiolate, blade linear-lanceolate, 1.5–6(–9) × 0.1–0.4(–0.8) cm, apex obtuse or acute; cauline sessile, blade linear or narrowly linear-lanceolate, 0.5–7(–9) × 0.3–0.5 cm, apex acute. Capitula usually numerous, in corymbose-racemiform synflorescences, 7–12 × 14–25 mm. Involucre

hemispheric; phyllaries 3-seriate, reddish or rarely green, linear-lanceolate, villous, sparsely short-stipitate glandular, apex acute, outer ca. 1/2 as long as inner, inner shorter than disk florets, 6–9 × 0.6–1.1 mm, margin scarious. Ray florets 2-seriate, outer or both series laminate, 5.5–8 mm, tube 2.5–3.5 mm, lamina pink or lilac, ca. 0.5 mm wide, inner sometimes reduced to tube, uncolored, tube 2–4.6 mm; disk florets yellow, lobes pinkish or purplish, 4.5–5.9 mm, tube ca. 2 mm, hairy. Achenes straw-colored, oblanceoloid, compressed, 2.2–2.3 mm, densely strigose. Pappus yellowish to orangish, 2-seriate, outer bristles short, inner ones 5–6.7 mm. Fl. Jun–Sep.

Glacial moraines and mountains; 1600–3600 m. W Xinjiang [Kazakhstan, Russia (W Siberia), Uzbekistan].

36. *Erigeron fukuyamae* Kitamura, Acta Phytotax. Geobot. 2: 42. 1933.

台湾飞蓬 tai wan fei peng

Erigeron morrisonensis Hayata var. *fukuyamae* (Kitamura) Kitamura.

Herbs, perennial, 10–30 cm tall, caespitose; rhizome short; caudex branched. Stems several, 1–1.5 mm in diam., erect or ascending, branched above, green, sparsely strigose, sometimes glabrate at base, stipitate glandular. Leaves: basal rosulate, withered, rarely present at anthesis, long petiolate, blade linear, 2–7 × 1–1.5 cm, glabrate or surfaces strigillose, leathery, 1-veined, margin serrate or subentire, apex acute or obtuse; cauline usually many, dense, upper sessile, gradually diminished, 2–6 × 0.1–0.3 cm, margin entire or sometimes remotely serrulate, on synflorescence branches very small, 5–6 mm. Capitula 3–9 in loose corymbiform synflorescences, 1.5–2.3 cm in diam.; peduncles 3–10 cm. Involucre hemispheric, 5–8 × 10–18 mm; phyllaries 3-seriate, equal, green or reddish at apex, linear-lanceolate, 0.5–0.7 mm wide, abaxially strigillose, sometimes also sparsely strigose, apex acuminate, outer 4–5 mm, inner 5–8 mm, margin scarious. Ray florets in 2 forms, outer laminate, ca. 6 mm, tube ca. 2.5 mm, sparsely hairy above, lamina reddish, ca. 0.5 mm wide, mid-inner tubular, ca. 2 mm; disk florets bisexual, yellow, tubular, ca. 4 mm, with scattered appressed fine hairs. Achenes oblong, ca. 2 × 0.5 mm, flattened, with appressed fine hairs. Pappus white or brownish, 2-seriate, outer bristles short, inner 3.5–4 mm. Fl. Apr–Jul.

• Alpine meadows, exposed forest roadsides; 1800–3000 m. Taiwan.

5. *Erigeron* sect. **Caenotus** (Nuttall) Brouillet & Y. L. Chen, **stat. nov.**

小篷草组 xiao peng cao zu

Basionym: *Erigeron* [unranked] *Caenotus* Nuttall, Gen. N. Amer. Pl. 2: 148. 1818; *Caenotus* (Nuttall) Rafinesque; *Conyzella* Fabricius; *Leptilon* Rafinesque.

Herbs, annual [or subshrubs], taprooted [caudex simple]; herbage hirsute or glabrate. Stems branched. Leaves linear to lanceolate or oblanceolate, base not clasping, margin entire or sparsely serrate. Capitula erect in bud, numerous, in panicleiform or loosely corymbiform synflorescences. Ray florets white, lamina filiform, slightly longer than involucre, erect, not coiling or reflexed. Achenes 0.8–1.5 mm. Pappus 1-seriate, of 11–25 bristles, not accrescent.

