

## 7. Tribe SENECTIONEAE

千里光族 qian li guang zu

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Herbs, annual or perennial, rarely subshrubs, shrubs, or trees. Leaves alternate, sometimes rosulate or opposite, sessile or petio- late, entire to lobed or deeply divided. Capitula arranged in corymbs or racemes, or solitary, heterogamous and radiate or disciform, or homogamous and discoid; plants sometimes dioecious. Phyllaries 1- or 2(or rarely pluri)-seriate, free or connate, outer row of bracts (calyculus) smaller, or absent. Receptacle flat or raised, rarely conical, naked or alveolate. Ray florets female, radiate or shortly tubular; styles 2-lobed. Disk florets bisexual or functionally male; corolla tubular, or with limb funnellform or campanulate, 4- or 5-lobed; stamens 4 or 5, anthers basally rounded, acute, or sagittate, sometimes caudate; style bifid, style branches flat with entire or divided stigmatic area inside, sometimes sterile or entire, apically truncate, obtuse, or rounded to conical, sometimes appendaged or with tufts of hair penicillate, glabrous or papillate to hirsute, with or without apical sweeping hairs; endothelial cell wall thick- enings radial or polarized or transitional, antheropodium straight and uniform or dilated toward base. Achene cylindric or terete- angular to ellipsoid-oblong or sometimes flattened, ribbed or smooth, glabrous, glandular, or pubescent. Pappus 1- to many seriate, bristles few or numerous or 0, rarely absent from all florets, white or colored, persistent or caducous. Pollen “seneciooid” or some- times “helianthoid.”

About 150–170 genera and ca. 3,500 species: worldwide; 23 genera (four endemic, three introduced), and 464 species (315 endemic, six intro- duced) in China.

This is a major tribe in the Asteraceae. Nordenstam (in Kadereit & C. Jeffrey, *Fam. Gen. Vasc. Pl.* 8: 208–241. 2007) recognized 151 genera, and, more recently, Nordenstam et al. estimated the number to around 160 (in V. A. Funk et al., *Syst. Evol. Biogeogr. Compositae*, 503–525. 2009). Some new genera have recently been added and a few more will be published, so the number will probably increase to ca. 170. Subtribal classification is problematic. Sometimes only two or three subtribes are recognized, viz., Senecioninae, Tussilaginatae, and Blennospermatinae Rydberg. The latter is better included in the Tussilaginatae, except for *Abrotanella* Cassini, which should be treated as a monogeneric subtribe, Abrotanellinae (Robinson et al., *Ann. Missouri Bot. Gard.* 84: 893–906. 1997; Nordenstam et al., loc. cit.). A satisfactory subtribal classification would probably recognize ca. eight subtribes, but it has not yet been produced. The Chinese members of the tribe Senecioneae are here provisionally divided into three subtribes: Tussilaginatae (Cassini) Dumortier, Tephroseridinae C. Jeffrey & Y. L. Chen, and Senecioninae (Cassini) Dumortier (*Farfugium*, *Ligularia*, and *Cremanthodium* were treated in Senecioninae in FRPS (77(2): 1–171. 1989) but are here referred to the Tussilaginatae). Twenty-three genera with 463 species are recorded in the present treatment. Plants in some genera have economic value, such as *Gynura*, *Ligularia*, *Parasenecio*, *Petasites*, and *Tussilago*, which are used medicinally. Several genera are well known in horticulture (*Doronicum*, *Euryops* (Cassini) Cassini, *Farfugium*, *Kleinia* Mil- ler, *Ligularia*, *Parasenecio*, *Pericallis*, *Senecio*, *Sinacalia*, *Steirodiscus* Lessing, etc.).

- 1a. Antheropodia (filament collars) balusterform, i.e., slightly to distinctly broadened toward base (although sometimes long and narrow) and with at least some basal cells larger than rest ..... 3. Senecioninae (p. 489)
- 1b. Antheropodia (filament collars) cylindric, i.e., of uniform width throughout (although rarely gradually slightly broadened toward base) with all cells  $\pm$  uniform in size, larger basal cells absent.
  - 2a. Phyllaries in 2 rows, all similar, herbaceous ..... 1. Tussilaginatae (*Doronicum*; p. 371)
  - 2b. Phyllaries at least initially in 1 row, although sometimes an outer series (calyculus) of bracts distinct in size and form (usually shorter) also present.
    - 3a. Inner florets functionally male or plants subdioecious; flowering precocious ..... 1. Tussilaginatae (p. 371)
    - 3b. Inner of all florets bisexual; flowering not precocious.
      - 4a. Leaves basally sheathed ..... 1. Tussilaginatae (p. 371)
      - 4b. Leaves basally not sheathed.
        - 5a. Capitula discoid.
          - 6a. Phyllaries 18–22 ..... 2. Tephroseridinae (*Tephroseris rufa* and *T. turczaninowii*; p. 464)
          - 6b. Phyllaries 3–12 ..... 1. Tussilaginatae (p. 371)
        - 5b. Capitula radiate.
          - 7a. Ray florets white ..... 3. Senecioninae (*Hainanecio*; p. 489)
          - 7b. Ray florets yellow, orange, or reddish.
            - 8a. Rhizomes dilatate, tuberiform ..... 1. Tussilaginatae (*Sinacalia*; p. 371)
            - 8b. Rhizomes slender or absent ..... 2. Tephroseridinae (p. 464)

### 1. Subtribe TUSSILAGININAE

款冬亚族 kuan dong ya zu

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Antheropodia cylindric or obconic, without enlarged marginal basal cells; endothelial tissue cell wall thickenings polarized,

cells short; stigmatic areas usually confluent or contiguous; chromosome number usually 30, sometimes 29, 28, 27, 26, or 25, rarely 20 or 19.

About 60 genera and 900 species: worldwide; 11 genera (three endemic) and 269 species (193 endemic) in China.

- 1a. Phyllaries in 2 series, all alike, herbaceous ..... 92. *Doronicum*  
 1b. Phyllaries in 1 series, herbaceous, cartilaginous, or leathery, if an outer series (calyculus) also present then distinct in size and form from inner series.  
 2a. Inner florets functionally male; florets precocious.  
   3a. Plants monoecious; peduncles 1-headed ..... 101. *Tussilago*  
   3b. Plants subdioecious; capitula with polygamous florets; peduncles several headed ..... 102. *Petasites*  
 2b. Inner florets bisexual, florets not precocious.  
   4a. Leaves basally sheathed; achenes not beaked.  
     5a. Leaf margins involute; achenes hairy ..... 93. *Farfugium*  
     5b. Leaf margins revolute; achenes glabrous.  
       6a. Involucre cylindric or obconic ..... 94. *Ligularia*  
       6b. Involucre broadly campanulate or hemispheric ..... 95. *Cremanthodium*  
   4b. Leaves basally not sheathed; achenes beaked or not.  
     7a. Capitula radiate; rhizomes dilated, tuberiform ..... 96. *Sinacalia*  
     7b. Capitula discoid, homogamous, florets bisexual; rhizomes not tuberiform.  
       8a. Style branches with papillae divided at apex into 2 brushlike lobes ..... 97. *Dicercocladus*  
       8b. Style branches with papillae undivided at apex.  
         9a. Cotyledons 1; radical leaves umbraculiform, pendulous when young ..... 100. *Syneilesis*  
         9b. Cotyledons 2; basal leaves not umbraculiform, not pendulous when young.  
           10a. Anthers caudate or sagittate; radical leaves withered by anthesis ..... 98. *Parasenecio*  
           10b. Anthers obtuse, not caudate; radical leaves persistent at anthesis ..... 99. *Ligulariopsis*

## 92. *DORONICUM* Linnaeus, Sp. Pl. 2: 885. 1753.

多榔菊属 duo lang ju shu

Chen Yilin (陈艺林 Chen Yi-ling); Bertil Nordenstam

Herbs, perennial. Leaves alternate; basal leaves long petiolate; stem leaves sessile and semiamplexicaul. Capitula large, usually solitary or 2–6(–8) laxly corymbose, radiate; involucre hemispheric or broadly campanulate; phyllaries 2(or 3)-seriate, herbaceous, subequal; outer phyllaries lanceolate, oblong-lanceolate, or lanceolate-linear; inner phyllaries linear or linear-lanceolate, laxly pubescent or glandular, apex long acuminate. Receptacle slightly raised, glabrous or hairy, heterogamous, all florets fertile. Ray florets uniseriate, female. Disk florets many seriate, bisexual, tubular, yellow; limb cylindric or campanulate, 5-lobed. Anther bases entire or ± auriculate, filamentous cells equal in size, appendages ovate, style 2-lobed, style branches shortly linear, apex rounded or truncate, puberulent. Achenes oblong or oblong-obconic, glabrous or adpressed hairy, ribbed; pappus of many fine bristles, white or reddish, usually absent in ray florets.

About 40 species: temperate N Africa, Asia, and Europe; seven species (four endemic) in China.

The capitula of the genus are large and colorful. Some species are often cultivated as ornamental plants and some used medicinally.

*Doronicum* is morphologically and chemically anomalous in the Senecioneae, and molecular data place it either outside the tribe or basally in the tribe (Pelser et al., Taxon 56: 1077–1104. 2007; Nordenstam et al. in V. A. Funk et al., Syst. Evol. Biogeogr. Compositae, 503–525. 2009). Thus, it may be treated either as the only genus of tribe Doroniceae Panero (Phytologia 87(1): 1. 2005), or the name Doroniceae may be treated within synonymy of the Senecioneae.

*Doronicum bargusinense* Sergievskaya var. *pilosum* C. H. An (Fl. Xinjiang, 5: 477. 1999) is of uncertain status and could not be treated here because no material was seen by the present authors.

- 1a. Ray florets as long as involucre or shorter; capitula 1.5–2(–2.5) cm in diam., few arranged in racemes at apex of stem.  
 2a. Peduncle thick, 3–8 cm, apex dilated and obconic, glandular villous; ray lamina oblong or oblong-elliptic, 7–8 × ca. 2 mm; achenes heteromorphic, glabrous and without pappus in ray florets, densely puberulent in disk florets ..... 6. *D. conaense*  
 2b. Peduncle slender, 1–1.5 cm, apex not dilated, densely villous, glandular hairy; ray lamina linear, 7–10 × 0.2–0.5 mm; achenes similar; achenes in all florets puberulent, pappus present ..... 7. *D. stenoglossum*  
 1b. Ray florets distinctly overtopping involucre; capitula 5–7 cm in diam., solitary, rarely 2.  
   3a. Ovary and achenes heteromorphic, achenes in ray florets glabrous and without pappus, in disk florets pappus present and adpressed hairy.

- 4a. Basal leaves elliptic or obovate-oblong, 2–6(–10) cm, base attenuate into 16–20 cm petiole; outer phyllaries lanceolate, 1.5–3.5 mm wide, inner phyllaries narrowly lanceolate, 1.2–3 mm wide; tube of ray florets glabrous, lamina basally puberulent ..... 4. *D. oblongifolium*
- 4b. Basal leaves obovate-spatulate or suborbicular, 4–11 cm, base attenuate into 4–15 cm winged petiole; outer phyllaries linear-lanceolate or lanceolate, 1.8–2 mm wide, inner phyllaries linear, 1–1.5 mm wide; tube of ray florets densely glandular hairy, lamina basally glabrous ..... 5. *D. turkestanicum*
- 3b. Ovary and achenes similar, glabrous or laxly hairy, all achenes with pappus.
  - 5a. Rhizomes slender, often stoloniferous; capitula 3–5 cm in diam.; involucre 1.5–2 cm in diam., phyllaries laxly or densely pubescent; achenes glabrous ..... 3. *D. gansuense*
  - 5b. Rhizomes robust, not stoloniferous; capitula 4–7 cm in diam.; phyllaries glandular hairy or villous.
    - 6a. Basal leaves ovate or ovate-oblong, rarely orbicular, petioles 6–19 cm, lower stem leaves ovate-oblong, basally attenuate into ca. 2 cm broadly winged petiole, glabrous or glandular ciliate on margin; involucre 2–3 cm in diam.; ray florets 1.6–2.5 cm, pappus as long as or only slightly longer than achenes; achenes glabrous or sometimes laxly puberulent ..... 1. *D. altaicum*
    - 6b. Basal leaves obovate-spatulate or oblong-elliptic, petioles shorter, lower stem leaves ovate-oblong or oblong-spatulate, basally attenuate into 2–4 cm broadly winged petiole, both surfaces articulate-villous and glandular hairy especially on veins; involucre 3–3.5 cm in diam.; ray florets 2.2–2.8 cm, pappus ca. 3 × as long as achenes; achenes laxly puberulent on veins ..... 2. *D. calotum*

**1. *Doronicum altaicum*** Pallas, Acta Acad. Sci. Imp. Petrop. 2: 271. 1779.

阿尔泰多郎菊 a er tai duo lang ju

*Aronicum altaicum* (Pallas) Candolle.

Rhizomes procumbent or sometimes ascending, stout, ca. 1 cm in diam. Stem solitary, erect, green or brown, sometimes purple tinged, 20–80 cm tall, simple, basally glabrous, apically densely glandular hairy, more densely so below capitula. Radical leaves usually withered by anthesis; petiole long, 6–19 cm; blade ovate or obovate-oblong, 5–10 × 4–5 cm, base attenuate, apex rounded or obtuse. Stem leaves 5 or 6; uppermost leaves ovate-oblong, 5–6 × 4–4.5 cm, base attenuate into ca. 2 cm broadly winged petiole; other stem leaves sessile, broadly ovate, semiamplexicaul. Median leaves 7–8 × 3–3.5 cm, upper leaves 2.5–3.5 × 0.8–2.5 cm, all glabrous, base broadly cordate, semiamplexicaul, margin undulate-denticulate, or sometimes entire, glandular ciliate, apex obtuse or slightly acute. Capitula solitary, large, 4–6 cm in diam. with ray florets. Involucre hemispheric, 2–3 cm in diam.; phyllaries equal, 1–1.3 cm; outer phyllaries oblong-lanceolate or lanceolate, 1.8–2 mm wide, densely glandular hairy at base; inner phyllaries linear-lanceolate or linear, 0.5–1 mm wide, glabrous or ciliate on margins only, all phyllaries apically long acuminate. Ray florets yellow, (1.6–)2–2.5 cm, with 2–2.5 mm tube, glabrous; lamina linear-oblong, 16–22 × 2–2.5 mm, 3-veined, apically 3-denticulate. Disk florets yellow, 5–5.3 mm, with 1.5–2 mm tube and cylindrical campanulate limb, 5-lobed, lobes ca. 1 mm, apically acute; anthers ca. 2 mm, basally obtuse, appendages ovate; style branches short, apically obtuse or truncate. Achenes yellow-brown or dark brown, cylindrical, 2–4 mm, ribbed, glabrous or sparsely puberulent. Pappus present in all florets, white or red-brown at base, 3–4 mm. Fl. Jun–Aug.  $2n = 30, 60$ .

Grasslands on slopes, understories of *Picea* forests; 2300–2500 m. Nei Mongol, Shaanxi, N Xinjiang [Mongolia, Russia (Siberia)].

**2. *Doronicum calotum*** (Diels) Q. Yuan, Acta Bot. Yunnan. 30: 439. 2008.

西藏多郎菊 xi zang duo lang ju

*Cremanthodium calotum* Diels, Bot. Jahrb. Syst. 36(Beibl. 82): 105. 1905; *Doronicum limprichtii* Diels; *D. thibetanum* Cavillier.

Rhizomes procumbent or ascending, stout, ca. 1 cm in diam., tuberous, sometimes short and slender. Stem solitary, erect, green or sometimes purple tinged, (6–)10–75 cm tall, simple, densely villous, yellow-brown, with intermixed short glandular hairs, more densely so below capitula, part of stem leafy. Radical leaves often withered by anthesis, long petiole; petiole 2–4 cm, dilated at base; leaf blade obovate-spatulate or oblong-elliptic, 4–15 × 1.5–3.5 cm, submembranous, base attenuate into narrow or broad petiole, apex obtuse or rounded. Stem leaves dense or lax, usually up to apex of stem; lower leaves ovate-oblong or oblong-elliptic, base narrowed into 2–4 cm broadly winged petiole, margin ciliate. Capitula solitary, terminal, large, 5–6(–7) cm in diam. Involucre hemispheric, 3–3.5 cm in diam.; phyllaries 2- or 3-seriate, equal; outer phyllaries lanceolate or linear-lanceolate, 15–18 × 1.5–2.2 mm; inner phyllaries linear-lanceolate or linear, 1–1.5 mm wide, densely pubescent and shortly glandular hairy, apically narrowly lanceolate. Ray florets yellow, 2.2–2.8 cm, with ca. 3 mm tube, glabrous; lamina oblong-linear, 1.8–3 mm wide, 3- or 4-veined, apically 3-denticulate. Disk florets yellow, 4.5–5 mm, with 2–2.5 mm tube and campanulate limb, 5-lobed, lobes ovate-triangular, apically acute; anthers 1–1.5 mm, basally obtuse; style branches 2-fid, apex obtuse or truncate. Achenes cylindrical, 1.5–2 mm, 10-ribbed, sparsely puberulent on ribs. Pappus present in all achenes, numerous, yellow-brown, 5–5.5 mm, scabrid. Fl. Jul–Sep.

• Alpine grasslands, thickets, stony slopes; 3400–4200 m. Qinghai, S Shaanxi (Qin Ling), SW and W Sichuan, Xizang, NW Yunnan.

**3. *Doronicum gansuense*** Y. L. Chen, Acta Phytotax. Sin. 36: 73. 1998.

甘肃多郎菊 gan su duo lang ju

*Doronicum cavillieri* Álvarez Fernández & Nieto Feliner.

Rhizomes erect or ascending, slender, clad in persistent brown petiole bases. Stem solitary or rarely with stoloniferous branches, green, erect, 10–20 cm tall, simple, glabrous, or upper part especially below capitula yellow-brown glandular hairy. Radical and stoloniferous leaves long petiolate; petiole 3.5–7.5 cm, slender, not winged; leaf blade obovate-oblong, ca. 2.5 × 1.5–2 cm, base slightly cordate, apex rounded. Lower stem leaves with petiole dilated at base; blade obovate or obovate-spatulate, ± membranous, base narrowed into ca. 2 cm winged petiole, apex rounded or obtuse. Median and upper leaves sessile, ovate to ovate-oblong, 2.5–4 × 1–2.5 cm, both surfaces glabrous or sparsely puberulent, base cordate, semiamplexicaul, margin apically entire or rarely inconspicuously denticulate, ciliate, apex obtuse or rounded. Capitula solitary, terminal, 3–5 cm in diam. Involucre hemispheric or broadly campanulate, 1.5–2 cm in diam.; phyllaries 2-seriate, green, subequal, herbaceous; outer phyllaries narrowly lanceolate, 10–13 × 1.5–1.8 mm; inner phyllaries linear-lanceolate, 1–1.3 mm wide, abaxially laxly or densely white hairy, apex acuminate. Ray florets 1.8–2.3 cm, with ca. 2 mm tube, glabrous; lamina yellow, 16–20 × 1.5–2 mm, 4-veined, apically 3-denticulate. Disk florets yellow, 4.5–5 mm, with ca. 2 mm tube and campanulate limb; lobes ovate, ca. 1 mm; anthers obtuse at base; style branches apically truncate. Achenes cylindric, ca. 2 mm, ribbed, glabrous. Pappus present in all florets, yellow-brown, 3–4 mm, scabrid. Fl. Jul–Aug.

- Grassy slopes, forest understories; ca. 3100 m. Gansu.

#### 4. *Doronicum oblongifolium* Candolle, Prodr. 6: 321. 1838.

长圆叶多郎菊 chang yuan ye duo lang ju

?*Doronicum tianshanicum* C. H. An.

Rhizomes short, stout, ca. 2.5 cm in diam., sometimes tuberous, ascending, with black membranous bristles at collar of root. Stem solitary, erect, green, sometimes reddish violet in upper part, 25–30(–50) cm tall, glabrous, glandular hairy in upper part. Radical leaf petiole 16–20 cm; blade elliptic or obovate-oblong, 2–6(–10) × 1.5–2.5 cm, base tapered, attenuate, apex rounded-obtuse. Lower stem leaves similar to radical leaves but narrowed to large winged petioles, semiamplexicaul or sometimes sessile. Median stem leaves sessile, narrowly oblong, 4–8 × 2–3 cm, base semiamplexicaul, apex obtuse or rather acute. Upper leaves 3–4 × ca. 1 cm. All leaves glabrous, margin entire or sometimes terminal leaves inconspicuously dentate, glandular ciliate on margin. Capitula solitary, long pedunculate, 3–4 cm in diam., hemispheric, 1.2–2 cm. Phyllaries 1.2–2 cm, white pubescent, with long, simple, and orbicular glandular hairs; outer phyllaries lanceolate, 1.5–3.5 mm wide; inner phyllaries narrowly lanceolate, 1.2–3 mm wide. Ray florets 2.2–2.8 cm; corolla yellowish, with ca. 2 mm tube; lamina 18–24 × 3.6–5 mm, hairy at base, 4–6-veined, apically finely toothed. Disk florets 5–6 mm; corolla yellow, with ca. 2 mm tube and campanulate limb, lobes 1–1.5 mm, glabrous. Achenes heteromorphic, achenes in ray florets ca. 1.8 mm, glabrous, without pappus; achenes in disk florets 2–2.8 mm, adpressed hairy. Pappus white, 2–2.3 mm, bristly, serrate. Fl. Jun–Aug. 2n = 40.

Beside water canals, forest understories; 1800–2700 m. Xinjiang (Hami) [Kazakhstan, Mongolia, Russia (Siberia)].

*Doronicum oblongifolium* is similar to *D. turkestanicum* but differs in having radical leaves elliptic or obovate-oblong, inner phyllaries linear-lanceolate, tube of ray florets glabrous, and lamina hairy basally.

#### 5. *Doronicum turkestanicum* Cavillier, Annuaire Conserv. Jard. Bot. Genève 13–14: 301, 354. 1911.

中亚多郎菊 zhong ya duo lang ju

*Doronicum oblongifolium* Candolle var. *leiocarpum* Trautvetter.

Rhizomes horizontal or oblique, ca. 1 cm in diam. Stem solitary, erect, striate, green, 25–80 cm tall, simple, with scattered, orbicular, glandular hairs, sometimes subglabrous in lower part. Leaves with both surfaces glabrous or adaxially and marginally sparsely hairy, margin entire or finely and sparsely toothed, base attenuate, apex obtuse or rather acute. Radical leaves withered by anthesis or present, obovate-spatulate or suborbicular, 4–11 × 4–6.5 cm, abruptly or gradually narrowed into a winged petiole 4–10(–15) cm. Stem leaves 4–6, oblong-ovate or oblong, rarely ovate, 3–11 × 1.5–4 cm, sessile or with broadly winged short petiole, semiamplexicaul. Upper leaves smaller, ovate or ovate-lanceolate, rarely linear-lanceolate. Capitula solitary with ray florets 5–6 cm in diam. Involucre hemispheric, (2–)2.5–3 cm in diam.; outer phyllaries lanceolate or lanceolate-linear, 12–17 × (1.5–)1.8–2 mm; inner phyllaries linear, 1–1.5 mm wide; all phyllaries abaxially and marginally sparsely or densely glandular pubescent, apically long acuminate. Ray florets yellowish, 1.8–3 cm, with ca. 2.5 mm tube, outside densely glandular hairy; lamina 1.5–2 cm × 2–2.8 mm, 4- or 5-veined, apically finely (2 or)3-toothed. Disk florets 5.5–7 mm; corolla dark yellow, with 2.5–3 mm tube and campanulate limb, lobes ca. 1 mm; anthers ca. 1.5 mm, basally entire, antheropodium cylindric. Achenes heteromorphic, brown; marginal achenes smooth, 3–4 mm, pappus absent; achenes in disk florets 3–3.5 mm, glabrous or scattered adpressed puberulent, pappus of numerous serrate bristles, white, 3–3.5 mm. Fl. Jun–Aug.

Slopes, understories of *Picea* forests; 1900–2700 m. Nei Mongol, N Xinjiang [Kazakhstan, Mongolia, Russia (Siberia)].

#### 6. *Doronicum conaense* Y. L. Chen, Acta Phytotax. Sin. 36: 75. 1998.

错那多郎菊 cuo na duo lang ju

Rhizomes short, not tuberous, with numerous fibrous roots. Stem solitary, erect, green, striate, 60–90 cm tall, rather stout, 7–8 mm in diam., simple or branched on synflorescences, scattered glandular hairy in upper part, subglabrous in lower part. Radical leaves often withered by anthesis. Median stem leaves sessile, ovate-oblong, 4–7 × 2.5–3 cm, membranous, both surfaces scattered adpressed glandular pubescent, especially on veins, base dilated, cordate, semiamplexicaul, margin rounded finely toothed or subentire, apex obtuse or rather acute. Upper stem leaves ovate or ovate-lanceolate, 2.5–4 × 1.5–2 cm, both surfaces sparsely shortly glandular hairy, base cordate, semiamplexicaul, apex acuminate. Capitula 3 or 4 in axillary racemes, with ray florets 2–2.5 cm in diam.; peduncles 3–8 cm, glandular pubescent, apically obconically dilated. Involucres hemispheric,

10–13 × 15–20 mm; phyllaries 2- or 3-seriate; outer phyllaries narrowly lanceolate, 1.5–2 mm wide, abaxially glandular pubescent in lower half, glabrous or subglabrous in upper part, margin long ciliate; inner phyllaries linear-lanceolate or linear, 0.5–0.8 mm wide, ciliate; all phyllaries long acuminate, equal to disk or rather shorter than disk. Ray florets yellow, 8–10 mm with 2.5–3 mm tube, glabrous; lamina oblong or oblong-elliptic, 7–8 × ca. 2 mm, 4-veined, apically 2- or 3-denticulate. Disk florets numerous; corolla yellow-green, 3.4–4 mm, with ca. 2.5 mm tube and campanulate-funnelform limb, lobes ovate-triangular; anthers linear, 1–1.2 mm, basally obtuse; style branches short, obtuse or truncate. Achenes heteromorphic, brown, obconic-oblong, 2.5–3 mm, 10-ribbed; marginal achenes glabrous, without pappus; achenes in disk florets densely white hairy, pappus pallid-yellow, 3–3.5 mm, scabrid. Fl. Jul–Sep.

- Thickets on slopes; 3800–3900 m. Xizang (Cona).

**7. *Doronicum stenoglossum*** Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 483. 1882.

狭舌多郎菊 xia she duo lang ju

*Doronicum souliei* Cavillier; *D. yunnanense* Franchet ex Diels.

Rhizomes short, slender, not tuberous. Stem solitary, erect, 50–100 cm tall, simple, rarely virgately inflorescence-branched, sparsely or densely white hairy, with intermixed short glandular hairs. Radical leaves withered by anthesis, elliptic or oblong-

elliptic, 8–11 × 3–4 cm, base cuneately narrowed into petiole 3–6 cm, apex obtuse or shortly acuminate. Lower leaves oblong or ovate-oblong, 4–10 × 2.5–4 cm, basally narrowed to narrowly winged petiole. Upper leaves sessile, ovate-lanceolate or lanceolate, 3–12 × 1.5–3.5 cm, base cordate, semiamplexicaul or constricted and lyrate in lower half. All leaves membranous, margin denticulate or subentire, both surfaces pubescent and shortly glandular hairy, especially on veins. Capitula small, 2–2.5 cm in diam., 2–10 arranged in racemes; peduncles 1–1.5 cm, shortly conical, densely glandular pubescent and villous. Involucres hemispheric or broadly campanulate, ca. 1.5 cm; phyllaries 2- or 3-seriate, green, lanceolate or linear-lanceolate, often exceeding disk, 0.3–1.5 mm wide, outside sparsely or densely villous and glandular hairy, subglabrous or glabrous in upper part, apex acuminate. Ray florets pallid yellow, shorter than involucre or equal to them, with 2.5–3 mm tube; lamina linear, 7–10 × 0.2–0.3 mm, 3- or 4-veined, apically 2- or 3-denticulate. Disk florets yellow, ca. 3.5 mm, with 1.5–2 mm tube and narrow campanulate limb; lobes ovate, ca. 0.5 mm; anthers ca. 3 mm, basally obtuse; style branches obtuse or truncate. Achenes homogeneous, brown, subcylindric or slightly curved, 2.5–3 mm, 10-ribbed, puberulent. Pappus present in all florets, white, yellow-white, or reddish, equal to achenes, scabrid. Fl. Jul–Sep.