Six species: North and South America, one species widely introduced worldwide in temperate to tropical regions, including China.

37. Erigeron canadensis Linnaeus, Sp. Pl. 2: 863. 1753.

小蓬草 xiao peng cao

Conyza canadensis (Linnaeus) Cronquist; *Conyzella canadensis* (Linnaeus) Ruprecht; *Leptilon canadense* (Linnaeus) Britton; *Marsea canadensis* (Linnaeus) V. M. Badillo.

Herbs, annual, 50–100 cm tall or more; root fusiform, fibrous rooted. Stems erect, sparsely hirsute, branched above, densely leafy. Leaves: basal withered at anthesis, lower petiole, oblanceolate, [2–]6–10 × [0.4–]1–1.5 cm, surfaces or only adaxial sparsely pilose, base attenuate, margin sparsely serrate or entire, apex acute or acuminate; mid and upper sessile or rarely 1- or 2-toothed. Capitula 3–4 mm in diam., numerous, in terminal, large paniculiform synflorescences; peduncles slen-

der, 5–10 mm. Involucre subcylindric, 2.5–4 mm; phyllaries 2- or 3-seriate, greenish, abaxially sparsely strigose [or glabrous], linear-lanceolate or linear, acuminate, outer ca. 1/2 as long as inner, inner 3–3.5 × ca. 0.3 mm, margin scarious, glabrous. Ray florets 20–30(–45), white, 2.5–3.5 mm, lamina slightly longer than disk floret, apex 2-denticulate; disk florets 8–30, yellowish, 2.5–3 mm, tube sparsely puberulent, lobes 4 or 5. Achenes linear-lanceoloid, compressed, 1–1.5 mm, sparsely strigillose. Pappus 1-seriate, dirty white, bristles 15–25, 2.5–3 mm. Fl. May–Sep.

Common weed of open places, field margins, roadsides, dry streamsides; sea level to 3000 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan, Zhejiang [native to North America].

6. Erigeron sect. Conyza (Lessing) Baillon, Hist. Pl. 8: 143. 1882.

白酒草组 bai jiu cao zu

Conyza Lessing, Syn. Gen. Compos. 203. 1832, nom. cons., not Linnaeus (1753).

Herbs, annual or biennial [or perennial], taprooted [caudex simple]; herbage hirsute to strigose [often glandular]. Stems simple or branched. Leaves linear to lanceolate, oblanceolate, or spatulate, base clasping or not, margin coarsely serrate or pinnatilobed, sometimes entire. Capitula erect in bud, in paniculiform, racemiform, or racemose-paniculiform synflorescences. Ray florets white, elaminate or lamina slightly longer than involucre. Achenes 0.8–2 mm, 2-veined. Pappus 1-seriate, of 10–25 bristles, not accrescent.

About 60–100 species: Africa, Asia, Australia, Europe, North and South America, some species widespread weeds in tropical and subtropical regions worldwide; two species (both introduced) in China.

- 1a. Lower cauline leaf blade margin usually coarsely 4–8-serrate per side, apex acute or acuminate; capitula in large and long paniculiform synflorescences, peduncles 3–5 mm; involucre ca. 4 mm; pappus white, later yellowish brown; ray floret lamina short, filiform 38. *E. sumatrensis*
- 1b. Lower cauline leaf blade margin usually coarsely serrate or pinnatilobed, sometimes entire, apex acute or obtuse; capitula in racemiform or racemose-paniculiform synflorescences, peduncles 10–15 mm; involucre ca. 5 mm; pappus reddish, sordid, or tawny; ray floret elaminate 39. *E. bonariensis*

38. Erigeron sumatrensis Retzius, Observ. Bot. 5: 28. 1788.

苏门白酒草 su men bai jiu cao

Conyza sumatrensis (Retzius) E. Walker.

Herbs, annual or biennial, 80–150 cm tall; roots fusiform. Stems erect, thick, branched above middle, densely leafy, densely gray-white strigose, sparsely hirsute. Leaves: basal withered at anthesis, lower cauline petiolate, blade oblanceolate or lanceolate, 6–10 × 1–3 cm, surfaces densely strigose, especially abaxially, base attenuate, margin usually coarsely 4–8-serrate per side, apex acute or acuminate, mid and upper reduced, blade narrowly lanceolate to linear, margin serrate or entire. Capitula 5–8 mm in diam., numerous, in large and long paniculiform synflorescences; peduncles 3–5 mm. Involucre campanulate to urceolate, ca. 4 × 3–4 mm; phyllaries 3-seriate, gray-green, linear-lanceolate or linear, abaxially scabrous, apex acuminate, outer short or ca. 1/2 as long as inner, inner ca. 4 mm, margin scarious. Ray florets numerous, 4–4.5 mm, lamina yellowish or purplish, short, filiform, apex 2-denticulate; disk florets 6–11, yellowish, ca. 4 mm, tube sparsely puberulent. Achenes linear-lanceoloid, compressed, 1.2–1.5 mm, strigillose. Pappus white, later yellowish brown. Fl. May–Oct.

Common weed of grasslands on slopes, open places, roadsides,

streamsides; 100–2500 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [presumably native to South America; widely distributed as a weed in tropical and subtropical regions worldwide].

39. Erigeron bonariensis Linnaeus, Sp. Pl. 2: 863. 1753.

香丝草 xiang si cao

Conyza ambigua Candolle; *C. bonariensis* (Linnaeus) Cronquist; *C. crispa* (Pourret) Ruprecht; *C. leucodasyis* Miquel; *Erigeron crispus* Pourret; *E. linifolius* Willdenow; *Leptilon bonariense* (Linnaeus) Small; *Marsea bonariensis* (Linnaeus) V. M. Badillo.

Herbs, annual or biennial, [10–]20–50[–150] cm tall; roots fusiform, fibrous rooted. Stems erect or ascending, thin, often branched above middle, densely leafy, densely strigose, sparsely hirsute. Leaves: basal withered at anthesis, lower cauline long petiolate, blade oblanceolate or oblong-lanceolate, 3–5[–8] × 0.3–1[–2.5] cm, surfaces densely strigose or hispidulous, base attenuate, margin usually coarsely serrate or pinnatilobed, sometimes entire, apex acute or obtuse, mid and upper shortly petiolate or sessile, blade narrowly lanceolate or linear, [1–]3–7 × 0.2–0.5[–1] cm, margin of mid dentate, margin of upper entire. Capitula 3–10 mm in diam., numerous, in racemiform or

racemose-paniculiform synflorescences; peduncles 10–15 mm. Involucre urceolate, ca. 5 × 8 mm; phyllaries 2- or 3-seriate, linear, abaxially densely gray-white scabrous, apex acute, outer ones slightly short or ca. 1/2 as long as inner, inner ones ca. 4 × 0.7 mm, margin scarious. Ray florets 65–150 or more, white, 3–3.5 mm, elaminate or 3- or 4-denticulate at apex; disk florets ca. 3 mm, tube sparsely puberulent. Achenes linear-lanceoloid,

compressed, ca. 1.5 mm, sparsely strigillose [or glabrous]. Pappus reddish, sordid, or tawny, 3–4 mm. Fl. May–Oct.

Field margins, grassy slopes, roadsides; sea level to 3100 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [native to South America; widely distributed as a weed in tropical and subtropical regions worldwide].

142. EURYBIA (Cassini) Cassini in F. Cuvier, Dict. Sci. Nat. 16: 46. 1820.

北美紫菀属 bei mei zi wan shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Aster subg. *Eurybia* Cassini, Bull. Sci. Soc. Philom. Paris 1818: 166. 1818.