- Subalpine and alpine grasslands, forest margins, secondary thickets, understories of *Picea* forests; 2100–3900 m. Gansu, Qinghai, NW and W Sichuan, Xizang, NW Yunnan.

### 93. FARFUGIUM Lindley, Gard. Chron. 4. 1857.

大吴风草属 da wu feng cao shu

Liu Shangwu (刘尚武); Irina D. Illarionova

Herbs, perennial, deciduous or sometimes evergreen, with long rhizomes. Stem scapelike, leafless or with few bracteal leaves, base densely long lanate. Leaves all basal in rosette, each leaf involute and appearing fistlike; petiole broadly sheathed at base; leaf blade reniform or orbicular-reniform, abaxially densely hairy, palmately veined. Capitula many in corymb, base with fewer supplementary bracts (calyculus). Involucre campanulate; phyllaries in 2 rows, outer phyllaries narrow, inner phyllaries broad, margin membranous. Receptacle flat, without scales, alveolate, with shallow pits, margin of pit denticulate. Outer florets radiate, female, in 1 row. Central florets tubular, bisexual; limb 5-lobed. Anthers caudate at base, apex appendage oblong, obtuse; filaments glabrous. Style branches shortly hairy, obtuse at apex. Achenes cylindric, hairy between ribs. Pappus of denticulate hairs, white.

Two species: China, Japan; one species in China.

**1. *Farfugium japonicum*** (Linnaeus) Kitamura, Acta Phytotax. Geobot. 8: 268. 1939.

大吴风草 da wu feng cao

*Tussilago japonica* Linnaeus, Syst. Nat., ed. 12, 2: 550; Mant. Pl. 1: 113. 1767; *Arnica tussilaginea* N. L. Burman; *Farfugium grande* Lindley; *F. japonicum* var. *formosanum* (Hayata) Kitamura; *F. japonicum* var. *nokozanense* (Yamamoto) Kitamura; *F. kaempferi* Benth; *F. tussilagineum* (N. L. Burman) Kitamura; *F. tussilagineum* var. *formosanum* (Hayata) Kitamura; *Ligularia formosana* (Hayata) Masamune; *L. kaempferi* Siebold & Zuccarini; *L. nokozanense* Yamamoto; *L. tussilaginea* (N. L. Burman) Makino; *L. tussilaginea* var. *formosana* Hayata; *Senecio japonicus* (Linnaeus) Lessing (1832), not Thunberg (1784); *S. kaempferi* Candolle, nom. illeg. superfl.; *S. tussilagineus* (N. L. Burman) Kuntze.

Rhizomes stout, 1–2 cm in diam. Scape to 70 cm tall, 5–6 mm in diam. at base, initially densely shortly pale yellow pilose, glabrescent. Leaves with petiole 15–25 cm, initially densely shortly pale yellow pilose, ± glabrescent, amplexicaul, sheath densely villous inside; leaf blade abaxially pale green, adaxially green, reniform, 9–13 × 11–22 cm, subleathery, initially gray puberulent, glabrescent, base cordate, margin entire or dentate to palmatilobed, apex rounded; sinus ca. 1/3 as long as leaf blade. Stem leaves bracteal, oblong or linear-lanceolate, 1–2 cm. Capitula 2–7 in corymb; peduncles 2–13 cm, puberulent. Involucre campanulate or broadly turbinate, 1.2–1.5 cm, mouth to 1.5 cm in diam., outside puberulent; phyllaries 12–14, oblong, apex acuminate; inner phyllaries broadly membranous at margin. Ray florets 8–12, yellow; lamina oblong or spatulate-oblong, 1.5–2.2 cm × 3–4 mm, apex rounded or acute. Tubular

florets numerous, 1–1.2 cm; tube ca. 6 mm. Achenes ca. 7 mm, ribbed, hairy. Pappus white, as long as tubular corolla. Fl. and fr. Aug to following Mar.  $2n = 60$ .

Forests, grassy slopes, valleys, sometimes cultivated in gardens; low elevations. ?Anhui, Fujian, Guangdong, Guangxi, Hubei, Hunan, ?Jiangsu, Taiwan, Zhejiang [Japan].

**94. LIGULARIA** Cassini, Bull. Sci. Soc. Philom. Paris 1816: 198. 1816, nom. cons., not Duval (1809).

橐吾属 tuo wu shu

Liu Shangwu (刘尚武); Irina D. Illarionova

*Erythrochaete* Siebold & Zuccarini; *Hoppea* Reichenbach; *Jacobaeoides* Vaillant; *Senecillis* Gaertner.

Herbs, perennial. Rhizome short, with non-flowering rosette leaves. Roots stout or slender, glabrous or hairy. Stem arising from outer axil of rosette leaves, erect, usually solitary, base surrounded with remains of old petiole. Basal leaves (rosette and lower stem leaves) well developed, palmately or pinnately veined; petioles longer, base broadly sheathed. Stem leaves alternate, fewer, similar to basal leaves but smaller, gradually smaller upward; petiole short, base with or without broad sheath. Capitula numerous in corymb, compound corymbs, racemes, paniculate racemes, or solitary, base with few or numerous supplementary bracts; peduncle with a leaflike bract. Involucre cylindric, campanulate, turbinate, or hemispheric; phyllaries in 2 rows, separate, outer phyllaries narrow, inner phyllaries broad, margin membranous, or phyllaries in 1 row, united, apex 2–5-dentate. Receptacle flat, without scales. Outer florets female, radiate or rarely narrowly tubular, or sometimes ray florets absent. Central florets tubular, bisexual; limb 5-lobed. Anthers obtuse at base, apex triangular or ovate, acute; filaments glabrous, apex inflated. Style branches slender, apex obtuse or rounded. Achenes ribbed, glabrous. Pappus with 2 or 3 rows of denticulate hairs or hairs sometimes absent.

About 140 species: Asia, Europe; 123 species (89 endemic) in China.

- 1a. Capitula in corymb or compound corymbs, very rarely solitary.
- 2a. Leaves pinnately veined; leaflike bracts linear; pappus as long as tubular corolla.
- 3a. Stem base without dense hairs; stem leaves with conspicuous, broad sheaths.
- 4a. Ray florets absent; involucre turbinate; pappus yellowish.
- 5a. Capitula numerous, in compound corymbs; involucre ca. 5 mm in diam., phyllaries 5; florets 5, wholly exceeding involucre; stem robust, 1–1.5 cm in diam. at base ..... 43. *L. myriocephala*
- 5b. Capitula 2–10, in corymb; involucre 10–15 mm in diam., phyllaries 10–13; florets numerous, not exceeding involucre; stem slender, 3–5 mm in diam. at base.
- 6a. Leaves oblong or obovate-oblong, base cuneate, margin irregularly coarsely dentate; involucre outside glabrous; outer florets narrowly tubular, female ..... 44. *L. discoidea*
- 6b. Leaves ovate-cordate, margin denticulate; involucre outside hairy; outer florets tubular, bisexual.
- 7a. Plants densely blackish purple pilose; phyllaries lanceolate, margin narrowly brown membranous, apex acute ..... 45. *L. atroviolacea*
- 7b. Plants densely yellow pilose; phyllaries oblong, margin broadly brown membranous, apex obtuse ..... 46. *L. microcardia*
- 4b. Ray florets present; involucre campanulate; pappus white or reddish brown.
- 8a. Leaves glabrous or hairy on both surfaces; stem slender, 4–7 mm in diam. at base.
- 9a. Leaves ovate-lanceolate, margin coarsely dentate, apex acuminate; pappus pale red ..... 50. *L. euryphylla*
- 9b. Leaves ovate-cordate or ovate-oblong, margin denticulate, apex obtuse; pappus brown ..... 51. *L. tongolensis*
- 8b. Leaves white arachnoid-puberulent on both surfaces; stem robust, 1–2.5 cm in diam. at base.
- 10a. Capitula 6–23(–40); involucre hemispheric or broadly campanulate, to 20 mm in diam.; pappus reddish brown or yellowish; leaf base truncate or somewhat cuneate ..... 47. *L. lapathifolia*
- 10b. Capitula more than 50; involucre campanulate or turbinate, 6–10 mm in diam.; pappus white; leaf base shallowly cordate or cuneate.
- 11a. Ray floret longer than tubular florets, lamina apically entire; leaf base shallowly cordate ..... 48. *L. cymbulifera*
- 11b. Ray floret as long as tubular florets, lamina apically 2–4-parted; leaf base cuneate ..... 49. *L. zhouquensis*
- 3b. Stem base with a densely, brown or reddish brown, floccose-lanate circle; stem leaves without broad sheaths.
- 12a. Capitula small, in paniculate compound corymbs; involucre narrowly campanulate, cylindric, or turbinate, 5–11 × 3–10 mm.
- 13a. Leaves ovate-oblong, base subrounded, with prominent reticulate veins on both surfaces ..... 32. *L. rumicifolia*
- 13b. Leaves sagittate or triangular-cordate, base deeply cordate, without prominent reticulate veins on both surfaces.
- 14a. Involucre cylindric or narrowly campanulate, 4–7 mm in diam., longer than wide; ray florets 1–4.

- 15a. Leaves sagittate ..... 33. *L. songarica*
- 15b. Leaves triangular-cordate ..... 34. *L. thomsonii*
- 14b. Involucre semispherical or cupular, 8–20 mm in diam., wider than long; ray florets 5–15.
- 16a. Leaves cordate; capitula 1–15, in corymb; involucre semispherical or cupular, 11–20 mm in diam. .... 41. *L. narynensis*
- 16b. Leaves sagittate or ovate-triangular; capitula numerous, in paniculate compound corymbs; involucre cupular, 6–14 mm in diam. .... 40. *L. thyrsoides*
- 12b. Capitula solitary or 2–10 in corymb or basipetal raceme.
- 17a. Leaves elliptic, base oblique, both laterally unequal ..... 42. *L. kunlunshanica*
- 17b. Leaves orbicular-cordate to oblong-ovate, base cordate.
- 18a. Plants without hairs; capitula 3–10.
- 19a. Achenes glabrous ..... 38. *L. xinjiangensis*
- 19b. Achenes sparsely hairy between ribs ..... 39. *L. tianschanica*
- 18b. Plants often hairy; capitula solitary, rarely in basipetal raceme.
- 20a. Stem white hairy; involucre broadly campanulate ..... 35. *L. schischkinii*
- 20b. Stem glabrous; involucre semispherical.
- 21a. Throat of ray floret outside with 6 flat hairs; petioles of stem leaves basally enlarged into lamellate auricle ..... 36. *L. hamiica*
- 21b. Throat of ray floret outside without hairs; petioles of stem leaves basally not enlarged ..... 37. *L. tulpanica*
- 2b. Leaves palmately veined, with 3–9 main veins; leaflike bracts ovate to linear; pappus as long as tubular corolla or tube of corolla.
- 22a. Capitula including ray florets 3–12 cm in diam.; involucre hemispheric or broadly campanulate, (7–)10–30 mm in diam.; ray florets numerous.
- 23a. Basal leaves ovate, base cordate or rounded, margin regularly sharply dentate; supplementary bracts numerous; pappus yellow, as long as tubular corolla ..... 1. *L. pyrifolia*
- 23b. Basal leaves reniform or ovate-reniform, base cordate or rounded, margin dentate or palmatisect; supplementary bracts 2–4 or absent; pappus white or brown.
- 24a. Phyllaries closely imbricate, not spreading, inner ones convex, 2-carinate on outside; pappus reddish brown.
- 25a. Involucre hemispheric, broader than long, 15–25 × 18–30 mm; ray lamina 4–6.5 cm.
- 26a. Leaf margin dentate; pappus as long as tubular corolla ..... 2. *L. dentata*
- 26b. Leaves palmatisect; pappus as long as tube of tubular corolla ..... 3. *L. japonica*
- 25b. Involucre broadly campanulate, 10–14 × 7–18 mm; ray lamina 1.5–3 cm.
- 27a. Capitula 1 to many; involucre longer than broad; phyllaries outside glabrous or white pilose, apex broadly triangular, obtuse; pappus as long as tubular corolla ..... 4. *L. hodgsonii*
- 27b. Capitula 2–4; involucre as long as broad or broader than long; phyllaries outside shortly brown pilose, apex acute; pappus slightly longer than tube of tubular corolla ..... 5. *L. calthifolia*
- 24b. Phyllaries laxly imbricate, spreading, inner ones not convex, not carinate on outside; pappus yellowish white or purplish brown.
- 28a. Pappus purplish brown, as long as or shorter than tube of tubular corolla ..... 6. *L. phaenicochaeta*
- 28b. Pappus yellowish white, as long as tubular corolla.
- 29a. Involucre 10–12 mm in diam., outside glabrous; stem distally white pilose ..... 7. *L. kangtingensis*
- 29b. Involucre 10–20 mm in diam., outside hairy; stem distally yellow or black pilose.
- 30a. Stem distally and involucre outside black pilose ..... 10. *L. retusa*
- 30b. Stem distally shortly yellow pilose; involucre outside white pilose or glabrous.
- 31a. Ray lamina oblong, 10–15 × 2–4 mm ..... 8. *L. cremanthodioides*
- 31b. Ray lamina cuneate or obovate, 7–8 × 3–6 mm ..... 9. *L. cuneata*
- 22b. Capitula small, including ray florets less than 2 cm in diam.; involucre narrowly campanulate or cylindric, 2–7 mm in diam., if involucre broader than capitula without ray florets.
- 32a. Capitula with ray florets; lamina slightly extending from involucre, rarely longer and split.
- 33a. Ray lamina 10–15 mm, 2–5-parted to -divided, rarely entire.
- 34a. Capitula with 10–15 florets; involucre 4–6 mm in diam., phyllaries 7–10; ray florets 3–5; lamina 3–5-divided ..... 11. *L. stenoglossa*
- 34b. Capitula with 5–7 florets; involucre 2–3 mm in diam., phyllaries 5; ray florets 1 or 2; lamina 2- or 3-parted or entire ..... 12. *L. oligonema*
- 33b. Ray lamina 4–7 mm, entire, apex 2- or 3-denticulate or ray floret similar to tubular floret.
- 35a. Capitula with 2–5 florets; involucre 2–3 mm in diam., outside glabrous; ray floret usually 1 or absent, similar to tubular floret, but split only on one side and as long as tubular floret ..... 13. *L. franchetiana*
- 35b. Capitula with 5–10 florets; involucre 4–7 mm in diam., outside glabrous or pilose; ray florets 1–6.

- 36a. Phyllaries linear-lanceolate, apex acuminate, curved; ray floret 1, as long as tubular florets, lamina small and narrow; limbs of tubular florets wholly extending from involucre; pappus brown, as long as tube of tubular corolla ..... 14. *L. curvisquama*
- 36b. Phyllaries all or only inner ones oblong, apex obtuse or acute, erect; ray florets 1–6, lamina wider; tubular florets slightly longer than involucre; pappus brown or white, as long as or longer than tube of tubular corolla.
- 37a. Involucre narrowly cylindrical, 3–4 mm in diam., outside shortly pilose; ray floret 1, lamina obovate-oblong or oblong, ca. 3 mm wide ..... 15. *L. rockiana*
- 37b. Involucre narrowly campanulate, ca. 6 mm in diam., outside glabrous; ray florets 3–6, lamina narrowly oblong, 1.5–2 mm wide ..... 16. *L. transversifolia*
- 32b. Capitula without ray florets.
- 38a. Involucre narrowly or broadly campanulate, or turbinate, 5–20 mm in diam.
- 39a. Leaves palmatisect, lobes narrow ..... 17. *L. paradoxa*
- 39b. Leaves undivided, margin dentate.
- 40a. Capitula numerous in compound corymbs; involucre turbinate, outside yellowish brown shortly pilose, inner phyllaries marginally broadly brown membranous; pappus brown or white, as long as tube of tubular corolla; stem robust, taller, 1–2 cm in diam. at base ..... 18. *L. purdomii*
- 40b. Capitula fewer, in corymb; involucre outside glabrous, inner phyllaries marginally narrowly membranous; pappus white, as long as tubular corolla; stem slender, dwarf, ca. 7 mm in diam. at base.
- 41a. Capitula fewer than 14; involucre 5–10 mm in diam., phyllaries 5–10.
- 42a. Leaves glabrous, abaxially pale green, adaxially green, margin coarsely sharply dentate; involucre narrowly campanulate, phyllaries 5–8; florets 6–20 ..... 19. *L. yunnanensis*
- 42b. Leaves often purplish red, abaxially with short hairs on white reticulate veins, margin undulately dentate; involucre turbinate, phyllaries 9 or 10; florets 20–30 ..... 20. *L. potaninii*
- 41b. Capitula 1–6; involucre broadly campanulate, 15–20 mm in diam., phyllaries 13–15.
- 43a. Leaves thick, margin undulate-dentate; phyllaries purplish red, petaloid, apex acute ..... 21. *L. cymosa*
- 43b. Leaves thin, margin regularly sharply dentate; phyllaries dark brown, apex obtuse, mucronate, or acute ..... 22. *L. microcephala*
- 38b. Involucre narrowly cylindrical, 1.5–7 mm in diam.
- 44a. Peduncles shortly purplish brown pilose; pappus brown, as long as tubular corolla.
- 45a. Florets 5 or 6(–8), yellow; phyllaries 5; leaves ovate-cordate or subreniform, 5–6(–11) cm wide ..... 24. *L. tenuicaulis*
- 45b. Florets 3 or 5, purple or yellow; phyllaries 3–5; leaves reniform, 6–17 cm wide.
- 46a. Florets 4 or 5, purple; phyllaries 4 or 5, outside purple shortly pilose ..... 23. *L. dux*
- 46b. Florets 3, ?yellow; phyllaries 3, glabrous ..... 25. *L. tongkyukensis*
- 44b. Peduncles shortly yellow pilose or glabrous; pappus white.
- 47a. Phyllaries 5–10, narrowly lanceolate, apex acuminate.
- 48a. Leaf margin regularly triangular-denticulate; florets more than 20; pappus as long as tubular corolla ..... 26. *L. xanthotricha*
- 48b. Leaf margin irregularly coarsely dentate, teeth to 2 cm wide; florets 6–16; pappus as long as or shorter than tubular corolla.
- 49a. Phyllaries outside densely shortly yellow pilose; pappus as long as tube of tubular corolla ..... 27. *L. achyrotricha*
- 49b. Phyllaries outside glabrous, purple ciliate; pappus slightly shorter than tubular corolla ..... 28. *L. macrodonta*
- 47b. Phyllaries 5–7, oblong, apex acute or obtuse.
- 50a. Involucre outside densely yellow shortly pilose ..... 31. *L. konkalingensis*
- 50b. Involucre outside glabrous.
- 51a. Limb of tubular corolla extending from involucre; pappus as long as or shorter than tube of tubular corolla ..... 29. *L. duciformis*
- 51b. Limb of tubular corolla slightly extending from involucre; pappus longer than tube of tubular corolla ..... 30. *L. nelumbifolia*
- 1b. Capitula in panicle-racemes, racemes, or solitary, if in corymb then plant blue-gray; pappus absent.
- 52a. Basal leaves erect, blue-green or grayish green, often glabrous, usually mealy, leaves pinnately veined.
- 53a. Phyllaries united.
- 54a. Capitula numerous in raceme; pappus reddish brown, as long as tube of tubular corolla ..... 52. *L. schmidtii*
- 54b. Capitula 1–9, solitary or in corymb; pappus absent ..... 53. *L. biceps*
- 53b. Phyllaries separate.
- 55a. Pappus reddish brown, as long as or shorter than tube of tubular corolla ..... 54. *L. mongolica*
- 55b. Pappus white, rarely rufous, as long as tubular corolla.

- 56a. Racemes paniculate, with dense and numerous branches in lower part of synflorescence, branches longer, each bearing a raceme.
- 57a. Capitula small; involucre narrowly cylindric or turbinate, 3.5–5 × 2–3 mm, phyllaries 4 or 5; ray florets 1–3; tubular florets 2–7 ..... 55. *L. macrophylla*
- 57b. Capitula larger; involucre cylindric or campanulate, 6–8 × 5–8 mm, phyllaries 6–8, apex acute or acuminate; ray florets (4 or)5–7; tubular florets 10–14(–16) ..... 56. *L. heterophylla*
- 56b. Raceme with fewer capitula, rarely branched.
- 58a. Leaves with conspicuous, white reticulate veins when dry; stem leaves broadly ovate to oblong, ca. 2 × as long as internodes, ascending, base broadened, auriculate or semiamplexicaul.
- 59a. Capitula without ray florets; leaflike bracts ovate-oblong to lanceolate, membranous, reddish yellow when dry, with conspicuous reticulate veins; involucre broadly campanulate, ca. 10 mm in diam. .... 57. *L. lingiana*
- 59b. Capitula with ray florets; leaflike bracts linear; involucre campanulate or turbinate, 4–6 mm in diam.
- 60a. Leaves herbaceous; petiole of basal leaves broadly winged; phyllaries blackish gray, apex acute or acuminate ..... 58. *L. melanocephala*
- 60b. Leaves leathery; petiole of basal leaves without wings; phyllaries dark green, apex triangular.
- 61a. Stem solid; leaf base cordate; phyllaries outside and margin glabrous or brown ciliate ..... 59. *L. dictyoneura*
- 61b. Stem hollow; leaf base cuneate; phyllaries outside shortly pilose, margin densely white ciliate ..... 60. *L. brassicoides*
- 58b. Leaves with obscure reticulate veins; stem leaves oblong to lanceolate, shorter than internodes, erect, base narrowed, semiamplexicaul or not.
- 62a. Leaves usually linear-oblong or elliptic; capitula inclined to one side of raceme rachis ..... 65. *L. pleurocaulis*
- 62b. Leaves ovate or elliptic.
- 63a. Capitula without ray florets ..... 64. *L. chalybea*
- 63b. Capitula with ray florets.
- 64a. Pappus rufous ..... 63. *L. longifolia*
- 64b. Pappus white.
- 65a. Stem white hairy.
- 66a. Phyllaries outside white puberulent or glabrous, margin densely white ciliate ..... 68. *L. liatroides*
- 66b. Phyllaries outside glabrous, margin glabrous or sparsely white ciliate ..... 69. *L. eriocaulis*
- 65b. Stem glabrous.
- 67a. Phyllaries blackish gray ..... 67. *L. virgaurea*
- 67b. Phyllaries green.
- 68a. Leaf margin entire; phyllaries outside glabrous ..... 61. *L. altaica*
- 68b. Leaf margin dentate; phyllaries outside glabrous or shortly pilose.
- 69a. Phyllaries outside shortly pilose ..... 62. *L. alpigena*
- 69b. Phyllaries outside glabrous ..... 66. *L. tangutorum*
- 52b. Basal leaves spreading or ascending, hairy or at least ciliate on margins, abaxially pale green, adaxially green, leaves pinnately or palmately veined.
- 70a. Stem scapelike, leafless, base with a circle densely long white lanate; leaves pinnately veined.
- 71a. Scape stout, base ca. 1 cm in diam.; involucre narrowly campanulate, 6–8 × ca. 5 mm, outside white puberulent; ray lamina ca. 8 mm ..... 70. *L. melanothyrsa*
- 71b. Scape slender, 4–5 mm in diam.; involucre campanulate, 10–12 × 8–10 mm, outside sparsely puberulent; ray lamina 10–18 mm ..... 71. *L. vellerea*
- 70b. Stem with normal leaves, base not densely lanate; leaves pinnately or palmately veined.
- 72a. Leaves pinnately veined; stem leaves without broad sheaths; pappus as long as tubular corolla, rarely shorter than tubular corolla.
- 73a. Capitulum solitary; leaves hastate ..... 72. *L. jamesii*
- 73b. Capitula numerous in paniculate racemes or raceme; leaves of other forms.
- 74a. Synflorescence paniculate-racemose or racemose.
- 75a. Leaves oblong or ovate-oblong, base truncate; synflorescence to 80 cm; ray lamina 5–9 × to 2 mm; limb as long as tube of tubular corolla ..... 73. *L. fangiana*
- 75b. Leaves triangular or ovate-triangular, base subtruncate or cordate; synflorescence to 50 cm; ray lamina 13–18 × ca. 6.5 mm; limb 3–4 × as long as tube of tubular corolla ..... 74. *L. jaluisensis*
- 74b. Synflorescence racemose, lower sometimes branched.
- 76a. Leaves broadly ovate-cordate, abaxially shortly pilose; peduncles usually 2–4, crowded; ray lamina linear, 9–15 × 1–1.5 mm ..... 75. *L. tenuipes*

- 76b. Leaves ovate, ovate-cordate, triangular, or sagittate; peduncle solitary; ray lamina usually wider, if lamina linear then more than 3 cm.
- 77a. Stem and abaxial surface of leaves densely puberulent; stem leaves numerous, apex caudate-acuminate.
- 78a. Leaves ovate-cordate, abaxially shortly brown pilose; involucre campanulate, phyllaries 5, outside shortly pilose; outer florets female, 1 or 2, without corolla; tubular florets 5; pappus shorter than tubular corolla ..... 76. *L. petiolaris*
- 78b. Leaves ovate or triangular, abaxially gray-white puberulent; involucre shallowly campanulate, phyllaries 8 or 9, outside grayish white puberulent; tubular florets numerous; pappus as long as tubular corolla.
- 79a. Capitula with ray florets; lamina yellow, to 13 mm ..... 77. *L. lankongensis*
- 79b. Capitula without ray florets; outer florets 1–3(or 4), narrowly tubular, labiate, not colored, shorter than tubular florets ..... 78. *L. nyingchiensis*
- 77b. Stem and leaves without dense hairs; stem leaves apex obtuse or acute.
- 80a. Basal leaves sagittate or ovate-cordate; stem leaves all or at least lower ones with long winged petiole.
- 81a. Pappus rufous, as long as or slightly longer than tube of tubular corolla; petiole broadly winged.
- 82a. Plants usually shortly yellowish pilose; wings of petiole dentate; involucre broadly campanulate, phyllaries 8, outside shortly pilose; pappus ca. 4 mm ..... 79. *L. pterodonta*
- 82b. Plants glabrous; wings of petiole entire or dentate; involucre narrowly campanulate or cylindrical, phyllaries 5–8, outside glabrous or white ciliate; pappus 6–7 mm ..... 80. *L. latipes*
- 81b. Pappus white, as long as tubular corolla; petiole narrowly winged.
- 83a. Leaves ovate-cordate; involucre broadly campanulate, ca. 10 mm in diam.; ray lamina linear, to 30 mm ..... 81. *L. alatipes*
- 83b. Leaves sagittate or ovate-cordate; involucre campanulate, 4–8 mm in diam.; ray lamina oblong, 2–12 mm.
- 84a. Leaflike bracts ovate, membranous; ray lamina 2–3 mm ..... 82. *L. botryodes*
- 84b. Leaflike bracts narrowly lanceolate or ovate-lanceolate to linear, herbaceous; ray lamina 5–12 mm ..... 83. *L. sagitta*
- 80b. Basal leaves ovate, base shallowly cordate, truncate, or cuneate; stem leaves sessile, erect or ascending.
- 85a. Basal leaves broadly sheathed; mouth of sheath recurved; stem leaves numerous and narrow, ovate-lanceolate or lanceolate, erect, adnate, base narrowed, not amplexicaul.
- 86a. Leaves ovate-cordate; involucre broadly turbinate, to 15 mm in diam.; pappus reddish brown or initially yellowish white; leaflike bracts linear or filiform ..... 84. *L. platyglossa*
- 86b. Leaves ovate-oblong, triangular, or cordate; involucre 5–10 mm in diam.; pappus yellowish; leaflike bracts linear-lanceolate to rhombic.
- 87a. Involucre campanulate, longer than wide; phyllaries oblong, apex acute or obtuse, erect ..... 85. *L. kanaitzensis*
- 87b. Involucre cupular, broader than long; phyllaries broadly obovate or elliptic, apex broadly triangular and recurved mucronate ..... 86. *L. lidjiangensis*
- 85b. Basal leaves narrowly sheathed; stem leaves fewer and wider, oblong or ovate, base rounded or subtruncate, semiamplexicaul.
- 88a. Plants taller, more robust; stem to 2.8 cm in diam. at base; leaves ovate-oblong or broadly ovate, with stout midvein; capitula larger; involucre hemispheric or campanulate, to 2.5 cm in diam. .... 87. *L. ghatsukupa*
- 88b. Plants of medium height; stem 3–8 mm in diam. at base; capitula smaller; involucre campanulate, 4–7 mm in diam.
- 89a. Raceme longer; capitula numerous; phyllaries green, outside glabrous, apex dark brown ..... 88. *L. tsangchanensis*
- 89b. Raceme shorter; capitula 4–13; involucre blackish purple or green, outside shortly pilose ..... 89. *L. muliensis*
- 72b. Leaves palmately veined, with 3–9 principal veins; stem leaves broadly sheathing; pappus as long as or shorter than tubular corolla.
- 90a. Pappus as long as tubular corolla.
- 91a. Leaflike bracts ovate or ovate-lanceolate, margin denticulate.
- 92a. Leaflike bracts herbaceous, green; raceme not spreading; peduncles short; involucre campanulate, base rounded; leaves glabrous ..... 90. *L. sibirica*

- 92b. Leaflike bracts membranous, purplish red; raceme spreading; peduncles long; involucre cupular, base truncate; leaves abaxially shortly pilose ..... 91. *L. cyathiceps*
- 91b. Leaflike bracts linear, margin entire.
  - 93a. Capitula in paniculate racemes, without ray florets; limb ca. 2 × as long as tube of tubular corolla.
    - 94a. Leaves ca. 5 cm wide, glabrous; involucre campanulate or cupular, outside glabrous, nitid; pappus brown ..... 92. *L. leveillei*
    - 94b. Leaves more than 5–11 cm wide, adaxially densely shortly yellow pilose; involucre narrowly campanulate, outside densely shortly yellow pilose; pappus yellow ..... 93. *L. nanchuanica*
  - 93b. Capitula in raceme or solitary, with or without ray florets; limb as long as tube of tubular corolla.
    - 95a. Involucre campanulate to broadly campanulate; pappus reddish brown.
      - 96a. Leaves reniform or cordate, base cordate, margin coarsely triangular-dentate; ray lamina linear, 1.5–2 mm wide ..... 94. *L. hookeri*
      - 96b. Leaves triangular, base truncate, margin denticulate; ray lamina oblong, to 5 mm wide ..... 95. *L. parvifolia*
    - 95b. Involucre campanulate or turbinate; pappus white or pale yellow.
      - 97a. Stem slender, 2–4 mm in diam. at base; leaves triangular-sagittate or ovate-cordate, 2.2–15 cm wide.
        - 98a. Capitula with ray florets; involucre campanulate-turbinate ..... 96. *L. lamarum*
        - 98b. Capitula without ray florets; involucre campanulate ..... 97. *L. subspicata*
      - 97b. Stem robust, 6–10 mm in diam. at base; leaves reniform or cordate, to 24 cm wide.
        - 99a. Leaves abaxially glabrous, adaxially densely shortly pilose; involucre campanulate to broadly turbinate; ray lamina short and wide, 3–4 mm wide ..... 98. *L. wilsoniana*
        - 99b. Leaves abaxially pilose, adaxially glabrous; involucre campanulate; ray lamina longer and narrower, 1–2 mm wide.
          - 100a. Leaves abaxially pale green, shortly pilose only on veins, adaxially dark green; pappus white ..... 99. *L. atkinsonii*
          - 100b. Leaves abaxially densely shortly white pilose; pappus yellowish brown ..... 100. *L. pubifolia*
- 90b. Pappus shorter than tube of tubular corolla.
  - 101a. Leaflike bracts broadly ovate, ovate-lanceolate, or spatulate, margin usually denticulate, if bracts linear-lanceolate then involucre broadly campanulate, ca. 10 mm in diam.
  - 102a. Leaves variable, base sagittate or hastate; basal lobes divergent; sheaths of stem leaves marginally denticulate or laciniate.
    - 103a. Stem robust, 4–12 mm in diam. at base; stem leaves dense and numerous, gradually smaller upward; raceme 22–65 cm; capitula numerous; involucre narrowly campanulate.
      - 104a. Leaves ovate-cordate, glabrous; ray florets 4–6 ..... 101. *L. phyllocolea*
      - 104b. Leaves triangular-hastate or hastate, brown pilose on both surfaces; ray florets 2 or 3 ..... 102. *L. changiana*
    - 103b. Stem slender, 3.5–6 mm in diam. at base; stem leaves few, 2 or 3, remote; raceme to 30 cm; capitula 5–25.
      - 105a. Involucre broadly campanulate, 8–12 mm in diam.; leaves broadly hastate, 2–3 × wider than long; ray lamina to 4 cm ..... 103. *L. latihastata*
      - 105b. Involucre campanulate or narrowly campanulate, 5–7 mm in diam.; leaves cordate or horseshoe-shaped; ray lamina to 2 cm.
        - 106a. Stem and leaves glabrous; leaves triangular- to ovate-cordate; ray lamina oblanceolate ..... 104. *L. caloxantha*
        - 106b. Stem and leaves yellowish red pilose; leaves horseshoe-shaped; ray lamina linear-oblong ..... 105. *L. odontomanes*
  - 102b. Leaves reniform or triangular-reniform, base cordate; basal lobes suborbicular, not divergent; sheaths of stem leaves marginally entire.
    - 107a. Capitula without ray florets.
      - 108a. Involucre glabrous ..... 107. *L. chekiangensis*
      - 108b. Involucre shortly pilose ..... 111. *L. ianthochaeta*
    - 107b. Capitula with ray florets.
      - 109a. Leaflike bracts submembranous ..... 110. *L. veitchiana*
      - 109b. Leaflike bracts herbaceous.
        - 110a. Petiole of basal leaves distally narrowly dentate; leaflike bracts spatulate, with short petiole ..... 108. *L. anoleuca*
        - 110b. Petiole of basal leaves not winged or distally narrowly winged; wing margins entire; leaflike bracts ovate to lanceolate.

- 111a. Leaflike bracts ovate in basal half of synflorescence, distally lanceolate ..... 106. *L. fischeri*  
 111b. Only a few leaflike bracts in base of synflorescence ovate, others lanceolate to linear ..... 109. *L. sachalinensis*
- 101b. Leaflike bracts linear or linear-lanceolate, margin entire.
- 112a. Involucre campanulate or broadly campanulate, 8–12 × 4–9 mm, phyllaries 6–10, florets numerous.
- 113a. Leaves reniform, glabrous, basal lobes not divergent; pappus purplish brown.
- 114a. Ray florets present; involucre glabrous ..... 112. *L. intermedia*  
 114b. Ray florets absent; involucre shortly pilose ..... 113. *L. hopeiensis*
- 113b. Leaves hastate, shortly pilose, basal lobes divergent; pappus pale yellow or yellowish brown.
- 115a. Leaves abaxially and sheath shortly pilose; ray lamina oblong, to 6 mm wide ..... 114. *L. chimiliensis*  
 115b. Leaves shortly pilose on both surfaces; ray lamina linear, 1.5–2 mm wide.
- 116a. Involucre outside glabrous; pappus pale yellow ..... 115. *L. longihastata*  
 116b. Involucre outside shortly white pilose; pappus yellowish brown ..... 116. *L. ruficoma*
- 112b. Involucre cylindric, 6–12 × 2–4 mm, phyllaries 4–6, florets 5–15, if phyllaries to 8 then involucre broader, 17–19 × ca. 8 mm.
- 117a. Leaves divided.
- 118a. Leaves palmatisect; synflorescence 30–60 cm; capitula 40–100; involucre 2–3 mm in diam.; phyllaries 4–6; ray florets 2 or 3 ..... 117. *L. przewalskii*  
 118b. Leaves pinnately dissected; synflorescence 10–25 cm; capitula 7–15; involucre 8–10 mm in diam.; phyllaries 8 or 9; ray florets 4 or 5 ..... 118. *L. qiaojiaensis*
- 117b. Leaves undivided, margin dentate only.
- 119a. Ray florets absent; leaves shortly pilose on both surfaces ..... 119. *L. confertiflora*  
 119b. Ray florets persistent; leaves glabrous or abaxially sometimes only shortly hairy on veins.
- 120a. Leaves cordate-hastate, coarsely 1- or 2-dentate on each outer margin of basal lobes; ray lamina linear-oblong or oblanceolate, 2–4 mm wide.
- 121a. Stem 3–6 mm in diam. at base; capitula with 6–15 florets; involucre 2.5–4 mm in diam., rarely broader ..... 120. *L. stenocephala*  
 121b. Stem slender, 2–3 mm in diam. at base; capitula with 4–6 florets; involucre to 2 mm in diam. .... 121. *L. dolichobotrys*
- 120b. Leaves reniform or ovate- or cordate-hastate, margin denticulate; ray lamina linear, 1–1.5 mm wide.
- 122a. Leaves reniform, to 3.5 cm wide, basal lobes not divergent; capitula with 8 or 9 florets ... 122. *L. kojimae*  
 122b. Leaves ovate- or cordate-hastate, to 6 cm wide, basal lobes divergent; capitula with 5 florets ..... 123. *L. fargesii*

**1. *Ligularia pyrifolia*** S. W. Liu, Bull. Bot. Res., Harbin 5(4): 68. 1985.

梨叶橐吾 li ye tuo wu

Stems 1 or 2, erect, 20–25 cm tall, 2.5–3 in diam. at base, glabrous except on synflorescence. Basal leaves petiolate; petiole to 16 cm, glabrous, base sheathed; leaf blade ovate or cordate-ovate, 5–7.5 × 4–6.3 cm, glabrous, both surfaces with prominent palmate veins, base rounded or shallowly cordate, margin regularly dentate, apex caudate-acuminate. Stem leaves 1 or 2, similar but smaller, petiolate, with enlarged sheath. Capitula 3–5, in lax corymb; peduncles 1.3–1.4 cm, distally shortly brown pilose; leaflike bracts linear-lanceolate, 1–1.5 cm, margin entire; supplementary bracts to 15, linear-lanceolate, 10–14 × ca. 1.5 mm wide, glabrous, margin entire. Involucre broadly campanulate, 1.6–2 × ca. 1.5 cm; phyllaries 10–12, in 2 rows, linear-lanceolate or lanceolate, 2–4 mm wide, margin dark brown, apex acute. Ray florets 6–10, yellow; lamina lanceolate, 20–25 × ca. 6 mm, with 6 or 7 brown veins, apex acuminate. Tubular florets numerous, 10–11 mm; tube ca. 4 mm. Pappus brownish or yellow, as long as tubular corolla. Fl. Aug–Oct.

• Mixed forests, between wet rocks; 1600–2500 m. Yunnan (Jingdong).

**2. *Ligularia dentata*** (A. Gray) H. Hara, J. Jap. Bot. 15: 318. 1939.

齿叶橐吾 chi ye tuo wu

*Erythrochaete dentata* A. Gray, Mem. Amer. Acad. Arts, n.s., 6: 395. 1858; *Ligularia clivorum* Maximowicz; *L. japonica* (Thunberg) Lessing var. *clivorum* (Maximowicz) Makino; *Senecillis dentata* (A. Gray) Kitamura; *Senecio clivorum* (Maximowicz) Maximowicz; *S. japonicus* (Thunberg) Schultz Bipontinus var. *integrifolius* Matsumura; *S. labordei* Vaniot.

Stem erect, 30–120 cm tall, ca. 1.2 cm in diam. at base, proximally glabrous, distally and branches of synflorescence white arachnoid-puberulent and shortly yellow pilose. Basal leaves petiolate; petiole 22–60 cm, stout, white puberulent, palmately veined with 5–7 principal veins, base sheathed; leaf blade abaxially grayish white, adaxially green, reniform, 7–30 × 12–38 cm, abaxially white puberulent, adaxially glabrous, margin regularly dentate, ciliate between teeth, apex rounded. Stem leaves similar but smaller; distal stem leaves sessile, broadly

sheathed. Synflorescence corymbose or compound corymbose, spreading; peduncles to 9 cm, white arachnoid-puberulent and shortly yellow pilose; leaflike bracts ovate to linear-lanceolate, margin denticulate; supplementary bracts absent. Capitula numerous. Involucre hemispheric, broader than long, 1.5–2.5 × 1.8–3 cm, outside densely white arachnoid-puberulent; phyllaries 8–14, closely imbricate, oblong, to 1 cm wide; inner phyllaries 2-carinate on convex outside and margin brown membranous. Ray florets yellow; lamina narrowly oblong, to 5 cm × 4–7 mm, apex acute; tube 7–12 mm. Tubular florets numerous, 1–1.8 cm. Achenes brown, cylindrical, 7–10 mm, ribbed. Pappus reddish brown, as long as tubular corolla. Fl. and fr. Jul–Oct.

Grassy slopes, riversides, forest margins, forest understories, sometimes cultivated in gardens; 700–3200 m. Anhui, Gansu, Guangxi, Guizhou, ?Hebei, Henan, Hubei, Hunan, Jiangxi, Shaanxi, Shanxi, Sichuan, Yunnan, Zhejiang [Japan, Myanmar, Vietnam; cultivated in Europe].

**3. *Ligularia japonica*** (Thunberg) Lessing, Syn. Gen. Compos. 390. 1832.

大头橐吾 da tou tuo wu

Stem erect, 50–100 cm tall, to 1 cm in diam. at base, distally and branches of synflorescence white arachnoid-puberulent or glabrous. Basal leaves petiolate; petiole grayish green, with purple spots, 20–100 cm, stout, unwinged, base sheathed; leaf blade abaxially pale green, adaxially green, reniform, ca. 40 cm in diam., abaxially initially white puberulent, glabrescent, adaxially glabrous or shortly pilose, veins palmate, palmatisect; lobes 3–5, palmatilobed; segments pinnate, margin dentate, or rarely entire. Middle and distal stem leaves smaller, shortly petiolate, sheath amplexicaul. Distal stem leaves without sheaths, palmatipartite. Capitula 2–8, in corymb; supplementary and leaflike bracts usually absent; peduncles to 20 cm, white floccose-puberulent. Involucre hemispheric, broader than long, 1–2.5 × 1.5–2.4 cm, outside white puberulent; phyllaries 9–12, closely imbricate, broadly oblong, to 8 mm wide, apex triangular, mucronate; inner phyllaries 2-carinate on convex outside and margin broadly membranous. Ray florets yellow; lamina oblong, 4–6.5 × ca. 1 cm; tube 7–12 mm. Tubular florets numerous, ca. 2 cm; tube ca. 1 cm. Achenes cylindrical, 7–16 mm, ribbed. Pappus reddish brown, as long as tube of tubular corolla. Fl. and fr. Apr–Sep. *2n* = 60.

Stream banks, grassland slopes, forest understories; 600–2300 m. Anhui, Fujian, Guangdong, Guangxi, ?Guizhou, ?Henan, Hubei, Hunan, Jiangxi, Taiwan, Zhejiang [India, Japan, Korea; cultivated in North America].

1a. Leaves adaxially glabrous ..... 3a. var. *japonica*  
1b. Leaves adaxially shortly pilose ..... 3b. var. *scaberrima*

**3a. *Ligularia japonica* var. *japonica***

大头橐吾(原变种) da tou tuo wu (yuan bian zhong)

*Arnica japonica* Thunberg in Murray, Syst. Veg., ed. 14, 768. 1784; *Erythrochaete palmatifida* Siebold & Zuccarini; *Ligularia macrantha* (C. B. Clarke) H. Koyama; *Senecillis japonica* (Thunberg) Kitamura; *Senecio japonicus* (Thunberg) Schultz Bipontinus (1845), not Thunberg (1784), nor (Lin-

naeus) Lessing (1832); *S. macranthus* C. B. Clarke; *S. palmatifidus* (Siebold & Zuccarini) Wittrock & Juel.

Leaves adaxially glabrous.

Stream banks, grassland slopes, forest understories; 900–2300 m. Anhui, Fujian, Guangdong, Guangxi, ?Guizhou, ?Henan, Hubei, Hunan, Jiangxi, Taiwan, Zhejiang [Japan, Korea; cultivated in North America].

**3b. *Ligularia japonica* var. *scaberrima*** Hayata ex Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 2: 532. 1934.

糙叶大头橐吾 cao ye da tou tuo wu

Leaves adaxially shortly pilose.

Grassland slopes, stream banks; 600–700 m. Fujian, Guangdong, Jiangxi, Taiwan, Zhejiang [Japan].

**4. *Ligularia hodgsonii*** J. D. Hooker, Bot. Mag. 89: t. 5417. 1863 [“*hodgsonii*”].

鹿蹄橐吾 lu ti tuo wu

*Ligularia hodgsonii* var. *crenifera* (Franchet) Handel-Mazzetti; *L. hodgsonii* var. *pulchella* (Pampanini) Handel-Mazzetti; *L. hodgsonii* var. *sutchuenensis* (Franchet) A. Henry; *L. yesoensis* (Franchet) Diels; *L. yesoensis* var. *crenifera* (Franchet) Diels; *L. yesoensis* var. *pulchella* Pampanini; *L. yesoensis* var. *sutchuenensis* (Franchet) Diels; *Senecillis hodgsonii* (J. D. Hooker) Kitamura; *Senecio hodgsonii* A. Henry; *S. yesoensis* Franchet; *S. yesoensis* var. *crenifer* Franchet; *S. yesoensis* var. *sutchuenensis* Franchet.

Stem erect, to 100 cm tall, 3–5 mm in diam. at base, proximally glabrous, distally and synflorescence white arachnoid-puberulent and shortly yellow pilose. Basal leaves petiolate; petiole 10–30 cm, slender, base narrowly sheathed; leaf blade reniform or cordate-reniform, (2–)5–8 × 4.5–13 cm, thick, glabrous, with palmate veins and conspicuous reticulate veins, base cordate, margin triangular-dentate or crenate and ciliate between teeth, apex rounded. Middle to distal stem leaves few, shortly petiolate or sessile, base broadly sheathed; leaf blade reniform, smaller than lower leaves. Capitula 1 to many, solitary or in corymb or compound corymb, branches 6–12 cm, fasciated; leaflike bracts navicular, 2–3 × ca. 1 cm; peduncles 0.5–2.5 cm; supplementary bracts linear-subulate, shorter than involucre. Involucre broadly campanulate, longer than broad, 10–14 × 7–10 mm, outside glabrous or white arachnoid-puberulent, base truncate or rounded; phyllaries 8 or 9, closely imbricate, purplish red, oblong, 3–4 mm wide, brown ciliate, apex broadly triangular, sometimes mucronate; inner phyllaries 2-carinate on convex outside, margin broadly membranous. Ray florets yellow; lamina oblong, 15–25 × to 6 mm wide, apex obtuse and denticulate; tube ca. 4 mm. Tubular florets numerous, extending from involucre, 9–10 mm; tube 2–3 mm. Achenes cylindrical, 7–8 mm, ribbed. Pappus reddish brown, as long as tubular corolla. Fl. and fr. Jul–Oct. *2n* = 58.

Stream banks, grassy slopes, forest margins; 900–2800 m. ?Anhui, SW Gansu, W Guangxi, NW Guizhou, ?Henan, Hubei, S Shaanxi, N Sichuan, ?Xizang, E Yunnan [Japan, Russia (Far East), ?Vietnam].

One of us (Illarionova) believes that *Ligularia hodgsonii* is absent from China. Chinese specimens determined as *L. hodgsonii* belong to *L. dentata*. *Ligularia hodgsonii* differs from *L. dentata* by the structure of synflorescence (indeterminate (acropetal) raceme with long peduncles in *L. hodgsonii* vs. (basipetal) corymb in *L. dentata*) and by the navicular membranous bracts near each peduncle. According to Illarionova, *L. hodgsonii* occurs only in Japan and Russia (Far East).

**5. *Ligularia calthifolia*** Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 15: 374. 1871 [*"calthaefolia"*].

乌苏里橐吾 wu su li tuo wu

*Ligularia hodgsonii* J. D. Hooker var. *calthifolia* (Maximowicz) Koidzumi; *Senecillis calthifolia* (Maximowicz) Kitamura; *Senecio calthifolius* (Maximowicz) Maximowicz.

Stem erect, 30–80 cm tall, 2.5–5 mm in diam. at base, proximally glabrous, distally white arachnoid-puberulent and shortly pilose. Basal leaves petiolate; petiole long and slender, 2–4 × as long as leaf blade, base sheathed; leaf blade cordate-reniform or cordate-ovate, 6–18 × 6–12 mm, glabrous, both surfaces with prominent palmate veins, base cordate, margin obtusely and sharply dentate, apex obtuse or acute. Middle to distal stem leaves 1 or 2, similar but smaller, petiolar base enlarged into a sheath. Capitula (1 or) 2–4, in corymb; leaflike bracts ovate-lanceolate, as long as peduncle, white puberulent; peduncles to 9 cm, shortly brown pilose; supplementary bracts narrowly lanceolate, as long as or longer than involucre. Involucre broadly campanulate or cupular, 1.2–1.3 × 1.3–1.8 cm, outside shortly brown pilose; phyllaries (5–) 8–12, closely imbricate, ovate-oblong or narrowly lanceolate, apex acute, mucronate; inner phyllaries broader, 2-carinate on convex outside, margin membranous. Ray florets yellow, 8–10; lamina linear-spatulate, 2–3 cm × 4–6 mm; tube 7–9 mm. Tubular florets numerous, 1.2–1.3 cm; tube ca. 6 mm. Achenes brown, cylindrical, 7–10 mm, ribbed. Pappus reddish brown, slightly longer than tube of tubular corolla. Fl. Jul, fr. Aug–Sep.  $2n = 60$ .

Grasslands, meadows, slopes; 100–1600 m. Heilongjiang [Russia (Far East)].

**6. *Ligularia phaenicochaeta*** (Franchet) S. W. Liu, Acta Biol. Plateau Sin. 7: 32. 1988.

紫缨橐吾 zi ying tuo wu

*Senecio phaenicochaetus* Franchet, Bull. Soc. Bot. France 39: 295. 1893; *Cremanthodium phaenicochaetum* (Franchet) R. D. Good; *Senecillis phaenicochaeta* (Franchet) Kitamura.

Stem erect, 15–40 cm tall, 2–2.5 mm in diam. at base, proximally glabrous or hairy, distally shortly brown pilose. Basal leaves petiolate; petiole 4–20 cm, base sheathed; leaf blade orbicular-reniform, 4–8 × 5–12.5 cm, glabrous, palmate veins prominent abaxially, margin regularly triangular-dentate. Stem leaves 1–3, gradually smaller upward, proximal leaves petiolate, base broadly sheathed; leaf blade reniform. Capitula 1–6, solitary or in corymb; leaflike and supplementary bracts linear-subulate, shorter; peduncles shortly brown pilose, longer than involucre. Involucre broadly campanulate or hemispheric, 8–10 mm, to 20 mm wide, outside glabrous; phyllaries 8–14, dark brown, oblanceolate, ca. 3 mm wide, apex obtuse; inner phyl-

laries membranous at margin. Ray florets yellow; lamina elliptic, 1–1.5 cm × ca. 2 mm, apex acute; tube ca. 3 mm. Tubular florets numerous, yellow, 6–9 mm; tube 1/3–1/2 as long as campanulate limb. Pappus purplish brown, 1–2 mm, as long as or shorter than tube of tubular corolla. Fl. Aug–Sep.

• Wet slopes, alpine meadows; 3200–4200 m. Xizang (Zayü), NW Yunnan.

**7. *Ligularia kangtingensis*** S. W. Liu, Bull. Bot. Res., Harbin 5(4): 68. 1985.

康定橐吾 kang ding tuo wu

Stem erect, 25–30 cm tall, 1.5–2 mm in diam. at base, proximally glabrous, distally and synflorescence densely white arachnoid-puberulent. Basal leaves petiolate; petiole to 13 cm, glabrous, base sheathed; leaf blade reniform, 2–3.3 × 4.5–6 cm, glabrous, palmately veined, veins prominent abaxially, margin regularly denticulate, apex rounded, rarely retuse; sinus ca. 1/4 as long as leaf blade, broad. Stem leaf 1, similar but smaller, narrowly petiolate, base broadly sheathed. Capitula 4 or 5, in lax corymb; leaflike bracts navicular, 1.6–4 × 0.6–1.2 cm, glabrous, margin entire; peduncles 3–9 cm; supplementary bracts to 1.2 cm. Involucre campanulate, 8–10 × 10–12 mm, outside glabrous; phyllaries 10–12, dark brown, usually curved, lanceolate, 1.5–2 mm wide, apex acuminate; inner phyllaries membranous at margin. Ray florets yellow; lamina linear, 1.1–1.3 cm × ca. 1 mm, apex acute; tube ca. 5 mm. Tubular florets numerous, yellow, 6–7 mm; tube as long as limb of tubular corolla. Pappus yellowish white, as long as tubular corolla. Fl. Aug.

• Grassy slopes; ca. 4000 m. Sichuan (Kangding).

**8. *Ligularia cremanthodioides*** Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 13. 1925.

垂头橐吾 chui tou tuo wu

*Cremanthodium cremanthodioides* (Handel-Mazzetti) R. D. Good.

Stem erect, 5–60 cm tall, 3–5 mm in diam. at base, proximally glabrous, distally densely shortly yellow pilose. Basal leaves petiolate; petiole 7–33.5 cm, base sheathed; leaf blade reniform, 3.5–13.5 × 4.5–11 cm, glabrous or abaxially shortly pilose only along veins, palmately veined, margin regularly triangular-dentate, tips of teeth mucronate, apex rounded or retuse; sinus ca. 1/3 as long as leaf blade, narrow, basal lobes orbicular. Stem leaves similar but smaller, petiolar base broadly sheathed. Middle to distal leaves smaller, only base broadly sheathed. Capitula 2–11, in corymb or rarely solitary; leaflike and supplementary bracts linear; peduncles to 10 cm, densely shortly yellow pilose. Involucre hemispheric or campanulate, 10–14 × 10–15 mm, outside white arachnoid-puberulent or glabrescent; phyllaries 10–13, in 2 rows, lanceolate or oblong, minutely denticulate, apex acute; inner phyllaries broadly membranous at margin. Ray florets yellow; lamina oblong, 10–15 × 2–4 mm, apex acute, 3- or 4-denticulate. Tubular florets numerous, 5–8 mm; limb ca. 2 mm wide; tube 1–2 mm. Pappus white, as long as tubular corolla. Fl. Jul–Aug.

Forest understories of valleys and rocky areas; 3600–4000[–5300] m. SE Xizang, NW Yunnan [Nepal].

**9. *Ligularia cuneata*** S. W. Liu & T. N. Ho, *Acta Phytotax. Sin.* 38: 286. 2000.

楔舌橐吾 xie she tuo wu

Stem erect, 70–100 cm tall, glabrous. Basal leaves not seen. Stem leaves petiolate; petiole 8–14 cm, base broadly sheathed; sheaths 7–12 cm, to 10 cm wide, submembranous, shortly white pilose; leaf blade reniform, 7–12 × 14–24 cm, abaxially shortly yellowish pilose, adaxially shortly white pilose, palmately veined, with 5–9 principal veins, base cordate, margin triangular-dentate, apex retuse. Distal stem leaves smaller, reniform. Capitula numerous, in compound corymbs; each peduncle with 1–5 capitula, densely shortly yellowish green pilose; leaflike bracts linear-lanceolate, 8–10 mm. Involucre hemispheric or campanulate, 9–12 × 10–15 mm, outside shortly white pilose; phyllaries many, equal, lanceolate or oblong, 8–10 × 3–5 mm, submembranous, margin ciliate, apex acute or acuminate. Ray florets yellow; lamina obovate or cuneate, 7–8 × 3–6 mm, apex obtuse, 3- or 4-denticulate; tube 4–5 mm. Tubular florets numerous, yellowish brown, 6–7 mm; tube ca. 2 mm. Pappus white, as long as tubular corolla. Fl. Jun.

- Stream banks; ca. 3800 m. S Xizang (Gyirong).

**10. *Ligularia retusa*** Candolle, *Prodr.* 6: 314. 1838.

黑毛橐吾 hei mao tuo wu

*Cremanthodium retusum* (Candolle) R. D. Good; *Ligularia nigropilosa* Kitamura; *Senecio retusus* (Candolle) Wallich ex J. D. Hooker.