Perennials, rhizomatous, usually eglandular [sometimes stipitate glandular]. Stems ascending to erect, usually simple, rarely branched at base, glabrous or ± densely hairy. Leaves basal and cauline, sessile or petiolate, blade cordate, ovate, obovate, elliptic, or oblong to spatulate, oblanceolate, or lanceolate, glabrate to hairy, margin entire or serrate [sometimes spinulose-serrate]. Capitula radiate, numerous, usually in corymbiform synflorescences, rarely solitary. Involucre cylindric-campanulate to broadly campanulate; phyllaries in 3–7 series, unequal, bases hardened (rarely wholly leaflike), glabrous or ± hairy [sometimes ± stipitate glandular], margins narrowly scarious (seldom herbaceous), green zones ± basally truncate, in distal 1/3–3/4 (outer) or less (inner), 1-veined, apices obtuse to acute. Receptacles flat to slightly convex, alveolate, epaleate. Florets fertile. Ray florets few to many, purple [or white]; disk florets few to many, bisexual, yellow, limb funnelliform to campanulate, lobes 5, deltate to lanceolate; anther base obtuse, apical appendage lanceolate; style branch tip lanceolate. Achenes cylindric-obconic to fusiform, ± compressed, glabrous or sparsely to densely strigillose, eglandular, 7–12(–18)-veined. Pappus persistent, reddish to yellowish, in 4 series, of numerous unequal, barbellate bristles, inner apically ± clavate.

Twenty-three species: Asia, Europe, North America; one species in China.

Eurybia is North American. *Eurybia sibirica* extended into N Eurasia via the Bering land bridge.

1. *Eurybia sibirica* (Linnaeus) G. L. Nesom, Phytologia 77: 261. 1995.

西伯利亚紫菀 xi bo li ya zi wan

Aster sibiricus Linnaeus, Sp. Pl. 2: 872. 1753; *A. ircutianus* Candolle; *A. sachalinensis* Kudô.

Herbs, perennial, [1–]5–35[–60] cm tall; rhizome thin. Stems usually ascending, sometimes decumbent, often purplish, simple or sometimes branched basally or above, densely villous (sometimes lanate below capitula). Leaves: basal small, deciduous at anthesis; mid cauline sessile, blade oblong to lanceolate [or lanceolate-ovate, obovate, or spatulate], [2.5–]5–8[–9.5] × [0.6–]1–1.7[–3.5] cm, markedly veined, abaxially glabrescent or scabridulous, adaxially sparsely to ± densely villous or villous-strigose, base attenuate to cuneate, subclasping, margin serrate [or entire], apex acute; upper gradually reduced, linear-

oblong. Capitula solitary or 2–5[–50] in dense corymbiform synflorescences. Involucre campanulate, 10–13 mm in diam.; phyllaries 3- or 4[or 5]-seriate, purplish wholly or at apex, densely villous, membranous, green zone in distal 1/3–4/5, truncate basally, or outer often leaflike, apex ± squarrose, outer oblong-lanceolate, 4–5 × ca. 1 mm, 1-veined, margin narrowly scarious, apex acute, inner linear-lanceolate, 4–5 × 1–1.5 mm, apex acuminate. Ray florets 12–50, purple [or white to pale violet], tube 3–4 mm, lamina 7–17.5 × 0.8–1.8 mm; disk florets 25–125, yellow becoming purplish, [5–]6.5–7[–8.1] mm, tube ca. 3 mm, limb funnelliform, lobes purplish, triangular, 0.5–1.1 mm. Achenes brown, fusiform, strigillose, veins 7–10. Pappus dark cinnamon to reddish, ± equaling to slightly longer than disk corolla. Fl. Jul–Aug.

Grasslands on hills; ca. 300 m. Heilongjiang [Japan, Mongolia, E Russia; N Europe, NW North America].

143. GRINDELIA Willdenow, Ges. Naturf. Freunde Berlin Mag. Neuesten Entdeck. Gesamten Naturk. 1: 259. 1807.

胶菀属 jiao wan shu

Perennials, taprooted. Stems usually erect, simple or branched, glabrous or hairy, often gland-dotted and/or resinous. Leaves basal and cauline, alternate, petiolate or (upper) sessile, blade oblong, obovate, oblanceolate, or spatulate to triangular, lanceolate, or linear, glabrous or ± hairy, gland-dotted, margin serrate [sometimes entire]. Capitula radiate [or discoid], usually few to numerous, in corymbiform [or paniculiform] synflorescences, sometimes solitary. Involucres globose to hemispheric or broadly urceolate [sometimes campanulate or obconic]; phyllaries in [3–]5–6[–9+] series, unequal, filiform, linear or lanceolate, glabrous or ± resinous, bases indurate, 1-veined, apices herbaceous, looped or hooked [to straight or incurved]. Receptacles flat to slightly convex, ± alveolate,