Stem erect, 1 or 2, 38–100 cm tall, 3.5–12 mm in diam. at base, densely shortly black pilose or proximally glabrescent. Basal leaves petiolate; petiole 7.5–20 cm, shortly black pilose, base narrowly sheathed; leaf blade reniform, 2.2–7.5 × 4–15 cm, abaxially glabrous or shortly pilose along veins, adaxially glabrous, palmately veined, margin regularly denticulate, between teeth shortly black pilose, apex retuse; sinus ca. 1/3 as long as leaf blade, basal lobes orbicular. Middle stem leaves similar but smaller, shortly petiolate, base broadly sheathed; sheath cymbiform, 4–9 × 1.5–3 cm, shortly black pilose, rarely glabrous; leaf blade 3–9.5 × 7–16 cm. Distal stem leaves only broadly sheathed. Capitula 2–11(–27), solitary or in corymb, branches spreading; branches and peduncles black pilose; leaflike and supplementary bracts linear-lanceolate, less than 1 cm, shortly black pilose. Involucre hemispheric or campanulate, 1–1.5 × 1.5–2 cm, outside shortly black pilose; phyllaries 11–18, oblong or lanceolate, 2–5 mm wide, apex acute or acuminate; inner phyllaries membranous at margin. Ray florets yellow; lamina oblong or oblanceolate, 9–10 × 3–4 mm, apex subtruncate, 2- or 3-denticulate. Tubular florets numerous, yellowish brown, 5–6 mm; tube 1–1.5 mm. Achenes pale brown, cylindrical, 7–10 mm, ribbed. Pappus yellow, as long as tubular corolla. Fl. and fr. Jul–Oct.

Stream banks, grassland slopes, alpine grasslands; 3800–4500 m. SE Xizang, NW Yunnan [Bhutan, NE India, Nepal].

**11. *Ligularia stenoglossa*** (Franchet) Handel-Mazzetti, *Bot. Jahrb. Syst.* 69: 111. 1938.

裂舌橐吾 lie she tuo wu

*Senecio stenoglossus* Franchet, *Bull. Soc. Bot. France* 39: 304. 1893; *Ligularia schizopetala* (W. W. Smith) Handel-Mazzetti; *L. trinema* Handel-Mazzetti; *Senecillis schizopetala* (W. W. Smith) Kitamura; *S. stenoglossa* (Franchet) Kitamura; *Senecio schizopetalus* W. W. Smith.

Stem erect, robust, to 150 cm tall, 1.5–2 cm in diam. at base, densely shortly yellow pilose or glabrescent. Basal leaves petiolate; petiole to 70 cm, densely shortly yellow pilose, base narrowly sheathed; leaf blade reniform, 10–15 × 22–29 cm, both surfaces shortly pilose, palmately veined, abaxially with prominent reticulate veins, margin triangular-dentate, apex rounded; sinus ca. 1/3 as long as leaf blade, broad, basal lobes orbicular. Middle stem leaves shortly petiolate; petiole to 3 cm, base broadly sheathed; sheath cymbiform, to 11 cm, ca. 5 cm wide; leaf blade reniform, to 21 cm wide. Distal stem leaves smaller, sessile. Corymbs compound, spreading; branches to 10 cm, shortly yellow pilose. Capitula numerous; leaflike and supplementary bracts smaller, subulate; peduncles 3–10 mm, shortly yellow pilose. Involucre narrowly campanulate, 9–10 × 4–6 mm, outside glabrous; phyllaries 7–10, oblong, 2–2.5 mm wide, brown ciliate, apex acute; inner phyllaries broadly membranous at margin. Ray florets 3–5, yellow; lamina 3–5-divided, segments filiform or linear, to 1.5 cm; tube ca. 6 mm. Tubular florets more numerous, to 10, yellowish brown, ca. 1 cm; tube as long as limb. Achenes brown, cylindrical, 5–6 mm. Pappus reddish brown, slightly shorter than tubular corolla. Fl. and fr. Sep–Nov.

- Forest understories, grassland slopes; 2100–4000 m. NW and W Yunnan.

**12. *Ligularia oligonema*** Handel-Mazzetti, *Bot. Jahrb. Syst.* 69: 111. 1938.

疏舌橐吾 shu she tuo wu

Stem erect, 55–150 cm tall, to 1.2 cm in diam. at base, shortly reddish brown pilose. Basal leaves petiolate; petiole to 53 cm, shortly brown pilose or glabrescent, base narrowly sheathed; sheath striate, to 2 cm wide; leaf blade reniform, 11–27 cm, to 50 cm wide, submembranous, glabrous, or abaxially shortly pilose, palmately veined, abaxially with 5 principal veins and prominent reticulate veins, margin regularly denticulate, tips of teeth black mucronate, apex rounded or slightly retuse; sinus 1/3–1/2 as long as leaf blade, narrow, basal lobes orbicular, divergent. Middle and distal stem leaves shortly petiolate, base broadly sheathed; sheath ovate, ca. 2 cm in diam., shortly yellowish brown pilose; leaf blade reniform, to 18 cm wide. Corymbs compound, spreading; branches to 15 cm. Capitula numerous; leaflike and supplementary bracts smaller, subulate; peduncles 3–14 mm. Involucre cylindrical, 9–12 × 2–3 mm, outside glabrous; phyllaries 5, oblong, 1.5–3 mm wide, apex acute; inner phyllaries membranous at margin. Ray florets 1 or 2, yellow; lamina linear, 1–1.5 cm, 2- or 3-divided, segments filiform, rarely undivided; tube ca. 6 mm. Tubular florets 4 or 5, 8–9 mm; tube ca. 4 mm. Achenes brown, cylindrical, ca. 6 mm.

Pappus white, shorter than tubular corolla or as long as tube. Fl. and fr. Sep–Oct.

• Forest understories, grassland slopes; 3000–4000 m. SW Sichuan, NW and W Yunnan.

**13. *Ligularia franchetiana*** (H. Léveillé) Handel-Mazzetti, Symb. Sin. 7: 1134. 1936.

隱舌橐吾 yin she tuo wu

*Senecio franchetianus* H. Léveillé, Bull. Géogr. Bot. 25: 16. 1915; *Ligularia aphanoglossa* Handel-Mazzetti; *Senecillus franchetiana* (H. Léveillé) Kitamura.

Stem erect, 70–150 cm tall, 7–21 mm in diam. at base, proximally glabrous, distally shortly purplish red pilose. Basal leaves petiolate; petiole 9–32 cm, glabrous or shortly brown pilose, base sheathed; leaf blade reniform, 4–30 × 6–42 cm, glabrous or abaxially pale green and initially shortly brown pilose, adaxially green, palmately veined, with 5 principal veins and prominent reticulate veins, margin regularly dentate, between teeth brown ciliate, apex rounded; sinus ca. 1/3 as long as leaf blade, broad. Middle and distal stem leaves shortly petiolate, base broadly sheathed; leaf blade reniform. Distalmost stem leaves smaller, sessile, base broadly sheathed. Corymbs compound, spreading, to 17 cm; branches and peduncles to 12 cm, densely shortly brown pilose. Capitula numerous; leaflike and supplementary bracts smaller, subulate. Involucre cylindrical, 5–11 × 2–3 mm, outside glabrous; phyllaries (2 or) 3–5, oblong, 1–2 mm wide, brown ciliate, margin membranous, apex triangular-acute. Florets (2 or) 3–5, yellow; ray floret solitary or absent, tubular, split on one side, as long as tubular florets. Tubular florets 9–10 mm; tube 3–4 mm. Achenes brown, cylindrical, to 8 mm. Pappus white, slightly shorter than tubular corolla. Fl. and fr. Jul–Sep.

• Stream banks, forest understories, grassland slopes; 2400–3900 m. SW Sichuan, NE and NW Yunnan.

**14. *Ligularia curvisquamis*** Handel-Mazzetti, Symb. Sin. 7: 1134. 1936.

弯苞橐吾 wan bao tuo wu

*Senecio curvisquamis* (Handel-Mazzetti) C. C. Chang; *S. curvisquamis* var. *robustus* C. C. Chang.

Stem erect, to 70 cm tall, 9–27 mm in diam. at base, shortly yellowish brown pilose. Basal leaves petiolate; petiole to 24 cm, ca. 5 cm wide, shortly yellowish brown pilose, base sheathed; sheath to 5 cm; leaf blade reniform, 8–9 × 18–20 cm, both surfaces sparsely shortly pilose, palmately veined, base cordate, margin dentate, between teeth ciliate, apex retuse; sinus ca. 1/3 as long as leaf blade, broad, basal lobes orbicular. Middle and distal stem leaves shortly petiolate; sheath enlarged into a leaf blade, to 6 cm wide, not amplexicaul, margin lacinate; leaf blade reniform, 3–8 cm, to 10 cm wide, abaxially shortly pilose. Corymbs compound, branched, not spreading; branches erect, to 23 cm, fasciated, densely shortly yellowish brown pilose. Capitula numerous; leaflike and supplementary bracts smaller, subulate; peduncles 2–10 mm, shortly yellowish brown pilose. Involucre narrowly turbinate, 6–8 mm, mouth ca. 6 mm in diam.; phyllaries 7–10, lanceolate or linear-lanceolate, out-

side glabrous, apex caudate-acuminate, curved, dark brown, ciliate; inner phyllaries 2–2.5 mm wide, margin membranous. Ray floret 1, yellow; lamina short, narrow, as long as tubular florets, rarely absent. Tubular florets 8 or 9, 6–10 mm, wholly extending from involucre in fruit; tube ca. 2.5 mm. Achenes brown, cylindrical, to 7 mm. Pappus brown above, purplish brown below, as long as tube of tubular corolla. Fl. and fr. Jul–Nov.

• Stream banks, bogs, forest understories, grassland slopes; ca. 4000 m. NW Yunnan.

**15. *Ligularia rockiana*** Handel-Mazzetti, Bot. Jahrb. Syst. 69: 110. 1938.

独舌橐吾 du she tuo wu

Stem erect, 50–70 cm tall, 6–8 mm in diam. at base, shortly yellowish brown pilose. Basal leaves petiolate; petiole 19–26 cm, shortly yellowish brown pilose, base sheathed; sheath usually reddish purple, entire; leaf blade peltate, broadly reniform, 9–15 × 20–30 cm, abaxially shortly pilose, adaxially glabrous, palmately veined, margin dentate, apex retuse; sinus ca. 1/3 as long as leaf blade, broad, basal lobes divergent. Middle and distal stem leaves shortly petiolate or sessile; sheath enlarged, cucullate; leaf blade smaller, reniform. Distalmost stem leaves only sheathed. Corymbs compound, not spreading, to 20 cm; branches to 15 cm, fasciated, shortly yellowish brown pilose. Capitula numerous; leaflike and supplementary bracts linear; peduncles 7–10 mm, shortly yellowish brown pilose. Involucre narrowly cylindrical, 7–9 × 3–4 mm, outside shortly pilose; phyllaries 5–8, lanceolate or oblong, apex acute or obtuse; inner phyllaries brown, margin broadly membranous. Ray floret 1, yellow; lamina oblong or obovate-oblong, 5–6 × ca. 3 mm, apex obtuse. Tubular florets 6–10, 5–6 mm; tube ca. 2 mm. Achenes cylindrical, to 7 mm. Pappus white to pale yellow, 3–4 mm, shorter than tubular corolla. Fl. and fr. May–Nov.

• Stream banks, bogs, forest understories, grassland slopes, gravelly slopes; 3400–3900 m. NW Yunnan.

**16. *Ligularia transversifolia*** Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 26. 1925.

横叶橐吾 heng ye tuo wu

Stem erect, 50–100 cm tall, 6–25 mm in diam. at base, densely shortly rufous pilose. Basal leaves petiolate; petiole to 30 cm, densely shortly rufous pilose, base sheathed; sheath to 11 × ca. 1.5 cm; leaf blade orbicular or orbicular-reniform, 7–24.5 × 11–38 cm, both surfaces shortly pilose, palmately veined, margin denticulate, apex rounded or retuse; sinus ca. 1/3 as long as leaf blade, broad, basal lobes orbicular. Middle stem leaves shortly petiolate or sessile; sheath enlarged, broadly ovate, ca. 5 cm, to 13 cm wide, denticulate; leaf blade smaller, reniform. Distalmost stem leaves only broadly sheathed. Corymbs compound; branches spreading or fasciated, proximal ones to 11 cm. Capitula numerous; leaflike and supplementary bracts linear-subulate; peduncles to 15 mm. Involucre narrowly campanulate, 6–8 × ca. 6 mm, outside glabrous or glabrescent; phyllaries 5–7, oblong or oblong-lanceolate, margin membranous, apex acute. Ray florets 3–6, yellow; lamina narrowly oblong, 3–6 × 1.5–2 mm, apex 2- or 3-denticulate. Tubular florets

to 15, ca. 6 mm; tube ca. 2 mm. Pappus white or brown, as long as tube of tubular corolla. Fl. Jun–Jul.

• Stream banks, grassland slopes, alpine grasslands; 3400–4500 m. NW Yunnan.

**17. *Ligularia paradoxa*** Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 59: 140. 1922.

奇异橐吾 *qi yi tuo wu*

Stem erect, to 90 cm tall, ca. 6 mm in diam. at base, proximally glabrous, distally arachnoid-puberulent. Basal leaves petiolate; petiole to 32.5 cm, base narrowly sheathed; leaf blade orbicular or broadly ovate, 10–25 cm in diam., glabrous or abaxially pale green and initially hairy, palmately veined, 3–8 (or 17)-palmatisect or palmatilobed; lobes 3-divided, lobules pinnatisect; segments linear-oblong, 7–15 × 3–6(–8) mm, margin revolute, apex acute. Stem leaves 2 or 3, similar but smaller, shortly petiolate, ± divided; sheath enlarged, cymbiform, glabrous, margin entire. Corymbs compound, slightly spreading; branches and peduncles shortly yellowish brown pilose. Capitula to 30; leaflike and supplementary bracts filiform, glabrous. Involucre campanulate-turbinate, 10–13 × 7–12 mm, outside shortly pilose; phyllaries 8 or 9, purple, oblong or lanceolate, 3–5 mm wide, margin membranous, apex acute. Ray florets absent. Tubular florets numerous, 6–7 mm, extending from involucre; tube 1–1.5 mm. Achenes brown, cylindrical, 7–8 mm. Pappus brown, shorter than tubular corolla, usually deciduous. Fl. and fr. Sep–Oct.

• Grassy slopes, forest understories, alpine grasslands; 3400–4500 m. Yunnan.

- 1a. Leaves 3–8-palmatipartite, lobes 3-divided ..... 17a. var. *paradoxa*  
 1b. Leaves palmatilobed, lobes 17, 1.5–3 cm wide, lobed or dentate ..... 17b. var. *palmatifida*

**17a. *Ligularia paradoxa* var. *paradoxa***

奇异橐吾(原变种) *qi yi tuo wu* (yuan bian zhong)

*Cremanthodium pteridophyllum* Y. L. Chen.

Leaves 3–8-palmatipartite; lobes 3-divided.

• Grassy slopes, forest understories, alpine grasslands; 3400–4500 m. NW Yunnan.

**17b. *Ligularia paradoxa* var. *palmatifida*** S. W. Liu & T. N. Ho, Acta Phytotax. Sin. 39: 559. 2001.

半裂橐吾 *ban lie tuo wu*

Leaves palmatilobed; lobes 17, 1.5–3 cm wide, lobed or dentate.

• Yunnan (Zhongdian).

**18. *Ligularia purdomii*** (Turrill) Chittenden, Royal Hort. Soc. Dict. Gard. 3: 1165. 1951.

褐毛橐吾 *he mao tuo wu*

*Senecio purdomii* Turrill, Bull. Misc. Inform. Kew 1914: 327. 1914.

Stem erect, to 150 cm tall, 1–2 cm in diam. at base, shortly

brown pilose. Basal leaves petiolate; petiole purplish red, to 50 cm, robust, to 1 cm in diam., shortly brown pilose, base narrowly long sheathed; leaf blade adaxially green, reniform or orbicular-reniform, 14–50 cm in diam. or broader than long, peltate, abaxially densely shortly pilose, adaxially glabrous, palmately veined, margin regularly dentate, apex rounded or retuse; sinus ca. 1/3 as long as leaf blade, broad, basal lobes orbicular. Middle stem leaves similar but smaller, to 18 cm wide, shortly petiolate, apex retuse; sheath enlarged, 7–10 cm, to 10 cm in diam., shortly brown pilose. Distal stem leaves only broadly sheathed. Corymbs compound, to 50 cm, much branched; branches numerous, densely shortly brown pilose, each branch with 3–7 capitula; peduncles to 3 cm, shortly brown pilose. Capitula numerous; leaflike and supplementary bracts linear, hairs as on peduncles. Involucre campanulate-turbinate, 8–13 × 6–16 mm, outside shortly yellowish brown pilose, rarely glabrous; phyllaries 6–12, dark brown, oblong or lanceolate, apex acute; inner phyllaries brown membranous at margin. Florets numerous, yellow, all tubular, 7–9 mm; tube ca. 3 mm; limb ca. 2 mm wide. Achenes yellowish brown, cylindrical, to 7 mm, narrowly ribbed. Pappus white or brown when mature, 3–4 mm, as long as tube of tubular corolla. Fl. Jun–Jul.

• Stream banks, swamps; 3700–4100 m. SW Gansu, SE Qinghai, NW Sichuan.

**19. *Ligularia yunnanensis*** (Franchet) C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 67. 1935.

云南橐吾 *yun nan tuo wu*

*Senecio yunnanensis* Franchet, Bull. Soc. Bot. France 39: 303. 1893; *Senecillis yunnanensis* (Franchet) Kitamura.

Stem erect, 30–56 cm tall, slender, 2.5–4 mm in diam. at base, shortly brown pilose, or proximally glabrous. Basal leaves 2, petiolate; petiole 15–41 cm, slender, glabrous, base narrowly long sheathed; sheath ca. 8 cm; leaf blade abaxially pale green, adaxially green, reniform or orbicular-reniform, 3–6.5 × 7–11 cm, glabrous, palmately veined, margin coarsely triangular-dentate, tips of teeth black mucronate, apex rounded; sinus ca. 1/3 as long as leaf blade, broad. Stem leaves 2 or 3, similar but smaller, petiole to 21 cm, slender, base sheathed; sheath enlarged, cucullate, 2.5–4 cm, to 2 cm wide, or lower narrower. Capitula 9–14, in corymb; branches shorter, fasciated, shortly brown pilose; leaflike and supplementary bracts linear, ca. 1 cm; peduncles to 1.5 cm, densely shortly brown pilose. Involucre narrowly campanulate, 9–14 × 5–7 mm, outside glabrous; phyllaries 5–8, in 2 rows, oblong, 2–3.5 mm wide, margin membranous, apex acute or acuminate. Florets 6–20, yellow, all tubular, 7–8 mm; tube as long as limb of tubular corolla. Achenes pale brown, cylindrical, 5–7 mm. Pappus white, as long as tubular corolla. Fl. and fr. May–Oct.

• Grassy slopes, forest understories, between rocks; 3100–4000 m. NW Yunnan.

**20. *Ligularia potaninii*** (C. Winkler) Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 5: 4. 1937.

浅齿橐吾 *qian chi tuo wu*

*Senecio potaninii* C. Winkler, Trudy Imp. S.-Peterburgsk.

Bot. Sada 13: 5. 1893; *Cacalia potaninii* (C. Winkler) Mattfeld; *Senecillis potaninii* (C. Winkler) Kitamura.

Stems 1 or 2, erect, to 31 cm tall, ca. 3 mm in diam. at base, proximally glabrous, distally and branches of synflorescence shortly brown pilose. Basal leaves petiolate; petiole often purplish red, to 11 cm, glabrous, base narrowly sheathed; leaf blade abaxially purplish red, broadly reniform, 4.5–6 × 9–10.5 cm, subleathery, abaxially hairy only along veins, reticulate veins prominent and white, adaxially glabrous, palmately veined, base shallowly cordate, margin undulate-crenate and ciliate, apex rounded or retuse; sinus ca. 1/4 as long as leaf blade, broad. Middle stem leaves smaller, reniform; petiole enlarged into a sheath; sheath 2.5–5 cm, to 2.5 cm wide. Distal-most stem leaves with only enlarged sheath or very rarely lanceolate, without sheath. Capitula (3–)7–9 in corymb; leaflike and supplementary bracts linear; peduncles 1–2 cm. Involucre turbinate, 1–1.1 cm, mouth ca. 1 cm in diam., outside glabrous; phyllaries 9 or 10, in 2 rows, oblong or lanceolate, purple ciliate, apex acute or acuminate; inner phyllaries membranous at margin. Florets 20–30, yellow, all tubular, 9–10 mm; tube ca. 5 mm. Achenes brown, cylindric, 5–7 mm. Pappus white, as long as tubular corolla. Fl. Jul.

- Grassy areas in swamps; ca. 4000 m. SW Gansu, N Sichuan.

**21. *Ligularia cymosa*** (Handel-Mazzetti) S. W. Liu, Acta Biol. Plateau Sin. 7: 31. 1988.

聚伞橐吾 ju san tuo wu

*Cremanthodium cymosum* Handel-Mazzetti, Acta Horti Gothob. 12: 305. 1938.

Stems 1 or 2, erect, 7–45 cm tall, ca. 2 mm in diam. at base, proximally glabrous, distally shortly purple pilose and white arachnoid-puberulent. Basal leaves petiolate; petiole 5–24 cm, slender, base sheathed; leaf blade reniform, (2–)4–12.5 cm wide, abaxially shortly pilose only along veins, adaxially glabrous, palmate veins prominent abaxially, margin regularly undulate-dentate, apex rounded; sinus ca. 1/3 as long as leaf blade, narrow. Middle stem leaves smaller, reniform; petiole short, with enlarged sheaths. Distal-most stem leaves only enlarged sheathed; mouth of sheath shallowly dentate at margin. Capitula 3–6 in corymb; leaflike and supplementary bracts linear, shorter than peduncle and involucre; peduncles 4–40 mm, densely shortly purple pilose and white arachnoid-puberulent. Involucre campanulate, 8–15 mm, mouth to 1.5 cm in diam., outside glabrous; phyllaries ca. 13, in 2 rows, purplish red, oblong, petaloid, 2–4 mm wide, apex acute; inner phyllaries narrowly membranous at margin. Florets numerous, yellow, all tubular, 5–10 mm; tube 1–2 mm. Pappus white, as long as tubular corolla. Fl. Aug.

- Grasslands; ca. 4000 m. NW Sichuan, Xizang.

**22. *Ligularia microcephala*** (Handel-Mazzetti) Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 13. 1925.

小头橐吾 xiao tou tuo wu

*Cremanthodium microcephalum* Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 57: 174. 1920.

Stems 1 or 2, erect, often purple, to 24 cm tall, 2–4 mm in diam. at base, proximally glabrous, distally shortly brown pilose. Basal leaves petiolate; petiole to 21.5 cm, slender, glabrous, base narrowly sheathed; leaf blade abaxially pale purple, adaxially green, reniform, 1.5–4.5 × 4.5–9.5 cm, abaxially shortly pilose only along veins, adaxially glabrous, palmately veined, with conspicuous reticulate veins, margin regularly sharply dentate, apex rounded or retuse; sinus narrow, 1/3(–1/2) as long as leaf blade, basal lobes orbicular. Stem leaves 1 or 2, smaller, reniform; petiole 11–15 cm, base enlarged sheathed; sheath to 3.5 cm, as long as broad or narrower. Capitula 1–4, in corymb or solitary; leaflike bract lanceolate, as long as peduncles; supplementary bracts 3 or 4, subulate, shorter than involucre; peduncles divaricately branched, to 1 cm, densely shortly brown pilose. Involucre broadly campanulate or hemispheric, ca. 8 mm, to 2 cm wide, outside glabrous or shortly white pilose; phyllaries ca. 15, in 2 rows, dark brown, elliptic, 2–3 mm wide, margin shallowly denticulate, apex obtuse or acute; inner phyllaries membranous at margin. Florets numerous, yellow, all tubular, 5–6 mm; tube ca. 2 mm. Achenes ca. 5 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Aug.

- Alpine grasslands, grassy slopes, rocky slopes; 3700–4800 m. NW Yunnan.

**23. *Ligularia dux*** (C. B. Clarke) Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 5: 3. 1937.

紫花橐吾 zi hua tuo wu

Stem erect, to 90 cm tall, 3–5 mm in diam. at base, proximally glabrous, distally umbrella-branched, shortly purplish brown pilose. Basal leaves petiolate; petiole 6–25 cm, slender, glabrous, base narrowly sheathed; leaf blade orbicular-reniform or reniform, 1.5–10 × (3–)6–15 cm, abaxially pilose, adaxially glabrescent, palmately veined, margin triangular-dentate, apex rounded; sinus ca. 1/3 as long as leaf blade, broad, basal lobes oblong, to 10 cm, margin coarsely dentate. Stem leaves smaller, reniform, petiolate, sheath amplexicaul. Corymbs compound, spreading or narrowed; branches to 13 cm; leaflike and supplementary bracts linear, 4–10 mm. Peduncles 3–7 mm, shortly purplish brown pilose. Capitula 5–8 or more. Involucre narrowly cylindric, 8–10 × 2–3 mm, outside shortly purplish brown pilose; phyllaries 4 or 5, in 2 rows, oblong, 2–3 mm wide, apex obtuse; inner phyllaries membranous at margin. Florets 4 or 5, purplish red, all tubular, 8–9 mm; tube 3–4 mm. Achenes yellowish brown, cylindric, 5–7 mm. Pappus yellowish brown, slightly shorter than tubular corolla. Fl. and fr. Aug.

- Grassy slopes, forest understories; 3200–4200 m. Xizang [NE India, Myanmar].

- 1a. Capitula numerous, in compound corymbs; basal leaves 6–15 cm wide ..... 23a. var. *dux*
- 1b. Capitula 5–8, in corymb; basal leaves 3–5 cm wide ..... 23b. var. *minima*

**23a. *Ligularia dux* var. *dux***

紫花橐吾(原变种) zi hua tuo wu (yuan bian zhong)

*Senecio dux* C. B. Clarke, J. Linn. Soc., Bot. 25: 40. 1889; *Senecillis dux* (C. B. Clarke) Kitamura.

Plants to 90 cm tall. Basal leaves 4.5–10 × 6–15 cm, base cordate. Capitula numerous, in compound corymbs.

Grassy slopes, forest understories; 3200–3900 m. SE Xizang [NE India, Myanmar].

**23b. *Ligularia dux* var. *minima*** S. W. Liu, Acta Biol. Plateau Sin. 3: 69. 1984.

小紫花囊吾 xiao zi hua tuo wu

?*Ligularia tenuicaulis* C. C. Chang var. *purpurea* S. W. Liu.

Plants 25–40 cm tall. Stem slender, 1.5–2.5 mm in diam. at base. Leaves reniform, 2–3 × 3–5 cm, base subtruncate. Capitula 5–8, in corymb.

• Grassy slopes; 3200–4200 m. Xizang (Mêdog).

**24. *Ligularia tenuicaulis*** C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 66. 1935.

纤细囊吾 xian xi tuo wu

Stem erect, 42–65 cm tall, 1.5–3 mm in diam. at base, proximally glabrous, distally and synflorescence densely shortly brown pilose. Basal leaves petiolate; petiole to 30 cm, slender, glabrous, base narrowly sheathed; leaf blade ovate-cordate or subreniform, 4.5–6 cm, base to 11 cm wide, abaxially sparsely shortly pilose, adaxially glabrous, palmate veins prominent abaxially, base cordate, margin coarsely irregularly triangular-dentate, apex acute. Middle stem leaves petiolate; petiole 5–10 mm; sheath enlarged, ovate, 17–25 × 8–10 cm; leaf blade reniform, 2–2.5 × 4–5 cm, base shallowly cordate or subtruncate, margin denticulate, apex rounded. Distalmost stem leaves ovate, base not amplexicaul. Compound corymbs spreading; branches to 6 cm; leaflike and supplementary bracts subulate, much shorter; peduncles to 2 cm, densely shortly brown pilose. Capitula 9–13. Involucre cylindrical, 9–12 mm, to 4 mm wide, outside glabrous, base shortly brown pilose; phyllaries 5, in 2 rows, oblong, 1.5–3 mm wide, margin membranous, apex acute. Florets 5 or 6(–8), yellow, all tubular, 6–7 mm; tube as long as limb. Achenes brown, linear, 6–8 mm. Pappus pale brown below, brown above, as long as tubular corolla. Fl. and fr. Sep–Oct.

• Grasslands, scrub; 3200–4500 m. ?Xizang, NW Yunnan.

**25. *Ligularia tongkyukensis*** Handel-Mazzetti, J. Bot. 76: 288. 1938.

东久囊吾 dong jiu tuo wu

Stem erect, 60–90 cm tall, distally branched, densely shortly brown pilose. Basal leaves petiolate; petiole to 30 cm, slender; leaf blade abaxially pale green, adaxially dark green, broadly reniform, ca. 10 cm, to 17 cm wide, abaxially shortly brown pilose along veins, palmately veined, with 9 principal veins and slender reticulate veins, base broadly cordate, margin sharply dentate, apex rounded; basal lobes orbicular. Middle stem leaves petiolate; sheath lanceolate; leaf blade reniform, ca. 7 cm. Distalmost stem leaves bracteal, spatulate, narrowly shortly petiolate, margin entire. Compound corymbs clustered, ca. 5 cm wide; leaflike and supplementary bracts filiform; pe-

duncles to 5 mm, shortly purplish brown pilose. Capitula numerous. Involucre brown, narrowly cylindrical, ca. 1 cm, outside glabrous; phyllaries 3, linear, margin brown or purplish brown membranous, apex obtuse. Florets 3, all tubular, longer than involucre; tube as long as limb. Pappus reddish brown, slightly shorter than tubular corolla. Fl. and fr. Aug.

• Scrub; 3400–4000 m. Xizang (Nyingchi).

**26. *Ligularia xanthotricha*** (Grüning) Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 5: 4. 1937.

黄毛囊吾 huang mao tuo wu

*Cacalia xanthotricha* Grüning, Repert. Spec. Nov. Regni Veg. 12: 312. 1913; *Senecillis xanthotricha* (Grüning) Kitamura.

Stem erect, robust, to 150 cm tall, 1–1.5 cm in diam. at base, densely yellow shortly pilose. Basal leaves petiolate; petiole to 38 cm, shortly yellow pilose, base enlarged sheathed; leaf blade orbicular-reniform, 7–21 cm, to 50 cm wide, glabrous, palmately veined, abaxially with prominent reticulate veins, margin densely minutely denticulate, apex rounded or retuse; sinus ca. 1/3 as long as leaf blade, narrow. Middle stem leaves shortly petiolate, base enlarged sheathed; sheath broadly ovate, to 7 × ca. 4 cm, shortly yellow pilose; leaf blade reniform, 2.7–6.5 × to 13 cm. Compound corymbs ca. 38 cm; branches densely shortly yellow pilose; leaflike and supplementary bracts filiform-subulate, to 1.3 cm; peduncles 5–15 mm, shortly yellow pilose. Capitula numerous. Involucre narrowly campanulate, 6–8 mm in diam., outside shortly yellow pilose; phyllaries 8–10, narrowly lanceolate, 9–15 × 2–3(–4) mm, margin narrowly membranous, apex acuminate. Florets more than 20, yellow, all tubular, 8–9 mm; tube ca. 4 mm. Achenes brown, cylindrical, 5–8 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Sep.

• Scrub, grasslands, stream banks; 1700–3500 m. Gansu (Tao He), Hebei, Shanxi.

**27. *Ligularia achyrotricha*** (Diels) Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 5: 4. 1937.

刚毛囊吾 gang mao tuo wu

*Senecio achyrotrichus* Diels, Bot. Jahrb. Syst. 36(Beibl. 82): 105. 1905; *Cacalia achyrotricha* (Diels) Y. Ling; *Senecillis achyrotricha* (Diels) Kitamura.

Stem erect, 25–64 cm tall, to 8 mm in diam. at base, densely shortly brown pilose. Basal leaves petiolate; petiole to 27 cm, shortly brown pilose, base narrowly sheathed; sheath ca. 12 cm; leaf blade reniform, 3–10 × 7–22.5 cm, glabrous or abaxially pubescent along veins, palmately veined, margin irregularly coarsely dentate and brown ciliate, apex rounded; teeth triangular, 2–6 mm; sinus ca. 1/3 as long as leaf blade, broad, basal lobes suborbicular. Middle stem leaves smaller, shortly petiolate; sheath enlarged, brown pubescent; leaf blade reniform, ca. 6.5 × 12 cm, margin coarsely triangularly dentate, apex rounded or retuse; teeth to 7 mm. Compound corymbs spreading, to 15 cm, branched; leaflike and supplementary bracts subulate; peduncles ca. 2 cm, densely yellow pubescent. Capitula numerous. Involucre narrowly campanulate or cylin-

dric, 5–6 mm in diam., outside yellowish brown pubescent; phyllaries 8–10, in 2 rows, narrowly lanceolate, 9–10 × 1.5–2.5 mm, outside densely shortly yellow pilose, apex acuminate; inner phyllaries membranous at margin. Florets 10–16, yellow, all tubular, 7–9 mm; tube 4.5–5 mm; limb to 2 mm wide. Achenes narrowly cylindrical, 7–9 mm. Pappus white or lower yellow, as long as tube of tubular corolla. Fl. and fr. Jun–Aug.

• Grassy slopes, forest margins; 3300–3700 m. S Shaanxi (Qin Ling).

**28. *Ligularia macrodonta*** Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 5: 2. 1937.

大齿橐吾 da chi tuo wu

Stem erect, 50–80 cm tall, to 7 mm in diam. at base, glabrous or distally and sometimes at base shortly brown pilose. Basal leaves petiolate; petiole to 30 cm, slender, glabrous, base enlarged sheathed; leaf blade abaxially pale green, adaxially green, reniform, 5–16 × 8–20 cm, abaxially glabrous or pubescent along veins, adaxially glabrous, palmately veined, margin deeply coarsely dentate, apex retuse; teeth irregularly triangular-lanceolate, to 2 cm wide, apex blackish purple and mucronate, recurved; sinus ca. 1/3 as long as leaf blade, broad, basal lobes subdivergent. Middle stem leaves smaller, reniform, shortly petiolate; sheath enlarged, broadly ovate, margin entire. Distal stem leaves only enlarged sheathed. Compound corymbs branched; branches to 15 cm, densely shortly pilose; leaflike and supplementary bracts linear-subulate, shorter; peduncles to 1.5 cm, slender, densely shortly pilose. Capitula numerous. Involucre narrowly cylindrical, ca. 1 cm, rarely to 1.3 cm, 3–4 mm wide, outside glabrous; phyllaries 5–8, in 2 rows, linear-lanceolate, 1.5–2 mm wide, purple ciliate, apex acute; inner phyllaries membranous at margin. Florets 6–8, yellow, all tubular, 8–9 mm; tube slightly longer than limb. Achenes yellowish brown, cylindrical, 4–5.5 mm. Pappus white, ca. 7 mm, shorter than tubular corolla. Fl. Sep.

• Grassy slopes; 2600–4300 m. SW Gansu, Qinghai (Xionghua).

**29. *Ligularia duciformis*** (C. Winkler) Handel-Mazzetti, Symb. Sin. 7: 1135. 1936.

大黄橐吾 da huang tuo wu

*Senecio duciformis* C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 14: 155. 1895; *Senecillis duciformis* (C. Winkler) Kitamura.

Stem erect, to 170 cm tall, to 1 cm in diam. at base, glabrous or distally shortly yellow pilose. Basal leaves petiolate; petiole shortly yellow pilose, to 31 cm, base enlarged sheathed; leaf blade reniform or cordate, 5–16 × 7–50 cm, glabrous, palmately veined, with 3–5 principal veins and prominent reticulate veins, margin irregularly dentate, apex rounded; sinus ca. 1/3 as long as leaf blade, broad, basal lobes orbicular. Middle stem leaves petiolate; petiole 4–9.5 cm, densely shortly yellowish green pilose; sheath much enlarged, to 5 × ca. 4 cm, shortly yellow pilose, mouth of sheath entire; leaf blade reniform, 4–10 × 8–20 cm, margin denticulate, apex retuse. Distal stem leaves only sheathed. Compound corymbs to 20 cm; branches spreading, pubescent; leaflike and supplementary

bracts minute, linear-subulate; peduncles to 1 cm, densely shortly yellow pilose. Capitula numerous. Involucre narrowly cylindrical, 8–13 × 3–4 mm, outside glabrous; phyllaries 5, in 2 rows, oblong, ciliate, apex triangular-acute; inner phyllaries broadly membranous at margin. Florets (5 or)6(or 7), yellow, all tubular, 6–9 mm, wholly extending from involucre; tube as long as limb. Achenes brown, cylindrical, 5–7 mm. Pappus white or lower part yellow, as long as tube of tubular corolla. Fl. and fr. Jul–Sep.

• Stream banks, forest understories, grasslands, alpine meadows; 1900–4300 m. S Gansu, Ningxia (Jingyuan), ?Shaanxi, N to SW Sichuan, NW Yunnan.

**30. *Ligularia nelumbifolia*** (Bureau & Franchet) Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 27. 1925.

莲叶橐吾 lian ye tuo wu

*Senecio nelumbifolius* Bureau & Franchet, J. Bot. (Morot) 5: 74. 1891; *Senecillis nelumbifolia* (Bureau & Franchet) Kitamura; *Senecio moisonii* H. Léveillé.

Stem erect, 80–100 cm tall, to 1 cm in diam. at base, distally white arachnoid-puberulent and shortly yellow pilose. Basal leaves petiolate; petiole white arachnoid-puberulent, 10–50 cm, base enlarged sheathed; leaf blade peltate, reniform, 7–30 × 13–38(–80) cm, abaxially white arachnoid-puberulent, adaxially glabrous, palmately veined, abaxially with prominent reticulate veins, margin sharply dentate, apex rounded; sinus ca. 1/3 as long as leaf blade, broad, basal lobes suborbicular. Distal stem leaves petiolate; petiole 5–20 cm; sheath enlarged, 4–6 × 2–2.5 cm, white arachnoid-puberulent. Compound corymbs spreading; branches numerous, divaricate, blackish purple, white arachnoid-puberulent and shortly yellow pilose; leaflike and supplementary bracts subulate, minute; peduncles blackish purple, to 1.5 cm, often curved. Capitula numerous. Involucre narrowly cylindrical, 10–12 × 3–4 mm, outside glabrous; phyllaries 5–7, in 2 rows, oblong, 2.5–3 mm wide, white ciliate, apex triangular, obtuse; inner phyllaries marginally brown or yellow, broadly membranous. Florets 6–8, rarely to 12, yellow, all tubular, 7–9 mm, slightly extending from involucre; tube as long as limb. Achenes brown, cylindrical. Pappus white or yellowish, 6–7 mm, slightly shorter than tubular corolla. Fl. Jul–Sep.

• Forest understories, slopes, alpine meadows; 2400–3900 m. S Gansu, W Hubei, SW and W Sichuan, NE to NW Yunnan.

**31. *Ligularia konkalingensis*** Handel-Mazzetti, Bot. Jahrb. Syst. 69: 112. 1938.

贡嘎岭橐吾 gong ga ling tuo wu

Stem erect, 60–90 cm tall, to 1 cm in diam. at base, shortly yellow pilose. Basal leaves petiolate; petiole densely shortly yellowish brown pilose, to 28 cm, base long sheathed; leaf blade orbicular-reniform, ca. 17 × to 24 cm, abaxially with prominent palmate veins and shortly pilose, adaxially glabrous, margin coarsely dentate, apex rounded; sinus ca. 1/3 as long as leaf blade, narrow. Middle stem leaves petiolate; petiole to 7 cm; sheath enlarged, ca. 5 × 2.5 cm, densely shortly yellow pi-

lose; leaf blade smaller, reniform. Distalmost stem leaves sessile, ovate, without sheath. Compound corymbs spreading or clustered; leaflike and supplementary bracts linear, shortly pilose; peduncles to 2 cm, shortly yellow pilose. Capitula numerous. Involucre cylindric or campanulate-cylindric, 10–12 × 4–6 mm, outside densely shortly yellow pilose; phyllaries 5–7, in 2 rows, oblong-lanceolate, ca. 2 mm wide, apex acute; inner phyllaries membranous at margin. Florets 5–9, yellow, all tubular, 7–8 mm, extending from involucre; tube ca. 5 mm; limb campanulate. Achenes brown, cylindric, 6–7 mm. Pappus pale brown, as long as tube of tubular corolla. Fl. Aug–Sep.

• Alpine stream banks; 3800–4800 m. Sichuan (Batang, Gonggaling, Muli).

**32. *Ligularia rumicifolia*** S. W. Liu in C. Y. Wu, Fl. Xizang, 4: 832. 1985.

藏囊吾 zang tuo wu

*Senecio rumicifolius* J. R. Drummond, Bull. Misc. Inform. Kew 1911: 271. 1911, not MacOwan & Bolus (1881), nor Klatt (1888); *Cremanthodium rumicifolium* R. D. Good; *Ligularia leescotal* Kitamura.

Stem erect, 40–100 cm tall, white lanate, 3–8 mm in diam. at base, with a circle of dense reddish brown lanate hairs. Basal leaves petiolate; petiole to 20 cm, winged or not, base slightly enlarged; leaf blade ovate-oblong, 10–19 × to 14.5 cm, both surfaces initially white lanate, glabrescent, adaxially or on both surfaces glabrescent, pinnately veined, with white prominent reticulate veins, base rounded or shallowly cordate, margin minutely denticulate, apex obtuse or rounded. Middle to distal stem leaves without petiole and sheath; leaf blade ovate or ovate-lanceolate, to 19 × 6–9 cm, base auriculate-amplexicaul or not, margin dentate, apex obtuse or acute. Distalmost stem leaves lanceolate or linear-lanceolate, to 6 cm, base not amplexicaul, margin subentire. Compound corymbs or panicles, initially clustered, later spreading; branches to 17 cm, white lanate; leaflike and supplementary bracts linear, shorter; peduncles shorter or to 3 cm, white lanate. Capitula numerous. Involucre turbinate or campanulate-turbinate, 5–9 mm, mouth to 1 cm in diam., outside green, glabrous or initially white pubescent; phyllaries 5–8, in 2 rows, dark brown, elliptic or oblong, apex acute; inner phyllaries broadly pale brown membranous at margin. Ray florets 3–7, yellow; lamina linear-oblong, 1–1.6 cm × 2–3 mm, apex rounded; tube 2–3 mm. Tubular florets numerous, 5.5–6.5 mm; tube 1–1.5 mm. Achenes pale brown, cylindric, 4–6 mm. Pappus white or pale brownish, as long as tubular corolla. Fl. and fr. Jul–Oct.

Lake shores, forest understories, scrub, slopes; 3700–4500 m. SW Sichuan, E Xizang [Nepal].

**33. *Ligularia songarica*** (Fischer) Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 2: 532. 1934.

准噶尔囊吾 zhun ga er tuo wu

*Senecio songaricus* Fischer in Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 52. 1841; *Senecillus songarica* (Fischer) Kitamura; *Senecio turkestanicus* C. Winkler.

Stem erect, 40–180 cm tall, white floccose-lanate or glabrous, 3–10 mm in diam. at base, with a circle of dense reddish brown lanate hairs. Basal leaves petiolate; petiole 5–30 cm, without wings, floccose-lanate or glabrous, base narrowly sheathed; leaf blade sagittate, ovate-sagittate, or oblong-sagittate, 6–14(–35) × 4–11 cm, glabrous, pinnately veined, margin minutely denticulate, apex obtuse or acute; sinus broad, basal lobes coarsely dentate. Middle stem leaves similar but smaller, shortly petiolate, without wings, white lanate in axils. Distal stem leaves sessile, ovate-lanceolate to narrowly lanceolate, apex acuminate. Compound corymbs spreading; branches to 10 cm; leaflike and supplementary bracts narrowly lanceolate to subulate, 1–3 mm; peduncles 2–7 mm, glabrous. Capitula numerous. Involucre narrowly cylindric, 6–9 × (2.5–)4 mm, outside glabrous; phyllaries 5–7, in 2 rows, oblong or ovate-oblong, apex obtuse; inner phyllaries white membranous at margin. Ray florets 3 or 4, yellow; lamina oblong, 6–10 × 2–4 mm, apex rounded, minutely denticulate; tube 3–4 mm. Tubular florets 8–13, 6–10 mm, extending from involucre; tube 2–3 mm. Achenes yellowish, oblong, 4–5 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jun–Aug.

Stream banks, wet grasslands; 500–1100 m. Xinjiang (Tian Shan) [E Kazakhstan, Kyrgyzstan].

**34. *Ligularia thomsonii*** (C. B. Clarke) Pojarkova, Spisok Rast. Gerb. Fl. S.S.S.R. Bot. Inst. Vsesojuzn. Akad. Nauk 11: 165. 1949.

西域囊吾 xi yu tuo wu

*Senecio thomsonii* C. B. Clarke, Compos. Ind. 205. 1876; *Ligularia bungei* (Franchet) M. Popov; *L. thyrsoides* (Ledebour) Candolle var. *alpina* Bunge; *S. bungei* Franchet.

Stem erect, 25–200 cm tall, white floccose-lanate, 5–10 mm in diam. at base, with a circle of dense reddish brown lanate hairs. Basal leaves petiolate; petiole 8–30 cm, white lanate or glabrous, base narrowly sheathed; leaf blade triangular- or ovate-cordate, 4–26 × 4–22 cm, abaxially sparsely white lanate, adaxially glabrous, veins palmate-pinnate, base cordate or hastate, margin minutely denticulate, apex obtuse; basal lobes suborbicular, slightly divergent. Middle to distal stem leaves shortly petiolate; petiole to 4 cm, base slightly enlarged; leaf blade smaller than basal leaves, ovate-cordate to narrowly ovate. Distal stem leaves narrowly lanceolate, 2–5 cm × 3–10 mm. Corymbs paniculate; branches to 7 cm, each branch with 2–4 capitula; leaflike and supplementary bracts subulate, 4–10 mm; peduncles 5–20 mm. Capitula numerous. Involucre narrowly cylindric or campanulate, 7–13 × 3–6 mm, outside glabrous; phyllaries 5–7, in 2 rows, dark brown, narrowly oblong or lanceolate, 2–4 mm wide, margin membranous, apex acute. Ray florets 1–3(or 4), yellow; lamina narrowly oblong, to 1.8 cm × 3–4 mm, apex subentire; tube ca. 5 mm. Tubular florets 7–11, ca. 9 mm, extending from involucre; tube ca. 3 mm. Achenes yellowish. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Aug.

Grasslands, forest margins; 1500–3800 m. Xinjiang (Tian Shan) [Afghanistan, Kashmir, E Kazakhstan, Kyrgyzstan, Nepal, Pakistan, Tajikistan, Uzbekistan].

**35. *Ligularia schischkinii*** N. I. Rubtzov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 7: 138. 1938.

高山橐吾 gao shan tuo wu

Stem erect, 5–17 cm tall, white floccose-lanate, 1.5–3 mm in diam. at base, with a densely reddish brown lanate circle. Basal leaves petiolate; petiole 6–8 cm, white lanate, base narrowly sheathed; leaf blade broadly ovate or orbicular, 1.5–3.5 × 1.5–4 cm, abaxially sparsely lanate, pinnately veined, base cordate, margin entire, undulate, or dentate, apex obtuse. Middle to distal stem leaves shortly petiolate or sessile, narrowly ovate to lanceolate. Distal stem leaves linear-lanceolate. Capitula 1 or 2, often solitary. Involucre broadly campanulate or hemispheric, 0.9–1.3 × 1–1.5 cm, outside lanate at base; phyllaries 10–12, in 2 rows, lanceolate or linear, margin dark brown, apex acute or acuminate. Ray florets 10–14, yellow; lamina oblong or broadly elliptic, 1.4–2.5 cm, apex truncate or 3-lobed; tube 3–4 mm. Tubular florets numerous, 7–8 mm. Achenes yellowish white, cylindrical, 4–6.5 mm. Pappus white, as long as tubular corolla. Fl. Jul.

Alpine meadows; 2300–3200 m. Xinjiang [Kazakhstan (Tarbagatay Shan)].

**36. *Ligularia hamiica*** C. H. An, Fl. Xinjiang, 5: 478. 1999.

哈密橐吾 ha mi tuo wu

Stem erect, ca. 35 cm tall, glabrous. Basal leaves petiolate; petiole ca. 15 cm; leaf blade broadly ovate-reniform, 5–7 × ca. 7 cm, pinnately veined, base cordate, margin dentate, apex obtuse. Middle stem leaves petiolate; petiole 2–4 cm, base enlarged into lamellate auricle; leaf blade ovate-orbicular to broadly ovate, 5–7 × 5–6 cm, base cordate or truncate, margin dentate, apex obtuse. Distal stem leaves narrowly triangular-ovate or oblong, 5–6 × 3–3.5 cm. Capitula solitary or in subcorymb or basipetal raceme, nodding; peduncles 1–10 cm. Involucre hemispheric, 1.8–2 × ca. 2.5 cm; phyllaries in 2 rows, oblong-lanceolate, margin densely shortly tomentose, apex acuminate. Ray florets numerous, yellow; lamina narrowly elliptic, ca. 20 × 5 mm, throat of tubular corolla with 4–6 yellow, flat hairs; tube ca. 2 mm. Tubular florets numerous, 8–9 mm. Achenes cylindrical, ca. 6 mm. Pappus white, as long as tubular corolla. Fl. Jun–Jul.

• Xinjiang (Hami).

One of us (Illarionova) treats *Ligularia hamiica* as synonymous with *L. tianschanica*.

**37. *Ligularia tulupanica*** C. H. An, Fl. Xinjiang, 5: 478. 1999.

土鲁番橐吾 tu lu fan tuo wu

Stem erect, 20–40 cm tall, glabrous, with a densely reddish brown lanate circle. Basal leaves petiolate; petiole 7–10 cm, leaf blade broadly ovate or ovate-cordate, 3–4 × 3–6 cm, pinnately veined, base cordate, margin dentate, apex obtuse or rounded. Stem leaves sessile, ovate, base cordate, margin dentate, apex obtuse. Distal stem leaves ovate, lanceolate, or linear. Capitula 1 or 2, nodding. Involucre hemispheric, 1.3–1.5 × 2.4–2.6 cm; phyllaries in 2 rows, oblong-lanceolate to linear, 2–5 mm wide, margin shortly tomentose, apex acuminate. Ray flo-

rets numerous, yellow; lamina oblong, 1.5–2 cm × 5–7 mm, throat of tubular corolla glabrous; tube ca. 3 mm. Tubular florets numerous, 8–9 mm, tube 3–3.5 mm. Achenes cylindrical, ca. 6 mm. Pappus white, as long as tubular corolla.

• Xinjiang (Hami, Qitai).

**38. *Ligularia xinjiangensis*** Chang Y. Yang & S. L. Keng, J. Aug. 1st Agric. Coll. 18(2): 1. 1995.

新疆橐吾 xin jiang tuo wu

Stem erect, 35–40 cm tall, glabrous, ca. 1 cm in diam. at base, with a densely reddish brown lanate circle. Basal leaves petiolate; petiole longer than leaf blade, glabrous, base narrowly sheathed; leaf blade orbicular-ovate, orbicular-cordate, or orbicular, 2–7 × 2–8 cm, green, pinnately veined, glabrous, base cordate, margin irregularly sharply dentate, apex obtuse or rounded. Distal stem leaves shortly petiolate, triangular, 5–10 × 3–5 cm, base auriculate-amplexicaul; distalmost stem leaves bracteal. Capitula 5, in subcorymb; leaflike bracts triangular, supplementary bracts 1–3, subulate; peduncles 3–8 cm, upper floccose-lanate. Involucre hemispheric or cupular, ca. 1.4 × 2.5–2.7 cm, outside glabrous, only base pubescent; phyllaries 12 or 13, in 2 rows, lanceolate or ovate-oblong, apex acute or acuminate; inner phyllaries broadly white membranous at margin. Ray florets 13–15, yellow; lamina oblong, ca. 16 × 6 mm, apex acute; tube 3–4 mm. Tubular florets numerous, 8–9 mm; tube ca. 3 mm. Achenes brown, cylindrical, ca. 5 mm, ?hairy between ribs. Pappus white, as long as tubular corolla. Fl. and fr. Jun–Jul.

• Subalpine meadows; 2400–2800 m. Xinjiang.

One of us (Illarionova) treats *Ligularia xinjiangensis* as synonymous with *L. tianschanica*.

**39. *Ligularia tianschanica*** Chang Y. Yang & S. L. Keng, J. Aug. 1st Agric. Coll. 18(2): 1. 1995.

天山橐吾 tian shan tuo wu

Stem erect, 20–40 cm tall, glabrous, 4–10 mm in diam. at base, with a densely reddish brown lanate circle. Basal and proximal stem leaves petiolate; petiole longer than leaf blade, 8–12 cm, glabrous, base narrowly sheathed; leaf blade orbicular-reniform, 1.8–4 × 3–4.5 cm, green, glabrous, pinnately veined, base cordate, margin irregularly sharply dentate, apex obtuse. Distal stem leaves shortly petiolate; leaf blade ovate or triangular, base auriculate-amplexicaul; distalmost leaves sessile, bracteal. Capitula 1–5, in subcorymb; leaflike bracts triangular; supplementary bracts 1–3, subulate; peduncles 1.5–8 cm, upper floccose-lanate. Involucre campanulate or hemispheric, 1–2 × 1.5–2.5 cm, outside glabrous, only base pubescent; phyllaries 12 or 13, in 2 rows, lanceolate or ovate-oblong, apex acute or acuminate; inner phyllaries broadly white membranous at margin. Ray florets 10–15, yellow; lamina oblong, ca. 20 × 5 mm, apex acute; tube 3–4 mm. Tubular florets numerous, ca. 8 mm; tube 2–3 mm. Achenes brown, cylindrical, 5–6 mm, glabrous. Pappus white, as long as tubular corolla. Fl. and fr. Jun–Jul.

• Subalpine meadows; 2400–2700 m. Xinjiang.

One of us (Illarionova) treats *Ligularia hamiica* and *L. xinjiangensis* as synonymous with *L. tianschanica*.

**40. *Ligularia thyrsoides*** (Ledebour) Candolle, Prodr. 6: 315. 1838.

塔序橐吾 ta xu tuo wu

*Cineraria thyrsoides* Ledebour, Icon. Pl. 2: 18. 1830; *Ligularia knorringiana* Pojarkova; *Senecillis thyrsoides* (Ledebour) Kitamura; *Senecio sibiricus* Linnaeus f.

Stem erect, 30–125 cm tall, initially floccose-lanate, glabrescent, 5–7 mm in diam. at base, with a densely reddish brown lanate circle. Basal leaves petiolate; petiole sometimes purplish red, 10–26 cm, base narrowly sheathed; leaf blade abaxially pale green, adaxially green, triangular, sagittate, or triangular-ovate, 9–14 × 9–11 cm, glabrous, pinnately veined, base cordate, margin irregularly dentate, apex obtuse; basal lobes slightly divergent. Middle to distal stem leaves shortly petiolate or sessile, triangular-ovate to linear-lanceolate, apex acuminate. Distal stem leaves with undeveloped capitula in axil. Compound corymbs pyramidal, paniculate, 5–25 cm, to 14 cm wide, thyrsoid, proximal branches to 10 cm, each branch with corymb; leaflike and supplementary bracts subulate, 1.5–7 mm; peduncles 3–10 mm. Capitula numerous (10–80). Involucre cupular, 5–12 × 6–15 mm, outside convex, glabrous; phyllaries 8–12, in 2 rows, ovate or oblong, 2–5 mm wide, apex acute; inner phyllaries broadly white membranous at margin. Ray florets 5–12, yellow; lamina oblong, 1–1.4 cm × 2–3 mm, apex acute; tube 3.5–4 mm. Tubular florets numerous, 6–7 mm; tube ca. 3 mm. Achenes yellowish, cylindrical, 3.5–4 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Aug.

Wet grasslands, stream banks; 500–2000 m. Xinjiang [Kazakhstan, Kyrgyzstan, W Mongolia, SW Russia (Siberia)].

**41. *Ligularia narynensis*** (C. Winkler) O. Fedtschenko & B. Fedtschenko, Conspect. Fl. Turkestan. 4: 212. 1911.

山地橐吾 shan di tuo wu

*Senecio narynensis* C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 11: 319. 1890; *Ligularia robusta* (Ledebour) Candolle var. *kareliniana* (Trautvetter) O. Fedtschenko & B. Fedtschenko; *Senecillis narynensis* (C. Winkler) Kitamura; *Senecio robustus* (Candolle) Schultz Bipontinus var. *karelinianus* Trautvetter.