epaleate. Florets fertile. Ray florets [absent or] 5–60+, yellow [or orange]; disk florets (20–)100–200(–300+), bisexual, yellow, limb funnellform to campanulate, lobes 5, deltate; anther base obtuse, apical appendage lanceolate; style branch appendage lanceolate [linear to ± deltate]. Achenes ellipsoid to obovoid, ± compressed, sometimes ± 3- or 4-angled, glabrous, eglandular, [striate, ribbed, furrowed, or rugose]. Pappus deciduous, of [1 or]2–8[–15] smooth, barbellulate or barbellate, inner sometimes apically ± clavate, subulate scales or setiform awns [or 1-seriate bristles].

About 30 species: W North America and South America, introduced in Eurasia; one species (introduced) in China.

Grindelia is North American, with a disjunct distribution in South America. Fan et al. (Pl. Diversity Resources 33: 171–173. 2011) recently reported it as introduced to China.

1. *Grindelia squarrosa* (Pursh) Dunal, Mém. Mus. Hist. Nat. 5: 50. 1819.

胶菀 jiao wan

Donia squarrosa Pursh, Fl. Amer. Sept. 2: 559. 1813; *Grindelia aphanactis* Rydberg; *G. nuda* Alph. Wood; *G. serrulata* Rydberg.

Herbs biennial, perennial, or subshrubs, [10–]40–55[–100] cm tall. Stems erect, glabrous, resinous. Leaves: cauline sessile, oval, ovate, [obovate or oblong to spatulate, oblanceolate, lanceolate, or linear], 3.1–4.2 × 1.3–1.6 cm, glabrous, strongly gland-dotted, base ± clasping, margin usually crenate to serrate (teeth resin-tipped) [rarely entire], apex [obtuse to] acute. Capitula in corymbiform synflorescences, rarely solitary, 0.9–1.5 cm. Involucres broadly urceolate to hemispheric or globose, [8–

20 mm in diam.]; phyllaries 5- or 6(–10)-seriate, reflexed to spreading or appressed, filiform or linear to lanceolate-linear, 4–7 mm, resinous, apex usually looped or hooked, subulate. Ray florets [absent or] (12–)24–36(–40), lamina elliptic, 7[–14] mm; disk florets 3–4 mm, limb funnellform, lobes ca. 1 mm. Achenes stramineous [or whitish, brown, or gray], [1.5–]2.8–3[–4.5] mm, faces smooth, striate or ± furrowed. Pappus of 2–4(–8) deciduous, straight or contorted to curled scales or awns [2.5–]4[–5.5] mm, shorter than disk corollas. Fl. [Jul–]Aug–Sep[–Oct].

100–200 m or more. Liaoning [native to W North America].

The specimens were not seen by us; the description is based on Fan et al. (Pl. Diversity Resources 33: 171–173. 2011) and Strother and Wetter (Fl. North America 20: 424–436. 2006).

144. SYMPHYOTRICHUM Nees, Gen. Sp. Aster. 135. 1832.

联毛紫菀属 lian mao zi wan shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Brachyactis Ledebour.

Herbs, perennial or annual, rhizomatous or taprooted, eglandular [sometimes stipitate glandular]. Stems ascending to erect, usually simple, sometimes branched distally, rarely proximally, usually hairy in decurrent lines at least distally, glabrous or hairy, proximally often glabrous. Leaves basal (sometimes persistent at anthesis) and cauline, petiolate (basal and lower cauline) or sessile, blade cordate to elliptic, oblanceolate, spatulate, ovate, elliptic, lanceolate, or linear, faces glabrous or hairy, sometimes stipitate glandular, margin serrate, crenate, or entire, scabrous or ciliate. Capitula radiate or disciform, numerous, usually in paniculiform, sometimes in racemiform or subcorymbiform, synflorescences, sometimes solitary. Involucre cylindric to campanulate [or hemispheric]; phyllaries in (3 or)4–6(–9) series, unequal to subequal, glabrous or hairy [rarely glandular], outer sometimes leaflike, base usually hardened, margin usually scarios, 1(–3)-veined, apex acute to obtuse, usually with a well-defined green zone, sometimes ± leaflike. Receptacles flat to slightly convex, alveolate, epaleate. Florets fertile. Ray florets few to numerous, in 1 [rarely 4 or 5+] series and laminate, or in 2–5+ series and ± elaminate, lamina white, pink, blue, or purple; disk florets few to numerous, bisexual, yellow [or rarely white], limb funnellform or cylindric, lobes 5, deltate to lanceolate; anther base obtuse, apical appendage lanceolate; style branch tip lanceolate. Achenes obovoid or obconic, sometimes fusiform, ± compressed, glabrous or strigillose, eglandular [rarely stipitate glandular], veins (2 or)3–5(–10). Pappus persistent, white to brownish, in 4 series, of numerous ± equal, barbellate, apically acute bristles.