Stem erect, 9–70 cm tall, floccose-lanate, 2–6 mm in diam. at base, with a densely reddish brown lanate circle. Basal leaves petiolate; petiole 2–15 cm, floccose-lanate, base narrowly sheathed; leaf blade adaxially green, ovate-cordate, orbicular-cordate, triangular-cordate, or oblong-cordate, 1.4–15 × 1.6–10 cm, abaxially floccose-lanate, adaxially glabrous, pinnately veined, base cordate, margin undulate or sharply dentate, apex obtuse or acute, mucronate. Middle to distal stem leaves shortly petiolate or sessile, narrowly ovate to lanceolate. Distal stem leaves linear-lanceolate, often with undeveloped capitula in axil. Capitula 1–15, in corymb or rarely solitary; leaflike and supplementary bracts linear-lanceolate, to 2.2 cm; peduncles 0.8–10 cm. Involucre hemispheric or cupular, 8–13 × 11–20

mm, outside glabrous; phyllaries (8–)10–15, in 2 rows, dark brown, lanceolate, oblong, or elliptic, 2–7 mm wide, apex acute or acuminate; inner phyllaries white membranous at margin. Ray florets 9–15, yellow; lamina oblong or broadly elliptic, 1.1–2.5 cm × 2–7 mm, apex acute or truncate; tube 3–4 mm. Tubular florets numerous, 8–9 mm, higher than involucre; tube ca. 3 mm. Achenes yellowish white or purplish brown, cylindrical, 4–7 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jun–Aug.

Grassy slopes, forest understories, alpine meadows; 600–3200 m. Xinjiang [E Kazakhstan, Kyrgyzstan].

**42. *Ligularia kunlunshanica*** C. H. An, Fl. Xinjiang. 5: 477. 1999.

昆仑山橐吾 kun lun shan tuo wu

Plants white floccose-lanate. Stem erect, to 70 cm tall, ca. 4 mm in diam. at base, with a densely reddish brown lanate circle. Basal and proximal stem leaves petiolate; petiole 10–15 cm, base narrowly sheathed; leaf blade oblong or elliptic, 4–12 × 2–7 cm, pinnately veined, base oblique, both sides laterally unequal, margin irregularly sparsely dentate, apex obtuse. Distal stem leaves sessile, bracteal, oblong, broadly lanceolate, or linear. Capitula 10, in corymb-raceme; supplementary bracts subulate; peduncles 6–12 cm. Involucre campanulate or cupular, 1–1.5 × 1.5–2 cm; phyllaries in 2 rows, linear-lanceolate, apex acuminate; inner phyllaries broadly white membranous at margin. Ray florets numerous, yellow; lamina obovate-oblong, 1.5–1.8 cm × ca. 4 mm, apex acute; tube ca. 4 mm. Tubular florets numerous, ca. 7 mm. Achenes cylindrical, 3–3.5 mm. Pappus white, as long as tubular corolla. Fl. Jun.

• Subalpine meadows; 2400–2700 m. Xinjiang.

**43. *Ligularia myriocephala*** Y. Ling ex S. W. Liu, Acta Biol. Plateau Sin. 3: 67. 1984.

千花橐吾 qian hua tuo wu

Stem erect, to 100 cm tall, 1–1.5 cm in diam. at base, proximally glabrous, distally umbellate-branched, white arachnoid-puberulent. Basal leaves petiolate; petiole 35–40 cm, upper winged, base narrowly sheathed; leaf blade oblong, 22–25 × 12–18 cm, abaxially shortly pilose, adaxially glabrous, pinnately veined, base cuneate, margin regularly dentate, apex subrounded. Middle stem leaves similar but smaller, petiolate; sheath enlarged, 8–10 cm, cymbiform-amplexicaul. Distal stem leaves sessile, lanceolate. Capitula numerous, small, in large, compound corymbs to 40 cm, branches numerous, densely shortly brown pilose; leaflike and supplementary bracts lanceolate or linear; peduncles short, densely shortly brown pilose. Involucre turbinate, 4–6 mm, mouth ca. 5 mm in diam., outside densely shortly brown pilose, base acute; phyllaries 5, in 2 rows, ovate-oblong, ca. 2 mm wide, margin broadly brown membranous, apex acute. Florets 5, all tubular, wholly extending from involucre, 5–6 mm; tube 1.5–2 mm. Achenes dark brown, cylindrical, 4–6 mm. Pappus yellowish, as long as tubular corolla. Fl. and fr. Jul–Aug.

• Grasslands, forest margins; 2600–4300 m. Xizang (Cona).

**44. *Ligularia discoidea*** S. W. Liu, Acta Biol. Plateau Sin. 3: 66. 1984.

盘状橐吾 pan zhuang tuo wu

Stem erect, 35–40 cm tall, 2.5–3 mm in diam. at base, proximally glabrous, distally shortly yellowish brown pilose and white arachnoid-puberulent. Basal leaves oblong-obovate or oblong, 4–6.5 × 3–4 cm, glabrous, pinnately veined, base cuneate, narrowed into a winged petiole, margin irregularly coarsely dentate, apex acute; teeth triangular, curved apically. Middle to distal stem leaves similar to basal leaves but sessile, to 13 × 3–4.5 cm; sheath 2.5–5 cm. Distalmost stem leaves oblong, tubular-amplexicaul, apex caudate-acuminate. Capitula 4–8, in corymb; leaflike and supplementary bracts linear; peduncles 1–3.5 cm, densely shortly yellowish brown pilose and white arachnoid-puberulent. Involucre broadly turbinate, 9–11 mm, mouth 1–1.5 cm in diam., outside glabrous; phyllaries 10–12, in 2 rows, linear-oblong, ca. 2 mm wide, brown ciliate, apex acuminate; inner phyllaries dark brown membranous at margin. Outer florets female, narrowly tubular, 2–5-divided, segments unequal, with 1 or 2 sterile stamens, anthers ovoid. Central florets bisexual, yellow, tubular, ca. 6 mm; tube ca. 1 mm. Achenes dark brown, cylindric, ca. 3 mm. Pappus yellowish, as long as tubular corolla. Fl. and fr. Aug.

- Scrub; ca. 4300 m. Xizang (Nyingchi).

**45. *Ligularia atrovioleacea*** (Franchet) Handel-Mazzetti, Bot. Jahrb. Syst. 69: 109. 1938.

黑紫橐吾 hei zi tuo wu

*Senecio atrovioleaceus* Franchet, Bull. Soc. Bot. France 39: 303. 1893; *Cremanthodium atrovioleaceum* (Franchet) R. D. Good; *Senecillis atrovioleacea* (Franchet) Kitamura; *Senecio oreotrepes* W. W. Smith.

Stem erect, 25–60 cm tall, 3–5 mm in diam. at base, densely long blackish purple pilose, intermixed white arachnoid-puberulent in synflorescence. Basal leaves petiolate; petiole 7–15 cm, densely long blackish purple pilose, base narrowly sheathing; leaf blade ovate-cordate, 5–9 × 3.5–7 cm, abaxially shortly pilose, densely so along veins, adaxially glabrescent, pinnately veined, lateral veins 6–10 pairs, abaxially with conspicuous slender reticulate veins, base cordate, margin minutely denticulate, long blackish purple pilose between teeth, apex obtuse; sinus 1/4–1/3 as long as blade, narrow, basal lobes oblong, convergent. Middle stem leaves often solitary, similar but smaller, shortly petiolate; sheath enlarged, 3–4 × ca. 1.5 cm, densely long blackish purple pilose. Capitula 4–10, in corymb; leaflike and supplementary bracts subulate, shorter; peduncles 3–15 mm, densely long blackish purple pilose. Involucre narrowly campanulate or turbinate, 6–10 mm, mouth to 1 cm in diam., outside long blackish purple pilose; phyllaries 10–12, in 2 rows; outer phyllaries lanceolate and narrow; inner phyllaries oblong and ca. 2.5 mm wide, margin narrowly brown membranous, apex acute. Florets numerous, all tubular, yellow, 6–7 mm; tube ca. 3 mm. Achenes pale brown, cylindric, ca. 5 mm. Pappus yellowish, as long as tubular corolla. Fl. and fr. Aug–Dec.

- Forest understories, grasslands; 3000–4000 m. SW Sichuan, NW Yunnan.

**46. *Ligularia microcardia*** Handel-Mazzetti, Bot. Jahrb. Syst. 69: 109. 1938.

心叶橐吾 xin ye tuo wu

Stem erect, to 45 cm tall, 3–4 mm in diam. at base, densely shortly yellow pilose, proximal hairs black, distal hairs yellow. Basal leaves petiolate; petiole to 12 cm, slender, densely shortly pilose; sheath 4–4.5 cm, densely shortly pilose, mouth of sheath entire; leaf blade ovate-cordate or ovate, 4–9.5 cm, to 11.5 cm wide at base, abaxially sometimes shortly pilose, adaxially glabrous, pinnately veined, base cordate, margin regularly denticulate, between teeth pubescent, apex obtuse; sinus 1/5–1/4 as long as leaf blade, basal lobes orbicular. Middle to distal stem leaves similar but smaller, shortly petiolate; sheath enlarged, cymbiform. Capitula 2–6, in corymb; leaflike bracts linear; supplementary bracts absent; peduncles 0.5–2 cm, densely shortly yellow pilose. Involucre broadly turbinate, 8–10 mm, mouth ca. 1 cm in diam., outside densely shortly yellow pilose; phyllaries ca. 13, in 2 rows, oblong, ca. 3 mm wide, apex obtuse; inner phyllaries broadly brown membranous at margin. Florets numerous, higher than involucre, all tubular, yellow, 5.5–6.5 mm; tube 1–1.5 mm; limb cylindric. Achenes dark brown, fusiform, ca. 4 mm. Pappus yellowish, as long as tubular corolla. Fl. and fr. Sep–Oct.

- Stream banks, grassy slopes; 3300–4000 m. S and SW Sichuan.

**47. *Ligularia lapathifolia*** (Franchet) Handel-Mazzetti, Vegetationsbilder 22(Heft 8): t. 45a. 1932.

牛旁叶橐吾 niu pang ye tuo wu

*Senecio lapathifolius* Franchet, Bull. Soc. Bot. France 39: 306. 1893; *Senecillis lapathifolia* (Franchet) Kitamura; *Senecio tongtchouanensis* H. Léveillé.

Stem erect, to 120 cm tall, 8–15 mm in diam. at base, proximally glabrous, distally and synflorescence initially shortly pilose and white arachnoid-puberulent, glabrescent. Basal leaves petiolate; petiole 7–25 cm, white arachnoid-puberulent, base sheathed; leaf blade ovate or ovate-oblong, 19–40.5 × 8.5–23 cm, both surfaces sparsely white arachnoid-puberulent or glabrescent, pinnately veined, midvein strong, to 1.2 cm wide, lateral veins spreading, base truncate or cuneate, margin regularly denticulate, between teeth ciliate, apex obtuse. Middle to distal stem leaves smaller distally, sessile, sheath amplexicaul; leaf blade ovate-oblong or ovate-lanceolate, to 20 × 9 cm. Compound corymb branched; branches to 23 cm, spreading or fasciated; leaflike and supplementary bracts smaller, linear-subulate; peduncles 0.5–4 cm. Capitula 6–23, rarely more (to 40). Involucre hemispheric or broadly campanulate, 1–1.2 × ca. 2 cm, outside white arachnoid-puberulent; phyllaries 8–14, in 2 rows, ovate-lanceolate or lanceolate, to ca. 7 mm wide, subleathery, apex acute, often curved; inner phyllaries broadly membranous at margin. Ray florets yellow; lamina linear-oblong, 1.5–2 cm × 3–4 mm, apex acute; tube ca. 7 mm. Tubular florets numerous, 1–1.1 cm; tube ca. 5 mm; limb narrowed at base. Achenes brown, cylindric, 3–6 mm. Pappus reddish brown or yellowish, as long as tubular corolla. Fl. and fr. Jul–Oct.

- Forest understories, grassy slopes, scrub; 1800–3300 m. SW Sichuan, NW Yunnan.

**48. *Ligularia cymbulifera*** (W. W. Smith) Handel-Mazzetti, *Symb. Sin.* 7: 1133. 1936.

舟叶橐吾 *zhou ye tuo wu*

*Senecio cymbulifer* W. W. Smith, *Notes Roy. Bot. Gard. Edinburgh* 8: 115. 1913; *Ligularia crassa* Handel-Mazzetti; *Senecillis cymbulifera* (W. W. Smith) Kitamura.

Stem erect, 80–120 cm tall, to 2.5 cm in diam. at base, shortly pilose and white arachnoid-puberulent. Basal leaves petiolate; petiole ca. 15 cm, winged; wings to 4 cm wide, entire; leaf blade elliptic or ovate-oblong, rarely obovate, 15–60 × to 45 cm, pinnately veined, midvein strong, white arachnoid-puberulent, base shallowly cordate, margin minutely denticulate, apex rounded. Middle stem leaves sessile, cymbiform, to 20 cm, both surfaces white arachnoid-puberulent, sheath amplexicaul. Distal stem leaves sheathlike. Compound corymb much branched, to 40 cm, white arachnoid-puberulent and shortly pilose; leaflike and supplementary bracts smaller, linear; peduncles 2–15(–22) mm. Capitula numerous. Involucre campanulate, 8–10 mm, mouth to 1 cm in diam., outside white arachnoid-puberulent or glabrous; phyllaries 7–10, in 2 rows, ovate-lanceolate or lanceolate, margin brown membranous, apex acute. Ray florets yellow; lamina linear, 1–1.4 cm × 1.5–2 mm; tube 4–5 mm. Tubular florets numerous, deep yellow, 6–7 mm; tube ca. 2 mm. Achenes blackish gray, narrowly cylindrical, 3–6 mm. Pappus white or yellowish, as long as tubular corolla. Fl. and fr. Jul–Sep.

• Forest margins, grassy slopes, alpine scrub, alpine meadows, stream banks; 2900–4800 m. SW and W Sichuan, S Xizang (Yadong), NW Yunnan.

**49. *Ligularia zhouquensis*** W. D. Peng & Z. X. Peng, *Acta Phytotax. Sin.* 33: 612. 1995.

舟曲橐吾 *zhou qu tuo wu*

Stem erect, 70–85 cm tall, 5–10 mm in diam. at base, distally white arachnoid-puberulent. Basal leaves obovate, small; sheath ca. 7 × 1 cm. Stem leaves 3 or 4, obovate to elliptic, 12–20 × 4.5–7.5 cm, white arachnoid-puberulent, pinnately veined, base cuneate, sheath amplexicaul, margin remotely denticulate, apex rounded. Distal stem leaves smaller, elliptic to narrowly elliptic, base not amplexicaul, apex acuminate. Compound corymbs paniculate, 23–28 cm, white arachnoid-puberulent and shortly brown pilose; leaflike bracts linear to linear-lanceolate; supplementary bracts 2 or 3, smaller, linear; peduncles 1.5–3 cm. Capitula numerous. Involucre turbinate, ca. 7 × 6 mm, outside dark green, base sparsely white arachnoid-puberulent; phyllaries 10–12, in 2 rows, linear or oblanceolate, margin membranous, apex acute to acuminate. Outer florets female, 5–7, yellow, similar to tubular florets, limb 2–4-lobed to -divided, lobes 0.5–4 mm, unequal; tube 2–4 mm. Tubular florets 12–15, yellow, ca. 6 mm; tube ca. 2.5 mm. Achenes cylindrical, with 7–10 ribs. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Aug.

• Alpine meadows; 2800–3600 m. SW Gansu.

**50. *Ligularia euryphylla*** (C. Winkler) Handel-Mazzetti, *Bot. Jahrb. Syst.* 69: 108. 1938.

广叶橐吾 *guang ye tuo wu*

*Senecio euryphyllus* C. Winkler, *Trudy Imp. S.-Peterburgsk. Bot. Sada* 14: 156. 1895; *Senecillis euryphylla* (C. Winkler) Kitamura.

Stem erect, to 100 cm tall, proximally glabrous, distally white arachnoid-puberulent. Basal leaves petiolate; petiole 30–40 cm, often winged, base sheathed; leaf blade ovate-lanceolate, ca. 20 × 15–20 cm, both surfaces shortly white pilose or abaxially intermixed arachnoid-puberulent, adaxially glabrous, pinnately veined, base hastate or cordate, rarely subtruncate, margin irregularly coarsely dentate, apex acuminate. Middle stem leaves petiolate; petiole winged; leaf blade cordate, 20–35 × ca. 9 cm, base sheathed, amplexicaul, margin sharply dentate. Capitula 12–15, in corymb; peduncles long, glabrous or arachnoid-puberulent; supplementary bracts 3–7, linear. Involucre campanulate, ca. 10 × 8 mm; phyllaries 8 or 9, in 2 rows, margin membranous, apex black. Ray florets yellow; lamina slightly longer than involucre, apex 3-denticulate. Tubular florets numerous. Achenes obovoid, ribbed. Pappus pale red. Fl. and fr. Aug.

• Grasslands; ca. 4300 m. Sichuan (Batang, Kangding, Litang).

**51. *Ligularia tongolensis*** (Franchet) Handel-Mazzetti, *Symb. Sin.* 7: 1136. 1936.

东俄洛橐吾 *dong e tuo wu*

*Senecio tongolensis* Franchet, *Bull. Soc. Bot. France* 39: 305. 1893; *Senecillis tongolensis* (Franchet) Kitamura; *Senecio monbeigii* H. Léveillé.

Stem erect, 20–100 cm tall, ca. 5 mm in diam. at base, white arachnoid-puberulent. Basal leaves petiolate; petiole 6–25 cm, shortly pilose, base sheathed; leaf blade ovate-cordate or ovate-oblong, 3–17 × 2.5–12 cm, shortly pilose, pinnately veined, base shallowly cordate, rarely subtruncate, margin denticulate, apex obtuse. Middle to distal stem leaves similar but smaller, smaller distally, shortly petiolate; sheath enlarged, to 10 cm, shortly pilose. Capitula 1–20, in corymb or solitary; peduncles 1–7 cm, arachnoid-puberulent and shortly pilose; leaflike and supplementary bracts linear, shorter. Involucre campanulate, 5–10 × 5–6(–7) mm, outside glabrous; phyllaries 7 or 8, in 2 rows, oblong or lanceolate, to 3 mm wide, apex acute; inner phyllaries brown membranous at margin. Ray florets 5 or 6, yellow; lamina oblong, 7–17 × 1.5–2 mm; tube ca. 3 mm. Tubular florets numerous, ca. 7 mm, extending from involucre; tube ca. 3 mm. Achenes pale brown, cylindrical, ca. 5 mm. Pappus pale brown, as long as tubular corolla. Fl. and fr. Jul–Aug.

• Forest margins, forest understories, wet valleys, scrub, alpine meadows; 2100–4000 m. SW and W Sichuan, SE Xizang, NW Yunnan.

**52. *Ligularia schmidtii*** (Maximowicz) Makino, *Bot. Mag. (Tokyo)* 17: 191. 1903.

合苞橐吾 *he bao tuo wu*

*Senecillis schmidtii* Maximowicz, *Bull. Acad. Imp. Sci. Saint-Petersbourg* 16: 222. 1871; *Cyathocephalum schmidtii* (Maximowicz) Nakai; *Senecio schmidtii* (Maximowicz) Franchet & Savatier.

Plants grayish green. Stem erect, 50–200 cm tall, 2.5–7 mm in diam. at base, glabrous. Basal leaves petiolate; leaf blade broadly ovate or oblong, 10–30 × 5–22 cm, glabrous, pinnately veined, base rounded, margin irregularly undulately dentate, apex obtuse or acute. Middle to distal stem leaves shortly petiolate or sessile, oblong or ovate-oblong, to 13 × 4 cm, smaller distally. Synflorescence racemose, 6–13(–18) cm; peduncles 3–15 cm; leaflike and supplementary bracts smaller. Capitula numerous. Involucre campanulate, 6–7 × ca. 5 mm, outside glabrous; phyllaries united, apex 2–5-dentate, tips of teeth acute or rounded. Ray florets 2–6, yellow; lamina oblong, 1.3–2.2 cm × 2–6 mm, apex acute; tube 4–5 mm. Tubular florets numerous, 7–10 mm; tube 2–3 mm. Achenes brown, cylindrical, 7–8 mm. Pappus reddish brown, as long as tube of tubular corolla. Fl. and fr. Jun–Sep.

Forest understories, grassy slopes, scrub; 100–1500 m. S Heilongjiang [Korea, Russia (Far East)].

**53. *Ligularia biceps*** Kitagawa, J. Jap. Bot. 17: 239. 1941.

无纓橐吾 wu ying tuo wu

Plants grayish green. Stem erect, to 50 cm tall, glabrous. Basal leaves petiolate; petiole to 25 cm, glabrous, middle to distal petioles broadly winged; leaf blade ovate to orbicular, to 28 × 23 cm, glabrous, pinnately veined, with conspicuous reticulate veins, base cordate, margin undulately dentate or entire, apex rounded. Middle to distal stem leaves lax, similar but smaller, sessile. Distalmost stem leaves bracteal. Capitula 1–9, often in corymb. Involucre blackish gray, campanulate, or cupular in fruit, 1–1.2 cm, outside glabrous; phyllaries spreading, leathery, below middle united, distally 3–5-lobed; lobes ovate or triangular, apex rounded, mucronate. Ray florets 6–13, yellow; lamina broadly elliptic, to 3 × 1.1 cm, apex entire or denticulate. Tubular ca. 1 cm; tube ca. 3 mm. Achenes brown, 6–10 mm. Pappus absent. Fl. and fr. Jul.

• ?Grassy slopes. Liaoning (Motian Ling).

**54. *Ligularia mongolica*** (Turczaninow) Candolle, Prodr. 6: 315. 1838.

全缘橐吾 quan yuan tuo wu

*Cineraria mongolica* Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 5: 199. 1832; *Ligularia mongolica* var. *taquetii* (H. Léveillé & Vaniot) H. Koyama; *L. putjatae* (C. Winkler) Handel-Mazzetti; *L. taquetii* (H. Léveillé & Vaniot) Nakai; *Senecillis mongolica* (Turczaninow) Kitamura; *Senecio mongolicus* (Turczaninow) Schultz Bipontinus; *S. putjatae* C. Winkler; *S. taquetii* H. Léveillé & Vaniot.

Plants grayish green. Stem erect, 30–110 cm tall, 2.5–5 mm in diam. at base, glabrous. Basal leaves petiolate; petiole to 35 cm, glabrous, base narrowly sheathed; leaf blade ovate, oblong, or elliptic, 6–25 × 4–12 cm, glabrous, pinnately veined, base cuneate, narrowed into a petiole, margin entire, apex obtuse. Middle to distal stem leaves sessile, oblong or ovate-lanceolate, erect, adnate, base semiamplexicaul. Synflorescences racemose, clustered, subcapitate, 2–4 cm, or proximally remote, to 16 cm; leaflike and supplementary bracts linear-subulate, less than 1 cm; peduncles 3–5 mm, slender. Capitula numerous. In-

volucre narrowly campanulate or cylindrical, 8–12 × 4–5 mm, outside glabrous; phyllaries 5 or 6, in 2 rows, oblong, to 4 mm wide, apex obtuse or acute; inner phyllaries membranous at margin. Ray florets 1–4, yellow; lamina oblong, 1–1.2 cm × to 6 mm, apex rounded; tube ca. 6 mm. Tubular florets 5–10, 8–10 mm; tube 4–5 mm; limb base cuneate, narrowed. Achenes brown, cuneate-cylindrical, 4–7 mm. Pappus reddish brown, as long as or shorter than tube of tubular corolla. Fl. and fr. Jun–Aug.

Swamp meadows, slopes, scrub, canopy gaps in forests; below 1500 m. N Hebei, NE Heilongjiang, Nei Mongol [Korea, Mongolia, Russia].

**55. *Ligularia macrophylla*** (Ledebour) Candolle, Prodr. 6: 316. 1838.

大叶橐吾 da ye tuo wu

*Cineraria macrophylla* Ledebour, Fl. Altaic. 4: 108. 1833; *Ligularia ledebourii* (Schultz Bipontinus) Bergman; *Senecillis macrophylla* (Ledebour) Kitamura; *Senecio ledebourii* Schultz Bipontinus.

Plants grayish green. Stem erect, 35–110(–180) cm tall, 8–15 mm in diam. at base, proximally glabrous, distally and synflorescence shortly pilose. Basal leaves petiolate; petiole often purplish red, 5–20 cm, glabrous, narrowly winged, base sheathed; leaf blade ovate-oblong or oblong, 6–16(–45) × 4.5–9(–28) cm, glabrous, pinnately veined, base cuneate, narrowed into a petiole, margin undulately denticulate, apex obtuse. Stem leaves sessile, erect, ovate-oblong to lanceolate, to 12 × 5 cm, tubular-amplexicaul or semiamplexicaul at base. Synflorescence paniculate, 5–40 cm, proximally branched; leaflike and supplementary bracts linear-subulate, 3–8 mm; peduncles 1–3 mm, slender. Capitula numerous. Involucre narrowly turbinate or cylindrical, 3.5–5(–6) × 2–3(–5) mm or mouth to 6 mm in diam., outside glabrous or white puberulent; phyllaries 4 or 5, in 2 rows, obovate or oblong, 1.5–3 mm wide, apex obtuse or rounded; inner phyllaries membranous at margin. Ray florets 1–3, yellow; lamina oblong, 6–8 × 2–3 mm, apex rounded; tube ca. 4 mm. Tubular florets 2–7, extending from involucre, 5–7 mm; tube 2–2.5 mm. Achenes yellowish, cylindrical, 3–6 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jun–Aug. *2n* = 58.

Stream banks, swamps, grasslands on shaded slopes, forest margins; 700–2900 m. Xinjiang (Altay, Tian Shan) [Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan].

**56. *Ligularia heterophylla*** Ruprecht, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 14(4): 53. 1869.

异叶橐吾 yi ye tuo wu

Plants grayish green. Stem erect, 20–200 cm tall, 4–15 mm in diam. at base, proximally glabrous, distally and synflorescence white arachnoid-puberulent and shortly yellow pilose. Basal leaves petiolate; petiole 5–60 cm, glabrous, narrowly winged, base sheathed; leaf blade ovate-oblong or oblong, 5–45 × 5–35 cm, glabrous, pinnately veined, base cuneate, narrowed into a petiole, margin undulately denticulate, apex obtuse. Proximal stem leaves petiolate; petiole 4–8 cm, glabrous, broadly winged, base enlarged sheathed; leaf blade elliptic, oblong, or

orbicular, 8–17 × 6–10.5 cm, glabrous, pinnately veined, base broadly cuneate or rounded, narrowed into a petiole, margin undulately shallowly dentate or irregularly sharply dentate, tips of teeth curved mucronate, apex obtuse. Middle to distal stem leaves sessile, oblong or elliptic, smaller distally, proximal leaves to 17 × 8.5 cm, tubular-amplexicaul or semiamplexicaul at base. Synflorescence racemose-paniculate, ca. 30 cm, rarely proximally branches fewer and shorter, with a raceme; branches 1–3(–7) cm; leaflike and supplementary bracts linear-subulate or filiform, to 1 cm; peduncles 2–4 mm. Capitula numerous. Involucre cupular or campanulate, 6–8 × 5–8 mm, outside glabrous or sparsely white puberulent; phyllaries 6–8(–10), in 2 rows, lanceolate or oblong, 2–3.5 mm wide, apex acute or acuminate; inner phyllaries membranous at margin. Ray florets (4 or) 5–7, yellow; lamina narrowly oblong or oblong, 7–10 × 2–4 mm, apex acute or obtuse; tube ca. 3 mm. Tubular florets 10–14(–16), slightly higher than involucre, 6–7 mm; tube ca. 2 mm. Achenes yellowish, cylindric, 4–7 mm. Pappus white, as long as tubular corolla. Fl. Jul–Aug.  $2n = 60$ .

Slopes, grasslands, stream banks, swamps; 2200–2500 m. Xinjiang (Tian Shan) [S Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

**57. *Ligularia lingiana*** S. W. Liu, Bull. Bot. Res., Harbin 5(4): 72. 1985.

君范橐吾 jun fan tuo wu

Plants grayish green. Stem erect, to 120 cm tall, 3–4 mm in diam. at base, glabrous. Basal leaves not seen. Middle stem leaves sessile; leaf blade elliptic or oblong, 10–15 × 6–10.5 cm, leathery, glabrous, pinnately veined, midvein strong, with conspicuous prominent reticulate veins on both surfaces, base cuneate, semiamplexicaul, margin undulately shallowly dentate, apex rounded. Distal stem leaves sessile, smaller, oblong, with conspicuous reticulate veins, apex acute or acuminate. Synflorescence racemose, lax, to 15 cm; leaflike bracts reddish yellow or yellowish brown when dry, ovate-oblong to lanceolate, 2–5 × 1.5–2.5 cm, smaller distally, membranous, with conspicuous reticulate veins, apex acuminate; peduncles to 2 cm, often curved. Capitula 6, nodding; supplementary bracts linear-lanceolate. Involucre broadly campanulate, 1–1.2 × ca. 1 cm, base subtruncate; phyllaries 8–10, in 2 rows, dark brown, lanceolate or oblong, apex acute; inner phyllaries broader, ca. 5 mm wide, margin membranous. Florets numerous, all tubular, yellow, 6–7 mm; tube ca. 2 mm. Achenes pale brown, oblong, 4.5–5 mm, with 4 ribs. Pappus white, as long as tubular corolla. Fl. and fr. Aug.