About 90 species: Asia, Europe, North and South America; three species (two introduced) in China.

Symphotrichum pilosum (Willdenow) G. L. Nesom var. *pringlei* (A. Gray) G. L. Nesom was collected from a park in Hong Kong; it may not be established in the flora. Cultivars of *S. novi-belgii* (Linnaeus) G. L. Nesom and other undetermined taxa (possibly horticultural hybrids) are cultivated in China but appear not to have escaped. A cultivar of *S. lanceolatum* (Willdenow) G. L. Nesom is cultivated for the cut-flower market.

- 1a. Herbs perennial; cauline leaves lanceolate to lanceolate-ovate 1. *S. retroflexum*
- 1b. Herbs annual; cauline leaves linear to linear-lanceolate.
 - 2a. Capitula disciform, ray florets elaminate in 2–5+ series, disk floret limb cylindric; phyllaries subequal, outer sometimes longer, leaflike 2. *S. ciliatum*
 - 2b. Capitula radiate, ray florets laminate, purple, in 1 series, disk floret limb funnellform; phyllaries unequal 3. *S. subulatum*

1. *Symphotrichum retroflexum* (Lindley ex Candolle) G. L. Nesom, *Phytologia* 77: 291. 1995.

倒折联毛紫菀 *dao zhe lian mao zi wan*

Aster retroflexus Lindley ex Candolle, *Prodr.* 5: 244. 1836; *A. curtisii* Torrey & A. Gray.

Herbs, perennial, 45–80 cm tall. Stems erect, sometimes purplish, glabrous (except above in lines). Leaves: basal petiolate, lanceolate to ovate, rarely rounded, usually fallen at anthesis; cauline petiolate to sessile, lanceolate to lanceolate-ovate, [5–]6–9.5 × 0.7–1.5[–3.1] cm, slightly reduced in size upward, surfaces glabrous, base attenuate to cuneate or rounded, margin serrate to crenate, sometimes entire, ciliate, apex acute to acuminate. Capitula radiate, numerous, in open, leafy, paniculiform synflorescences, branches spreading; peduncles 0.2–2.5 cm; leaflike bract usually subtending capitulum. Involucre campanulate; phyllaries 3–5-seriate, outer squarrose, often leaflike, lanceolate to linear-lanceolate, ± unequal, outer 6–11 × 0.8–2 mm, eglandular, glabrous, margin narrowly scarious, erose, eciliate, apex acute to acuminate. Ray florets [13–]18–20[–30] in 1 series, lamina purplish blue, [10 or]11[–17] × 1.5[–3] mm, glabrous; disk florets cream to pale yellow, becoming pinkish, 5[–6.8] mm, limb funnelform, 3–3.5 mm, lobes erect, lanceolate, 0.9–1.2 mm, glabrous. Achenes oblanceoloid, ± compressed, 3–3.9 mm, sparsely strigillose, 4–6-veined. Pappus white to reddish, inner 4–4.5 mm, innermost 5–6 mm. Fl. and fr. Sep–Dec.

Roadsides along fields or in mountains. Introduced in Jiangxi [E North America].

2. *Symphotrichum ciliatum* (Ledebour) G. L. Nesom, *Phytologia* 77: 277. 1995.

短星菊 *duan xing ju*

Erigeron ciliatus Ledebour, *Icon. Pl.* 1: 24. 1829; *Aster angustus* Torrey & A. Gray; *A. brachyactis* S. F. Blake; *A. ciliatus* (Ledebour) B. Fedtschenko (1915), not Walter (1788), nor Muhlenberg ex Willdenow (1803), nor Nuttall (1840); *A. latisquamatus* (Maximowicz) Handel-Mazzetti; *Brachyactis ciliata* (Ledebour) Ledebour; *B. latisquamata* (Maximowicz) Kitagawa; *Conyza altaica* Candolle; *E. latisquamatus* Maximowicz.

Herbs, annual, [7–]9–60[–70+] cm tall. Stems erect, usually branched from base, branches then decumbent, often reddish below, upper half and branches sparsely to moderately pilosulose, densely leafy. Leaves: basal petiolate, fallen at anthesis; cauline sessile, linear or linear-lanceolate, 2–6 × 0.3–0.6 cm, reduced in size upward, base subclasping, slightly decurrent, margin entire, sometimes serrulate, apex acute. Capitula

disciform, numerous, in racemiform or paniculiform synflorescences, rarely solitary at ends of branches. Involucre campanulate; phyllaries 2- or 3-seriate, subequal or outer longer, linear, acute, outer leaflike, 3–6 × ca. 1 mm, margin ciliate, margin of inner scarious below, leaflike above. Ray florets 75–95+ in 4 or 5 series, reduced to tube (sometimes with an extremely reduced lamina remnant, latter sometimes pinkish), 2–3 mm, apex sparsely hairy; disk florets white with pink-tipped lobes, 3.5–5 mm, limb narrowly funnelform, ca. 2 mm, lobes erect, triangular, 0.2–0.3 mm. Achenes purplish, narrowly obovoid, [1.5–]2–2.5 mm, moderately strigillose, 2–4-veined. Pappus of many white, fine, barbellulate bristles, outer very short, inner 6–7 mm. Fl. and fr. Aug–Oct.

Salt marshes, meadows, damp riverbanks, marshes and lakes in plains and steppes, usually saline; 500–1500 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Xinjiang [Japan, Kazakhstan, Korea, Mongolia, Russia, Uzbekistan; E Europe, North America].

This North American species crossed the Bering Sea during the Pleistocene.

3. *Symphotrichum subulatum* (Michaux) G. L. Nesom, *Phytologia* 77: 293. 1995.

钻叶紫菀 *zuan ye zi wan*

Aster subulatus Michaux, *Fl. Bor.-Amer.* 2: 111. 1803.

Herbs, annual, 16–150 cm tall. Stems erect, sometimes purplish, glabrous, eglandular. Leaves: basal petiolate, lanceolate to ovate, usually fallen at anthesis; cauline petiolate to sessile, lanceolate to linear-lanceolate, 2–11 × 0.1–1.7 cm, slightly reducing in size upward, surfaces glabrous, eglandular, base attenuate to cuneate, margin serrulate to entire, eciliate, apex acute. Capitula radiate, numerous, in paniculiform synflorescences; peduncles 0.3–1 cm, glabrous, eglandular. Involucre cylindrical; phyllaries 3–5-seriate, lanceolate to linear-lanceolate, glabrous, strongly unequal, outer 1–2 × ca. 0.2 mm, margin scarious, entire, scabrous, distally ciliate, eglandular, apex acute to acuminate. Ray florets numerous, in 1 series, lamina purplish blue, 1.5–2.5 mm, glabrous, eglandular; disk florets yellow, pinkish with age, 3–3.5 mm, limb 1.4–1.5 mm, lobes erect, triangular, 0.4–0.5 mm, glabrous, eglandular. Achenes lanceoloid, 1.5–2.5 mm, 2–6-veined, sparsely strigillose. Pappus of many white, fine, barbellulate bristles, 4–5 mm. Fl. and fr. Aug–Oct.

Disturbed areas, roadsides, grassy fields, irrigation ditches, rice field margins; near sea level to 2000 m. Introduced in Anhui, Fujian, Guangxi, Guizhou, Hebei, Henan, Hong Kong, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Taiwan, Yunnan, Zhejiang [Africa, Central, North, and South America].