• Scrub, forest margins; ca. 3600 m. Sichuan (Muli).

**58. *Ligularia melanocephala*** (Franchet) Handel-Mazzetti, Bot. Jahrb. Syst. 69: 119. 1938.

黑苞橐吾 hei bao tuo wu

*Senecio melanocephalus* Franchet, Bull. Soc. Bot. France 39: 294. 1893; *Senecillis melanocephala* (Franchet) Kitamura.

Plants grayish green. Stem erect, to 100 cm tall, 6–8 mm in diam. at base, proximally glabrous, distally and synflorescence shortly brown pilose. Basal leaves shortly petiolate; petiole broadly winged, base enlarged sheathed; leaf blade oblong,

ovate, or broadly ovate, 14–28 × 9.5–11 cm, herbaceous, glabrous, pinnately veined, with prominent reticulate veins on both surfaces, base cordate or broadly cuneate, narrowed into a petiole, margin denticulate, apex obtuse. Middle to distal stem leaves sessile, oblong to lanceolate, 14–27 × 8–10 cm, base auriculate-amplexicaul, apex obtuse or acute. Synflorescence racemose, 30–40 cm, lax; leaflike bracts linear, to 3.5 cm, smaller distally; peduncles 5–30 mm. Capitula numerous; supplementary bracts subulate. Involucre blackish gray, turbinate, rarely subcampanulate, 5–8 × ca. 5 mm, outside glabrous; phyllaries 7 or 8, in 2 rows, ovate-lanceolate or lanceolate, apex acute or acuminate; inner phyllaries membranous at margin. Ray florets 8–12, yellow; lamina oblong or elliptic, 4–8 × 2–3.5 mm, 2- or 3-dentate, apex rounded; tube ca. 2 mm. Tubular florets numerous, 5–6 mm, higher than involucre; tube 1.5–2 mm. Achenes reddish brown, cylindric, to 7 mm, prominently ribbed. Pappus yellowish white, as long as tubular corolla. Fl. and fr. Aug–Sep.

• Forest margins, forest understories, grassy slopes; 3400–4000 m. Sichuan (Daocheng, Muli), NW Yunnan.

**59. *Ligularia dictyoneura*** (Franchet) Handel-Mazzetti, Vegetationsbilder 22(Heft 8): 6. 1932.

网脉橐吾 wang mai tuo wu

*Senecio dictyoneurus* Franchet, Bull. Soc. Bot. France 39: 294. 1893; *Ligularia platyphylla* Handel-Mazzetti; *Senecillis dictyoneura* (Franchet) Kitamura.

Plants grayish green. Stem erect, purplish red, 33–124 cm tall, 2.5–4 mm in diam. at base, solid, glabrous. Basal leaves petiolate; petiole 8–22 cm, glabrous, below rounded, above flat, middle to distal petioles narrowly winged; leaf blade oblong, ovate, or suborbicular, 8–30 × 5–21 cm, glabrous, pinnately veined, midvein robust, to 5 mm wide, with prominent reticulate lateral veins on both surfaces, base cordate or slightly subtruncate, margin dentate or subentire, apex rounded. Middle to distal stem leaves subsessile, obovate to ovate, 7–16 × 4–11 cm, base semiamplexicaul or tubular-amplexicaul, margin dentate, apex obtuse. Distal stem leaves sessile, ovate-lanceolate to linear. Synflorescence racemose, to 30 cm, initially densely clustered, elongating in fruit, lax; leaflike and supplementary bracts linear, less than 1 cm; peduncles unequal, to 6.5 cm, densely shortly yellowish brown pilose. Capitula numerous. Involucre turbinate or subcampanulate, 6–9 × 4–5 mm, outside dark brown, glabrous; phyllaries 6–8, in 2 rows, oblong, 3–4 mm wide, brown ciliate, apex broadly triangular, acute, or shortly mucronate; inner phyllaries broadly membranous at margin. Ray florets 4–6, yellow; lamina oblong, 6–8(–20) × 3–4 mm, apex rounded; tube ca. 3 mm. Tubular florets numerous, 5–6 mm, higher than involucre; tube 2.5–3 mm. Achenes dark brown, cylindric, 3.5–5.5 mm. Pappus yellowish white, as long as tubular corolla. Fl. Jun–Aug.  $2n = 58^*$ .

• Stream banks, forest understories, grassy slopes, scrub; 1900–3600 m. SW Sichuan, Xizang, NW Yunnan.

**60. *Ligularia brassicoides*** Handel-Mazzetti, Bot. Jahrb. Syst. 69: 118. 1938.

芥形橐吾 jie xing tuo wu

Plants grayish green. Stem erect, 45–70 cm tall, ca. 7 mm in diam. at base, hollow, glabrous, except white arachnoid-puberulent in synflorescence. Basal leaves petiolate; petiole to 15 cm, glabrous, base sheathed, upper winged; leaf blade oblong or ovate, 17–30 × 6.5–17 cm, glabrous, pinnately veined, mid-vein robust, with white prominent reticulate veins on both surfaces, base cuneate, narrowed into a petiole, margin denticulate, apex obtuse. Middle to distal stem leaves sessile, oblong, to 14 × 4 cm, smaller distally, reticulate veins conspicuous, base semiamplexicaul or tubular-amplexicaul, apex obtuse. Synflorescence racemose, to 26 cm, initially densely clustered, elongating in fruit; leaflike bracts linear, shorter than peduncle, supplementary bracts subulate, shorter; peduncles 4–5 mm. Capitula numerous. Involucre shallowly campanulate, 6–8 × to 6 mm wide, outside shortly pilose; phyllaries 6–8, in 2 rows, black, ovate or oblong, rarely glabrous, apex triangular; inner phyllaries densely white ciliate and brown membranous at margin. Ray florets 5 or 6, yellow; lamina oblong, 8–10 × ca. 3 mm. Tubular florets numerous, ca. 7 mm; tube slightly shorter than limb. Pappus white, as long as tubular corolla. Fl. Jul.

- Grassy slopes; 2600–3100 m. SW and W Sichuan.

**61. *Ligularia altaica*** Candolle, Prodr. 6: 315. 1838.

阿勒泰橐吾 a le tai tuo wu

*Ligularia glauca* O. Hoffmann var. *altaica* (Candolle) Krylov; *Senecillis altaica* (Candolle) Kitamura; *Senecio altaicus* (Candolle) Schultz Bipontinus.

Plants grayish green. Stem erect, 10–150 cm tall, 4–10 mm in diam. at base, glabrous. Basal leaves petiolate; petiole 13–30 cm, glabrous, base narrowly sheathed, upper narrowly winged; leaf blade oblong, ovate-oblong, or elliptic, 8–50 × 3–35 cm, glabrous, pinnately veined, base cuneate, narrowed into a petiole, margin entire, apex obtuse or rounded. Stem leaves similar, but sessile, smaller distally, base semiamplexicaul, proximal leaves to 13.5 × 4 cm. Synflorescence racemose, 6–20 cm, glabrous; leaflike and supplementary bracts linear-subulate, less than 4 mm; peduncles to 1 cm. Capitula 5–17(–35). Involucre campanulate or subcupular, 6–10 × 5–7 mm, outside glabrous; phyllaries 7–9, in 2 rows, oblong or lanceolate, 1.5–3 mm wide, glabrous, apex acute or acuminate; inner phyllaries membranous at margin. Ray florets 4 or 5, yellow; lamina obovate or oblong, 6–7 × 3–4 mm, denticulate, apex rounded; tube ca. 4 mm. Tubular florets numerous (10–20), extending from involucre, ca. 7 mm; tube ca. 7 mm; limb narrowly cuneate. Achenes yellowish brown, cylindric, 4–7 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jun–Aug.

Grassy slopes, forest margins; 1100–3000 m. Xinjiang (Altay) [Kazakhstan, Mongolia, Russia (Siberia)].

**62. *Ligularia alpigena*** Pojarkova, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 12: 313. 1950.

帕米尔橐吾 pa mi er tuo wu

*Ligularia heterophylla* Ruprecht var. *alpina* Ruprecht; *L. heterophylla* var. *subramosa* Ruprecht.

Plants grayish green. Stem erect, 22–140 cm tall, 3–10 mm in diam. at base, glabrous except synflorescence shortly

pilose. Basal leaves petiolate; petiole purplish red, 2.5–25 cm, glabrous, base sheathed, upper part narrowly winged; leaf blade oblong or broadly elliptic, 4.5–20 × 2.3–10.5 cm, glabrous, pinnately veined, abaxially with prominent veins, base cuneate, narrowed into a petiole, margin irregularly dentate, apex rounded or acute. Middle to distal stem leaves similar, but sessile, to 12 × 7 cm, smaller distally, base semiamplexicaul. Synflorescence racemose, rarely paniculate, 4–6(–45) cm, distal ones clustered, proximal ones branched, lax; branches 1.5–12 cm, each with 2–23 capitula; leaflike and supplementary bracts linear-subulate, 5–7 mm; peduncles 2–4 mm. Capitula numerous. Involucre campanulate or subcupular, 6–7 × 5–6 mm, outside densely shortly yellow pilose; phyllaries 6–8, in 2 rows, oblong or ovate, 3–5 mm wide, apex acute or obtuse; inner phyllaries membranous at margin. Ray florets yellow; lamina obovate or oblong, 7–10 × 3–4 mm, apex obtuse; tube ca. 4 mm. Tubular florets numerous, 6–7 mm; tube 2–2.5 mm. Achenes yellowish, cylindric, 4–5 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Aug. 2n = 58.

Alpine meadows, grassy slopes; 1900–4500 m. Xinjiang (Pamir, Tian Shan) [NE Afghanistan, Kyrgyzstan, N Pakistan, Tajikistan, Uzbekistan].

**63. *Ligularia longifolia*** Handel-Mazzetti, Bot. Jahrb. Syst. 69: 122. 1938.

长叶橐吾 chang ye tuo wu

*Ligularia ebracteata* Handel-Mazzetti; *L. semavensis* Handel-Mazzetti.

Stem erect, 83–200 cm tall, ca. 1 cm in diam. at base, proximally glabrous, distally white arachnoid-puberulent. Basal leaves petiolate; petiole to 57 cm, glabrous, base sheathed, upper part winged; leaf blade lanceolate, 14–37 × 6.5–9 cm, thick, glabrous, pinnately veined, base rounded or subtruncate, margin irregularly dentate, apex obtuse. Stem leaves fewer, sessile, oblong or lanceolate, to 7(–10) cm, smaller distally, semiamplexicaul or sheath amplexicaul. Synflorescence racemose, 5–19 cm, distally or wholly (initially) densely clustered, proximally lax; leaflike bracts linear-lanceolate, to 2.5 cm; supplementary bracts linear; peduncles 5–20 mm. Capitula numerous. Involucre broadly turbinate, 9–12 mm × to 1.5 cm, outside glabrous; phyllaries 13–15, in 2 rows, reddish brown or brown, lanceolate or narrowly lanceolate, apex acuminate; inner phyllaries broadly membranous at margin. Ray florets 6 or 7, yellow; lamina oblong, 1–1.5 cm × 3–5 mm, apex rounded; tube ca. 3 mm. Tubular florets numerous, 6–7 mm; tube ca. 2.5 mm. Pappus rufous, as long as tubular corolla. Fl. and fr. Aug–Sep.

- Grassy areas in swamps; 1900–3100 m. SW Sichuan, S to W Yunnan.

**64. *Ligularia chalybea*** S. W. Liu, Bull. Bot. Res., Harbin 5(4): 73. 1985.

灰苞橐吾 hui bao tuo wu

Plants grayish green. Stem erect, 35–45 cm tall, 2–4 mm in diam. at base, proximally glabrous, distally white arachnoid-puberulent and shortly yellowish brown pilose. Basal leaves petiolate; petiole 4–11 cm, winged; wings to 6 mm wide, mar-

gin entire, shortly ciliate; leaf blade ovate or ovate-oblong, rarely spatulate, 7–21.5 × 3–8 cm, thin, abaxially white pubescent along veins, adaxially glabrous, pinnately veined, base abruptly narrowed into a petiole, margin sparsely denticulate or dentate, apex obtuse or rounded. Middle to distal stem leaves sessile, oblong, 8–13 × to 5 cm, tubular-amplexicaul, margin denticulate, apex obtuse or acuminate. Distal stem leaves bracteal, ovate-lanceolate, 4–5 cm, apex acuminate. Synflorescence racemose, to 13 cm; leaflike bracts linear, to 1.5 cm; peduncles 2–4 mm. Capitula 6–17. Involucre turbinate, 7–9 mm, mouth to 9 mm in diam., outside glabrous; phyllaries 7 or 8, in 2 rows, blackish gray, oblong or lanceolate, submembranous, apex obtuse or acuminate. Florets numerous, all tubular, blackish gray, 4.5–5 mm; tube ca. 1.5 mm. Pappus upper part white, lower part yellowish brown, as long as tubular corolla. Fl. Aug.

- Alpine meadows; ca. 4700 m. SW Sichuan.

**65. *Ligularia pleurocaulis*** (Franchet) Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 149. 1925.

侧茎橐吾 *ce jing tuo wu*

*Senecio pleurocaulis* Franchet, J. Bot. (Morot) 8: 365. 1894, based on *S. tatsienensis* Franchet, Bull. Soc. Bot. France 39: 293. 1893, not Bureau & Franchet (1891); *Cremanthodium pleurocaule* (Franchet) R. D. Good; *C. pleurocaule* f. *franchetii* R. D. Good.

Plants grayish green. Stem erect, 25–100 cm tall, 4–10 mm in diam. at base, proximally glabrous, distally and synflorescence white arachnoid-puberulent. Basal leaves subsessile; sheath often purplish red; leaf blade linear-oblong or broadly elliptic, 8–30 × 0.7–7 cm, glabrous, pinnate-parallel or parallel veined, base narrowed, margin entire, apex acute. Stem leaves sessile, smaller, elliptic to linear, base semiamplexicaul or not. Synflorescence racemose, to 20 cm, often lax; leaflike bracts lanceolate to linear, to 8 cm, sometimes longer than peduncle; peduncles 0.5–3(–10.5) cm. Capitula numerous, inclined to one side of racemose axis; supplementary bracts linear-subulate. Involucre turbinate, 5–14 × 5–15(–20) mm, outside glabrous, base acute; phyllaries 7–9, in 2 rows, ovate or lanceolate, 2–7 mm wide, apex acute; inner phyllaries membranous at margin. Ray florets yellow; lamina broadly elliptic or ovate-oblong, 7–14 × 3–6 mm, apex acute; tube ca. 2 mm. Tubular florets numerous, 5–6 mm; tube ca. 1 mm. Achenes brown, cuneate-cylindric, 2.5–3.5 mm, ribbed. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Nov.

- Slopes, stream banks, scrub, alpine meadows; 3000–4700 m. SW and W Sichuan, Xizang, NW Yunnan.

**66. *Ligularia tangutorum*** Pojarkova, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 21: 362. 1961.

唐古特橐吾 *tang gu te tuo wu*

*Ligularia potaninii* Pojarkova, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 12: 314. 1950, not (C. Winkler) Y. Ling (1937).

Plants grayish green. Stem erect, 40–100 cm tall, 2–9 mm in diam. at base, glabrous or distal stem shortly pilose. Basal leaves petiolate; petiole 3–15 cm, proximally purplish red, dis-

tally broadly winged; leaf blade broadly ovate or elliptic, 6–21 × 3–13 cm, glabrous, pinnately veined, abaxially with strong midvein, base subtruncate or broadly cuneate, abruptly narrowed into a broadly winged petiole or only distally winged, margin denticulate or coarsely undulate-dentate, apex acute. Middle to distal stem leaves erect, elliptic or oblong, 4–8 × to 4.5 cm, base amplexicaul. Synflorescence racemose, to 15 cm, lax; leaflike and supplementary bracts linear-lanceolate. Capitula numerous. Involucre turbinate, 6–8 mm × to 1 cm, outside glabrous; phyllaries 8–10, in 2 rows, oblong or narrowly lanceolate, apex obtuse to acute. Ray florets 6–10, yellow; lamina oblong, ca. 1 cm. Tubular florets numerous, 6–7 mm. Achenes yellowish, cylindric, ca. 4 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Aug.  $2n = 58^*$ .

- Shaded slopes, scrub, forest understories; 2700–4000 m. NW Gansu, Qinghai, Sichuan.

**67. *Ligularia virgaurea*** (Maximowicz) Mattfeld ex Rehder & Kobuski, J. Arnold Arbor. 14: 40. 1933.

黄帚橐吾 *huang zhou tuo wu*

Plants grayish green. Stem erect, 15–80 cm tall, 2–9 mm in diam. at base, glabrous. Basal leaves petiolate; petiole to 21.5 cm, winged or only upper winged; wings entire or dentate, broad or narrow, glabrous; sheath often purplish red; leaf blade ovate, elliptic, or oblong-lanceolate, 3–15 × 1.3–11 cm, glabrous, pinnately or sometimes subparallel veined, base cuneate, gradually attenuate, margin entire, sometimes revolute, apex obtuse or acute. Stem leaves sessile, smaller, ovate or ovate-lanceolate to linear, longer than internodes, rarely distally shorter, often tubular-amplexicaul, apex acute to acuminate. Synflorescence racemose, 4.5–22 cm, clustered or distally clustered, proximally lax; leaflike bracts linear-lanceolate to linear, to 6 cm, smaller distally; peduncles 3–10(–20) mm, white arachnoid-puberulent. Capitula numerous, sometimes solitary or few; supplementary bracts filiform. Involucre turbinate or cupular, 7–10 × 6–9 mm, rarely wider, in solitary capitulum, outside glabrous or densely pilose; phyllaries 10–14, in 2 rows, oblong or narrowly lanceolate, 1.5–5 mm wide, attenuate to caudate, margin broadly or narrowly membranous, apex obtuse to acuminate. Ray florets 5–14, yellow; lamina linear, 8–22 × 1.5–2.5 mm, apex acute; tube ca. 4 mm. Tubular florets numerous, 7–8 mm; tube ca. 3 mm; limb cuneate. Achenes yellowish, cylindric, 3.5–5 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Aug.  $2n = 58, 87$ .

Slopes, stream banks, scrub, swamp meadows, alpine meadows; 2400–4700 m. Gansu, Qinghai, Sichuan, E and NE Xizang, NW Yunnan [Bhutan, India (Sikkim), Nepal].

- 1a. Capitula solitary or few, in lax raceme ..... 67c. var. *oligocephala*
- 1b. Capitula numerous, in dense raceme.
  - 2a. Involucre glabrous ..... 67a. var. *virgaurea*
  - 2b. Involucre outside densely shortly yellow pilose ..... 67b. var. *pilosa*

**67a. *Ligularia virgaurea* var. *virgaurea***

黄帚橐吾(原变种) *huang zhou tuo wu* (yuan bian zhong)

*Senecio virgaurea* Maximowicz, Bull. Acad. Imp. Sci.

Saint-Petersbourg 27: 484. 1882; *Cremanthodium plantaginifolium* (Franchet) R. D. Good; *C. plantaginifolium* subsp. *franchetii* R. D. Good; *C. plantaginifolium* f. *lagotis* (W. W. Smith) R. D. Good; *C. virgaurea* (Maximowicz) Handel-Mazzetti; *Ligularia plantaginifolia* (Franchet) Mattfeld; *Senecillus virgaurea* (Maximowicz) Kitamura; *Senecio lagotis* W. W. Smith; *S. plantaginifolius* Franchet.

Involucre outside glabrous.

Shaded slopes, stream banks, scrub, swamp meadows, alpine meadows; 2400–4700 m. Gansu, Qinghai, Sichuan, NE Xizang, NW Yunnan [Bhutan, India (Sikkim), Nepal].

**67b. *Ligularia virgaurea* var. *pilosa*** S. W. Liu & T. N. Ho, *Acta Phytotax. Sin.* 38: 288. 2000.

毛黄帚橐吾 mao huang zhou tuo wu

Involucre outside densely shortly yellow pilose.

- Grassy slopes; 3800–4500 m. Sichuan (Garzê), E Xizang.

**67c. *Ligularia virgaurea* var. *oligocephala*** (R. D. Good) S. W. Liu, *Fl. Qinghai.* 3: 427. 1996.

疏序黄帚橐吾 shu xu huang zhou tuo wu

*Cremanthodium plantaginifolium* subsp. *oligocephalum* R. D. Good, *J. Linn. Soc., Bot.* 48: 292. 1929.

Plants dwarf. Capitula usually solitary or few, in lax raceme.

- Grassy slopes; 3200–4500 m. SW Gansu, Qinghai.

**68. *Ligularia liatroides*** (C. Winkler) Handel-Mazzetti, *Bot. Jahrb. Syst.* 69: 121. 1938.

缘毛橐吾 yuan mao tuo wu

Plants grayish green. Stem erect, to 100 cm tall, 5–8 mm in diam. at base, proximally glabrous, distally and synflorescence white arachnoid-puberulent. Basal leaves petiolate; petiole to 5 cm, glabrous, entirely winged, base sheathed; leaf blade oblong or ovate-lanceolate, rarely elliptic, 8–22 × 4.5–8 cm, glabrous, or initially white pubescent along veins, or puberulent and sometimes shortly yellowish brown pilose, pinnately veined, abaxially with prominent reticulate veins, base cuneate, narrowed into a winged petiole, margin dentate, apex obtuse or acute. Middle to distal stem leaves sessile, ovate-lanceolate to linear, smaller distally, base semiamplexicaul, margin entire or denticulate, apex acuminate. Synflorescence racemose, to 40 cm, clustered; leaflike bracts linear-lanceolate to linear, proximally to 4.5 cm, smaller distally; peduncles 3–7 mm. Capitula numerous; supplementary bracts subulate. Involucre turbinate, 7–10 × ca. 5 mm, outside white pubescent or glabrescent, or puberulent and sometimes shortly yellowish brown pilose; phyllaries 7 or 8, in 2 rows, oblong or lanceolate, ca. 3 mm wide, margin membranous and densely white ciliate, apex acuminate. Ray florets 5 or 6, yellow; lamina linear, 6–8 × 1–1.5 mm, apex obtuse; tube ca. 4 mm. Tubular florets numerous, ca. 7 mm; tube ca. 3 mm. Achenes yellowish, cylindric, 3–5 mm, with prominent ribs. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Aug.  $2n = 58^*$ .

- Stream banks, swamps, scrub-covered meadows, alpine meadows; 2900–4500 m. SW Qinghai, Sichuan, NE Xizang.

- 1a. Leaves and involucre initially white pubescent ..... 68a. var. *liatroides*
- 1b. Leaves and involucre white pubescent and shortly yellowish brown pilose ..... 68b. var. *shifangensis*

**68a. *Ligularia liatroides* var. *liatroides***

缘毛橐吾(原变种) yuan mao tuo wu (yuan bian zhong)

*Senecio liatroides* C. Winkler, *Trudy Imp. S.-Peterburgsk. Bot. Sada* 13: 8. 1893; *Cremanthodium plantaginifolium* (Franchet) R. D. Good f. *winkleri* R. D. Good; *Senecillus liatroides* (C. Winkler) Kitamura.

Leaves and involucre white pubescent.

- Stream banks, swamps, scrub-covered meadows, alpine meadows; 2900–4500 m. SW Qinghai, N, SW, and W Sichuan, NE Xizang.

**68b. *Ligularia liatroides* var. *shifangensis*** (G. H. Chen & W. J. Zhang) S. W. Liu & T. N. Ho, *Acta Phytotax. Sin.* 39: 560. 2001.

什邡缘毛橐吾 shi fang yuan mao tuo wu

*Ligularia shifangensis* G. H. Chen & W. J. Zhang, *Acta Phytotax. Sin.* 35: 181. 1997.

Leaves and involucre white pubescent and shortly yellowish brown pilose.

- 3200–3700 m. Sichuan (Pengxian, Shifang).

**69. *Ligularia eriocaulis*** M. Zhang & L. S. Xu, *Acta Bot. Yunnan.* 19: 241. 1997.

毛茎橐吾 mao jing tuo wu

Plants grayish green. Stem erect, 30–55 cm tall, 4–6 mm in diam. at base, proximally glabrescent, distally and synflorescence densely white arachnoid-puberulent and shortly yellowish brown pilose. Basal leaves petiolate; petiole 2–16 cm, glabrous or sparsely arachnoid-puberulent, base sheathed, entirely winged at middle to distally; leaf blade ovate-oblong or oblanceolate, 8–28 × 3–6 cm, sparsely white puberulent and shortly yellowish brown pilose on both surfaces or adaxially more densely so, pinnate-parallel veined, base cuneate, margin denticulate, apex acute. Stem leaves 1–3, sessile, tubular, 2.5–7 cm, margin entire or irregularly denticulate. Synflorescence racemose, 5–15 cm, lax; leaflike bracts linear-lanceolate to linear, proximal ones to 3.5 cm, densely arachnoid-puberulent, smaller distally. Capitula 2–10; supplementary bracts linear to subulate, shorter than involucre, arachnoid-puberulent. Involucre broadly campanulate, 8–13 mm, mouth 7–16 mm in diam., outside white puberulent or shortly yellowish brown pilose; phyllaries 10–12, in 2 rows, lanceolate or ovate-lanceolate, 1.5–4 mm wide, margin membranous and sparsely white ciliate, apex acuminate, acute, or rounded. Ray florets 10 or 11, yellow; lamina oblong, 9–13 × 2–3.5 mm, apex acute or rounded; tube 1.5–2.5 mm. Tubular florets numerous, 4–5 mm; tube 1–1.5 × ca. 3 mm. Achenes oblanceolate (immature). Pappus white, as long as tubular corolla. Fl. Aug, fr. Aug–Sep.

• Stream banks, forest understories, alpine meadows; 3500–4000 m. Gansu (Têwo), Qinghai (Yushu), Sichuan (Jiulong, Muli), Yunnan (Zhongdian).

**70. *Ligularia melanothyrsa*** Handel-Mazzetti, Bot. Jahrb. Syst. 69: 119. 1938.

黑穗橐吾 hei sui tuo wu

Stem scapelike, erect, 55–120 cm tall, white lanate, to 1 cm in diam. at base, with a dense longer white lanate circle. Leaves all basal, petiolate; petiole 15–23 cm, base white lanate sheathed, distally narrowly winged; leaf blade ovate-oblong, 19–23 × 12–18 cm, glabrescent, pinnately veined, base cordate or rarely subtruncate, abruptly narrowed into a petiole, margin undulately dentate, apex obtuse, mucronate. Scape with a linear bracteal leaf. Synflorescence paniculate-racemose, to 50 cm, densely white lanate; leaflike and supplementary bracts longer, to 3.5 cm, narrower, white lanate; peduncles slender, proximal ones with 7 capitula. Capitula numerous. Involucre narrowly campanulate, 6–8 × ca. 5 mm, outside white puberulent; phyllaries 7 or 8, in 2 rows, oblong, 1.5–3 mm wide, apex triangular, obtuse; inner phyllaries brown membranous at margin. Ray florets yellow; lamina oblong, to 8 × 2–3 mm. Tubular florets numerous, 7–8 mm; tube ca. 1/4 as long as limb. Pappus white, as long as tubular corolla. Fl. Jul, fr. Aug.

• Wet scrub; 3200–4300 m. SW Sichuan.

**71. *Ligularia vellerea*** (Franchet) Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 12. 1925.

棉毛橐吾 mian mao tuo wu

*Senecio vellereus* Franchet, Bull. Soc. Bot. France 39: 299. 1893; *Ligularia vellerea* var. *gracilior* Handel-Mazzetti; *Senecillis vellerea* (Franchet) Kitamura; *Senecio primulifolius* H. Léveillé.

Stem scapelike, erect, 15–63 cm tall, sparsely white puberulent, 4–5 mm in diam. at base, with a densely long white lanate circle. Leaves all basal, petiolate; petiole to 23 cm, base white lanate sheathed, distally narrowly entirely winged; leaf blade ovate, elliptic, or suborbicular, 2.5–15 × 3.5–12 cm, abaxially white lanate, adaxially glabrous, pinnately veined, lateral veins 12 pairs, base shallowly cordate, truncate, or cuneate, margin regularly denticulate, apex acute. Scape without bracteal leaf. Synflorescence racemose, 4.5–15 cm, clustered or lax, white lanate; leaflike and supplementary bracts to 3 cm; peduncles to 1 cm. Capitula numerous. Involucre campanulate, 10–12 × 8–10 mm, outside sparsely white puberulent; phyllaries 10, in 2 rows, lanceolate or rarely ovate, apex acute, mucronate; inner phyllaries membranous at margin. Ray florets 5–7, yellow; lamina oblong, 10–18 × ca. 3 mm, apex acute; tube ca. 5 mm. Tubular florets numerous, 7–8 mm; tube ca. 2 mm. Achenes yellowish, narrowly oblanceolate, 5–7 mm. Pappus pale yellow, as long as tubular corolla. Fl. and fr. Jun–Sep.  $2n = 58^*$ .

• Stream banks, forest understories, grassy slopes; 2100–4600 m. SW Sichuan, NW Yunnan.

**72. *Ligularia jamesii*** (Hemsley) Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 25: 697. 1907.

长白山橐吾 chang bai shan tuo wu

*Senecio jamesii* Hemsley in Forbes & Hemsley, J. Linn. Soc., Bot. 23: 453. 1888; *Senecillis jamesii* (Hemsley) Kitamura.

Stem erect, 30–60 cm tall, 4–5 mm in diam. at base, proximally glabrous, distally white arachnoid-puberulent. Basal leaves petiolate; petiole to 29 cm, slender, glabrous, base narrowly sheathed; leaf blade triangular-hastate, 3.5–9 cm, base 7–10 cm wide, abaxially glabrous, adaxially shortly yellow pilose, palmate-pinnately veined, margin sharply dentate, apex acute or acuminate; sinus ca. 1/2 as long as leaf blade, broad, basal lobes lanceolate, to 6 cm, segments to 2.5 cm, divergent, margin entire or 2- or 3-divided. Middle stem leaves shortly petiolate; sheath enlarged, to 4 cm, amplexicaul; leaf blade smaller, ovate-sagittate. Distal stem leaves numerous, sessile, bracteal, lanceolate, to 3 cm, margin subentire. Capitulum solitary, 5–7 cm in diam.; supplementary bracts linear-lanceolate. Involucre broadly campanulate, 15–17 × to 1.5 cm, outside white arachnoid-puberulent; phyllaries ca. 13, in 2 rows, lanceolate, ca. 3 mm wide, margin brown membranous, apex acuminate. Ray florets 13–16, yellow; lamina linear-lanceolate, to 4 cm × 3–4 mm, apex acuminate, 2- or 3-lobed; tube 5–6 mm. Tubular florets numerous, 1–1.1 cm; tube ca. 5 mm. Achenes dark brown, cylindrical, 5–7 mm. Pappus pale yellow, as long as tubular corolla. Fl. and fr. Jul–Aug.

Forest understories, scrub, alpine meadows; 300–2500 m. Jilin, Liaoning, Nei Mongol [Korea].

**73. *Ligularia fangiana*** Handel-Mazzetti, Bot. Jahrb. Syst. 69: 124. 1938.

植扶橐吾 zhi fu tuo wu

Stem erect, often purplish red, to 150 cm tall, to 1.5 cm in diam. at base, hollow, proximally glabrous, distally shortly brown pilose and white arachnoid-puberulent. Rosette of leaves not seen. Proximal stem leaves petiolate; petiole to 24 cm, white arachnoid-puberulent; leaf blade oblong or ovate-oblong, 35–40 × 25–30 cm, abaxially pubescent, adaxially glabrous, pinnately veined, lateral veins more than 27 pairs, prominent on both surfaces, base subtruncate, margin regularly dentate, apex rounded. Middle to distal stem leaves petiolate; petiole to 10 cm, without sheath; leaf blade smaller, oblong or ovate-oblong. Synflorescence racemose, to 80 cm, distally clustered, proximally lax; leaflike bracts linear, white arachnoid-puberulent, proximal ones to 5.5 cm × ca. 1 mm, smaller distally; peduncles unequal, proximally to 5 cm, with 5 capitula, distal ones with 1 capitulum. Capitula numerous, nodding; supplementary bracts linear. Involucre campanulate or turbinate, 8–10 × 5–7 mm, outside blackish gray, white arachnoid-puberulent; phyllaries 7 or 8, in 2 rows, oblong or lanceolate, apex acute or acuminate; inner phyllaries white membranous at margin. Ray florets 3–5, yellow; lamina oblanceolate, 5–9 × ca. 2 mm; tube ca. 6 mm. Tubular florets numerous, higher than involucre, 6–7 mm; tube as long as limb. Achenes brown, oblong, ca. 5 mm. Pappus pale yellow, as long as tubular corolla. Fl. and fr. Jul–Aug.

• Grassy slopes; below 3600 m. S and SW Sichuan.

**74. *Ligularia jaluensis*** Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 18: 420. 1901.

复序橐吾 fu xu tuo wu

*Ligularia deltoidea* Nakai; *L. jaluensis* var. *rumicifolia* Komarov; *L. leucocoma* Nakai; *L. pulchra* Nakai; *Senecillis jaluensis* (Komarov) Kitamura.

Stem erect, to 200 cm tall, ca. 1 cm in diam. at base, proximally glabrous, distally shortly brown pilose and white arachnoid-puberulent. Basal leaves petiolate; petiole to 40 cm, shortly pilose, narrowly, entirely winged, base sheathed; leaf blade triangular or ovate-triangular, 8–37 × 7–35 cm, abaxially shortly pilose only along veins, adaxially glabrous, pinnately veined, midvein robust, lateral and reticulate veins abaxially prominent, base cordate or subtruncate, margin shallowly triangular-dentate and ciliate, apex acute. Middle to distal stem leaves smaller, shortly petiolate; petiole winged, base sheathed; leaf blade triangular or oblong. Synflorescence paniculate-racemose or racemose, to 50 cm, branched, lower branches to 22 cm; leaflike bracts linear, ca. 5 mm; peduncles 1–1.5 cm, shortly pilose. Capitula numerous; supplementary bracts subulate or absent. Involucre campanulate or cupular, 1–1.1 cm × 8–15 mm, glabrous; phyllaries 8–12, in 2 rows, oblong, 3–4 mm wide, apex acute; inner phyllaries membranous at margin. Ray florets 5–8, yellow; lamina elliptic, 1.3–1.8 cm, to 6.5 mm wide, apex acute; tube ca. 5 mm. Tubular florets numerous, 8–9 mm; tube 2–2.5 mm. Achenes yellowish, cylindrical, 4–6 mm. Pappus white, as long as tubular corolla. Fl. Jul–Sep.

Meadows, forest margins; 400–1000 m. SE Heilongjiang, Jilin (Changbai Shan), Liaoning [Korea, Russia (Far East)].

**75. *Ligularia tenuipes*** (Franchet) Diels, Bot. Jahrb. Syst. 29: 621. 1901.

簇梗橐吾 cu geng tuo wu

*Senecio tenuipes* Franchet, Bull. Soc. Bot. France 39: 297. 1893; *Senecillis tenuipes* (Franchet) Kitamura.

Stem erect, to 100 cm tall, 6–10 mm in diam. at base, shortly brown pilose and white arachnoid-puberulent. Basal leaves petiolate; petiole to 45 cm, white puberulent, base sheathed; leaf blade cordate or broadly ovate-cordate, 9.5–16 × 14–22 cm, thin, abaxially sparsely shortly pilose or pubescent only along veins, adaxially glabrous, pinnately veined, base cordate, margin regularly dentate and ciliate, apex rounded or rarely mucronate; sinus ca. 1/4 as long as leaf blade. Middle stem leaves smaller, shortly petiolate; petiole winged; sheath slightly enlarged, semiamplexicaul. Distal stem leaves sessile, ovate-lanceolate, to 7 cm. Synflorescence racemose, to 59 cm; leaflike bracts narrowly lanceolate to linear, 1.5–4 mm, margin dentate, apex acuminate; peduncles often 2–4, crowded or solitary, proximal ones to 9.5 cm, with 2–4 capitula. Capitula numerous; supplementary bracts linear to linear-lanceolate. Involucre turbinate, 5–11 × 5–7 mm, outside shortly pilose; phyllaries 7 or 8, in 2 rows, oblong or lanceolate, apex acute or acuminate; inner phyllaries brown membranous at margin. Ray florets 4 or 5, yellow; lamina linear, 9–15 × 1–1.5 mm, apex acute; tube 4–6 mm. Tubular florets numerous, 8–10 mm; tube 4–5 mm. Pappus dirty brown, slightly longer than tube of tubular

corolla. Fl. Jul–Sep.

• Stream banks, wet slopes, grassy slopes; 2200–3200 m. ?Guizhou, W Hubei, ?Shaanxi, Sichuan.

**76. *Ligularia petiolaris*** Handel-Mazzetti, J. Bot. 76: 288. 1938.

裸柱橐吾 luo zhu tuo wu

Stem erect, ca. 30 cm tall, robust, hollow, sparsely arachnoid-pubescent. Petiole as long as leaf blade, unwinged, base sheathed; leaf blade dark green, ovate-cordate, ca. 16 × 12 cm, abaxially shortly brown pilose, adaxially sparsely pubescent, pinnately veined, abaxially with tenuous prominent reticulate veins, margin dentate, apex acute, or rounded in narrow basal leaves. Distal stem leaves smaller, transversely elliptic, margin dentate, apex entirely long caudate-mucronate. Synflorescence initially racemose, clustered, ca. 8 cm, pubescent; leaflike bracts linear; peduncles ca. 2 mm. Capitula numerous; supplementary bracts filiform. Involucre campanulate, ca. 8 mm, outside and margin shortly pilose; phyllaries 5, in 2 rows, oblong-lanceolate, apex acute; inner phyllaries membranous at margin. Outer florets female, 1 or 2, corolla absent; style naked. Tubular florets 5. Pappus white, shorter than tubular corolla. Fl. Jul, fr. Aug.

• Scrub; ca. 3600 m. SE Xizang (Nangxian).

**77. *Ligularia lankongensis*** (Franchet) Handel-Mazzetti, Symb. Sin. 7: 1139. 1936.

洱源橐吾 er yuan tuo wu

*Senecio lankongensis* Franchet, Bull. Soc. Bot. France 39: 301. 1893; *Ligularia lankongensis* var. *laxa* (Franchet) Handel-Mazzetti; *L. lankongensis* var. *minor* Lauener & D. K. Ferguson; *Senecillis lankongensis* (Franchet) Kitamura; *Senecio iochanensis* H. Léveillé; *S. lankongensis* var. *laxus* Franchet.

Stem erect, ca. 50 cm tall, ca. 6 mm in diam. at base, densely white arachnoid-puberulent. Basal leaves petiolate; petiole to 23 cm, white arachnoid-puberulent, base sheathed; leaf blade triangular or ovate, 19.5–24 × ca. 16 cm, abaxially grayish white arachnoid-puberulent, adaxially glabrous, pinnately veined, base subtruncate, margin regularly denticulate, apex obtuse. Proximal stem leaves scalelike, ovate, ca. 3 cm, middle to distally grayish white puberulent. Middle stem leaves sessile, similar but smaller. Distalmost stem leaves sagittate or ovate-lanceolate, including petiole to 8 cm, base cuneate, narrowed into a broadly winged petiole, margin minutely denticulate, apex caudate-acuminate. Synflorescence racemose, 9–25 cm, clustered or lax, proximal capitula often undeveloped; leaflike and supplementary bracts linear; peduncles ca. 1 cm, white puberulent. Capitula numerous. Involucre broadly and shallowly campanulate, 7–12 mm, mouth to 1.2 cm in diam., outside grayish white puberulent; phyllaries 8 or 9, in 2 rows, linear-oblong, ca. 2 mm wide. Ray florets 7, yellow; lamina oblong, 10–13 × 3–5 mm, apex obtuse; tube ca. 3 mm. Tubular florets numerous, ca. 7 mm; tube ca. 2 mm; limb narrow, base cuneate. Achenes yellowish, cylindrical, 4.5–6 mm. Pappus white, as long as tubular corolla. Fl. and fr. Apr–Sep.

• Slopes, scrub, forest understories; 2100–3800 m. SW Sichuan, NE to NW Yunnan.

**78. *Ligularia nyingchiensis*** S. W. Liu, Acta Biol. Plateau Sin. 3: 68. 1984.

林芝橐吾 lin zhi tuo wu

Stem erect, to 100 cm tall, ca. 1 cm in diam. at base, white pubescent. Rosette of leaves not seen. Proximal stem leaves petiolate; petiole 5.5–10 cm, narrowly winged, base sheathed; leaf blade ovate-cordate, 13–16.5 × 11–13 cm, abaxially grayish white pubescent, adaxially glabrous, pinnately veined, base cordate, margin regularly obtusely crenate, apex rounded. Distal stem leaves sessile or shortly petiolate, ovate to narrowly ovate, to 7 × 4 cm, apex caudate-acuminate. Synflorescence racemose, to 24 cm; leaflike and supplementary bracts linear, to 2 cm; peduncles 5–8 mm, shortly white pilose. Capitula numerous. Involucre shallowly campanulate, 5–6 × 6–8 mm, outside white pubescent; phyllaries ca. 8, in 2 rows, black, oblong or lanceolate, 2–3 mm wide, apex acute or acuminate. Florets all tubular; outer florets female, 1–3 (or 4), narrowly cylindrical, shorter than central florets, 4–5 mm, corolla deeply 2-divided, labiate, one of lobes sometimes shorter or 2-divided. Central florets numerous, yellow, higher than involucre, ca. 6 mm; tube ca. 2 mm. Pappus pale yellow, as long as tubular corolla. Fl. Jun–Jul, fr. Jul–Aug.

• Alpine meadows; ca. 4400 m. Xizang (Nyingchi), Yunnan (Lijiang).

**79. *Ligularia pterodonta*** C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 65. 1935.

宽翅橐吾 kuan chi tuo wu

Stem erect, ca. 62 cm tall, ca. 6 mm in diam. at base, shortly pale yellow pilose. Basal leaves petiolate; petiole 22–26 cm, distalmost winged; wings 4.5–5 cm wide, base enlarged sheathed, margin regularly triangularly dentate; leaf blade ovate-cordate, 13–15 × 14–16 cm, glabrous, pinnately veined, base cordate, margin densely dentate, apex acute. Middle to distal stem leaves similar but smaller. Synflorescence racemose, ca. 13 cm; leaflike bracts lanceolate, 2–2.5 cm × 2–3.2 mm; peduncles ca. 1 cm. Capitula numerous; supplementary bracts short. Involucre broadly campanulate, ca. 1 cm, outside shortly pilose; phyllaries ca. 8, in 2 rows, apex acute; outer phyllaries linear, 2–2.5 mm wide; inner phyllaries 3–4 mm wide, margin broadly membranous. Ray florets ca. 8, yellow; lamina ca. 28 × 5 mm, apex obtuse; tube ca. 5 mm. Tubular florets numerous, ca. 10.5 mm; tube ca. 4.5 mm; limb campanulate, ca. 2.5 mm wide. Achenes oblong, ca. 4.5 mm. Pappus reddish brown, ca. 4 mm, as long as tube of tubular corolla. Fl. and fr. Sep.

• Margins of scrub; ca. 4000 m. Xizang (Zayü).

**80. *Ligularia latipes*** S. W. Liu, Bull. Bot. Res., Harbin 5(4): 71. 1985.

阔柄橐吾 kuo bing tuo wu

Stem erect, to 70 cm tall, 5–8 mm in diam. at base, proximally glabrous, distally and synflorescence purplish red, shortly blackish purple pilose. Basal leaves petiolate; petiole 4–8 cm, winged; wings to 2 cm wide, margin entire or dentate; base enlarged sheathed; sheath to 11 × 4 cm, glabrous, margin entire or dentate; leaf blade cordate or ovate-cordate, 3.5–15 × 5.5–11

cm, pinnately veined, base cordate, margin sinuate-dentate, apex rounded; basal lobes orbicular. Middle stem leaves smaller, shortly petiolate, enlarged sheathed; leaf blade ovate. Synflorescence paniculate-racemose, to 10 cm, lax, proximal branches with 3 or 4 capitula; leaflike bracts linear, shorter; peduncles to 1.5 cm. Capitula numerous; supplementary bracts subulate, shorter than involucre. Involucre narrowly campanulate or cylindrical, 6–8 × 4–5 mm, outside purplish red, glabrous; phyllaries 5–8, in 2 rows, oblong, white ciliate, margin membranous and pale colored, apex obtuse, triangular. Ray florets ?yellow, not seen. Tubular florets 10–15, 8–9 mm, tube slightly longer than broadly campanulate limb. Achenes dark brown, narrowly oblanceolate, 5–6 mm, attenuate at apex. Pappus rufous, 6–7 mm, slightly shorter than tubular corolla. Fl. and fr. Aug–Sep.

• Grassy slopes; ca. 2600 m. N Sichuan.

**81. *Ligularia alatipes*** Handel-Mazzetti, Bot. Jahrb. Syst. 69: 132. 1938.

翅柄橐吾 chi bing tuo wu

Stem erect, to 150 cm tall, 1–1.5 cm in diam. at base, proximally glabrous, distally white arachnoid-puberulent and shortly yellow pilose. Basal leaves petiolate; petiole to 32.5 cm, winged; wings to 5 mm wide; base sheathed, margin entire; leaf blade ovate-cordate, 7–40 cm, proximally 10–17 cm wide, glabrous or abaxially pubescent along veins, pinnately veined, base cordate, margin regularly denticulate, ciliate, apex obtuse; sinus broad and shallow, ca. 1/10 as long as leaf blade, basal lobes orbicular. Middle stem leaves similar, but shortly petiolate; petiole winged; wings denticulate; sheath to 10 cm, upper margin dentate. Distalmost stem leaves bracteal, with enlarged sheathed petiole; leaf blade ovate or reniform, to 6 × 7 cm, margin dentate; pinnately or palmate-pinnately veined. Synflorescence racemose, to 35 cm; leaflike bracts ovate-lanceolate, proximal ones to 7.5 × 2.5 cm, smaller distally, dentate or reniform with sheathed petiole; peduncles slender, proximally to 11 cm, shorter distally, white arachnoid-puberulent. Capitula numerous; supplementary bracts narrowly lanceolate, 1–1.5 cm, longer than involucre, entire or dentate. Involucre broadly campanulate, 8–11 × ca. 10 mm, outside glabrous or white arachnoid-puberulent; phyllaries 10 or 11, in 2 rows, oblong, 4–5 mm wide, margin broadly brown membranous, apex broadly triangular. Ray florets yellow; lamina linear, 30–40 × 2–3 mm, apex acute; tube ca. 5 mm. Tubular florets numerous, ca. 8 mm; tube ca. 4 mm; limb broadly campanulate. Pappus white, as long as tubular corolla. Fl. Jul–Aug.

• Grassy slopes; 2700–3600 m. SW Sichuan, NW Yunnan.

**82. *Ligularia botryodes*** (C. Winkler) Handel-Mazzetti, Bot. Jahrb. Syst. 69: 126. 1938.

总状橐吾 zong zhuang tuo wu

*Senecio botryodes* C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 14: 154. 1895; *Senecillis botryodes* (C. Winkler) Kitamura.

Stem erect, 50–70 cm tall, 3–4 mm in diam. at base, proximally glabrous, distally and synflorescence white arachnoid-puberulent. Basal leaves petiolate; petiole to 25 cm, base sheathed,

proximally glabrous, distally narrowly winged, white arachnoid-puberulent; leaf blade ovate-cordate, triangular-cordate, or suborbicular, 2.5–12 × 4–15 cm, thin, glabrous, pinnately veined, base shallowly cordate or cordate, margin regularly denticulate, apex rounded or acute; basal lobes triangular. Middle stem leaves shortly petiolate, base enlarged sheathed; leaf blade cordate or ovate-cordate, 2–7 × 4–7 cm. Distal stem leaves sessile, lanceolate. Synflorescence racemose, 12–26 cm, lax; leaflike bracts ovate, to 25 × ca. 8 mm, smaller distally, membranous, with prominent reticulate veins on both surfaces, margin denticulate, apex acuminate; peduncles 5–8 mm, slender, white arachnoid-puberulent. Capitula numerous; supplementary bracts narrowly ovate or lanceolate, as long as involucre, membranous, margin denticulate or entire. Involucre campanulate, 6–8 × 5–6 mm, outside white arachnoid-puberulent; phyllaries 7–9, in 2 rows, oblong, 2–3 mm wide, brown ciliate, apex triangular; inner phyllaries broadly membranous at margin. Ray florets 5 or 6, yellow; lamina oblong, 2–3 × ca. 1 mm; tube ca. 4 mm, slender. Tubular florets numerous, 7–8 mm; tube 2–3 mm. Pappus white, as long as tubular corolla. Fl. Jul–Sep.  $2n = 58$ .

Grassy slopes, forest understories; 3100–4000 m. SW Gansu, ?Shaanxi, N and NW Sichuan [Nepal].

**83. *Ligularia sagitta*** (Maximowicz) Mattfeld ex Rehder & Kobuski, *J. Arnold Arbor.* 14: 40. 1933.

箭叶橐吾 jian ye tuo wu

*Senecio sagitta* Maximowicz, *Bull. Acad. Imp. Sci. Saint-Petersbourg* 27: 483. 1882; *Ligularia kansuensis* Handel-Mazzetti; *L. ovato-oblonga* (Kitamura) Kitamura; *L. sagitta* var. *ovato-oblonga* (Kitamura) Kitamura; *Senecillis ovato-oblonga* Kitamura; *S. sagitta* (Maximowicz) Kitamura; *Senecio microdontus* Bureau & Franchet (1891), not Baker (1881).

Stem erect, 25–70 cm tall, to 1 cm in diam. at base, glabrous or distally and synflorescence initially white arachnoid-puberulent, glabrescent. Basal leaves petiolate; petiole 4–8 cm, white arachnoid-puberulent, narrowly winged, wing margin entire or denticulate, base sheathed; leaf blade sagittate, hastate, or ovate-oblong to oblong-sagittate, 2–20 cm, 1.5–20 cm wide at base, abaxially white arachnoid-puberulent or glabrescent, adaxially glabrous, pinnately veined, margin dentate, apex obtuse or acute; sinus 1/4–1/3 as long as leaf blade, broad, basal lobes divergent or not, outer margin coarsely dentate. Middle stem leaves shortly petiolate, sheath amplexicaul; leaf blade smaller, sagittate or ovate. Distal stem leaves bracteal, lanceolate to narrowly lanceolate. Synflorescence racemose, 6.5–40 cm, lax; leaflike bracts ovate-lanceolate or narrowly lanceolate to linear, 6–15 × ca. 7 mm or rarely longer and wider, to 6.5 cm, herbaceous, apex acuminate; peduncles 5–70 mm, slender. Capitula numerous; supplementary bracts linear. Involucre campanulate or narrowly campanulate, 7–10 × 4–8 mm, outside glabrous; phyllaries 7–10, in 2 rows, oblong or lanceolate, apex acute or acuminate; inner phyllaries membranous at margin. Ray florets 5–9, yellow; lamina oblong, 5–12 × ca. 3 mm, apex obtuse; tube ca. 5 mm. Tubular florets numerous, 7–8 mm; limb extending from involucre; tube 3–4 mm. Achenes brown, cylindrical, 3.5–6 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Sep.  $2n = 58$ .

Stream banks, grassy slopes, forest margins, forest understories, scrub; 1300–4000 m. Gansu, Hebei, Heilongjiang, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan [E Himalaya (Gyong), Mongolia].

**84. *Ligularia platyglossa*** (Franchet) Handel-Mazzetti, *Symb. Sin.* 7: 1137. 1936.

宽舌橐吾 kuan she tuo wu

*Senecio platyglossus* Franchet, *Bull. Soc. Bot. France* 39: 293. 1893; *Ligularia kanaitzensis* (Franchet) Handel-Mazzetti var. *ruficeps* Handel-Mazzetti; *L. potaninii* Pojarkova var. *yunnanensis* Pojarkova; *Senecillis platyglossa* (Franchet) Kitamura.

Stem erect, 30–100 cm tall, 5–8 mm in diam. at base, proximally glabrous, distally white arachnoid-puberulent and shortly pilose. Basal leaves petiolate; petiole 10–30 cm, narrowly, entirely winged, base sheathed; leaf blade ovate or ovate-cordate, 11–40 × 6–20 cm, glabrous, pinnately veined, base shallowly cordate, truncate, or broadly cuneate, margin undulate-dentate, apex obtuse. Stem leaves sessile, without sheath, erect, ovate-oblong or ovate-lanceolate, 2–16 cm, smaller distally, margin dentate, apex acute. Synflorescence racemose, 15–50 cm, proximally sometimes shortly branched; leaflike bracts narrowly lanceolate or linear to filiform, to 5.5 cm; peduncles 4–30 mm, shortly pilose. Capitula numerous; supplementary bracts linear. Involucre broadly turbinate, 7–10 mm, mouth to 1.5 cm in diam., outside glabrous; phyllaries 8–11, in 2 rows, ovate-lanceolate to narrowly lanceolate, 1.5–4(–5) mm, apex acute; inner phyllaries broadly membranous at margin. Ray florets yellow; lamina oblong, 1–2 cm × 2–4.5 mm, apex acute; tube ca. 5 mm. Tubular florets numerous, 6–8 mm; tube ca. 2 mm. Achenes brown, cylindrical, 4–6 mm. Pappus reddish brown or yellowish white initially, slightly shorter than tubular corolla. Fl. and fr. Jul–Nov.

• Stream banks, grassy slopes, forest understories; 1200–3800 m. NE and NW Yunnan.

**85. *Ligularia kanaitzensis*** (Franchet) Handel-Mazzetti, *Vegetationsbilder* 22(Heft 8): 13. 1932.

干崖子橐吾 gan ya zi tuo wu

Stem erect, 30–160 cm tall, 4–15 mm in diam. at base, proximally glabrous, distally white arachnoid-puberulent. Basal leaves petiolate; petiole 9–30 cm, glabrous, narrowly winged, gradually enlarged toward base into a sheath; sheath 7–11 cm, to 2 cm wide, oppositely amplexicaul, mouth of sheath spreading toward outside, forming an oblique petiole; leaf blade ovate-oblong or ovate-triangular, 4–25 × 3–20 cm, glabrous, pinnately veined, base shallowly cordate or truncate, margin regularly dentate, apex acute. Stem leaves sessile, erect, adnate, ovate-lanceolate, to 9 cm, smaller distally, tubular-amplexicaul. Synflorescence racemose, 15–40 cm; leaflike bracts narrowly lanceolate or rhombic, 2–3.3 cm × 3–4 mm, subtire or dentate, narrowed at base; peduncles 5–20 mm, smaller distally. Capitula numerous; supplementary bracts linear-lanceolate, 8–12 mm. Involucre campanulate, 8–10 × 5–8 mm, outside glabrous; phyllaries 8, in 2 rows, oblong, 2–3 mm wide, apex acute

or obtuse; inner phyllaries broadly membranous at margin. Ray florets 5–7, yellow; lamina oblong or obovate-oblong, 1.4–1.8 cm × 3–4.5 mm, apex obtuse; tube ca. 4 mm. Tubular florets numerous, 7–8 mm; tube ca. 3 mm. Achenes brown, cylindrical, ca. 5 mm. Pappus yellow, as long as tubular corolla. Fl. and fr. Jul–Oct.  $2n = 58^*$ .

• Grassy slopes, swamps, scrub, grasslands in valleys; 2400–4300 m. N Sichuan, NW and W Yunnan.

- 1a. Leaflike bract narrowly lanceolate, sessile, margin entire ..... 85a. var. *kanaitzensis*
- 1b. Leaflike bract rhombic, shortly petiolate, margin dentate ..... 85b. var. *subnudicaulis*

**85a. *Ligularia kanaitzensis* var. *kanaitzensis***

干崖子橐吾(原变种) gan ya zi tuo wu (yuan bian zhong)

*Senecio kanaitzensis* Franchet, Bull. Soc. Bot. France 39: 298. 1893; *Ligularia mosoyensis* (Franchet) Handel-Mazzetti; *Senecillis kanaitzensis* (Franchet) Kitamura; *S. mosoyensis* (Franchet) Kitamura; *Senecio jeffreyanus* Diels; *S. mosoyensis* Franchet.

Leaflike bracts sessile, narrowly lanceolate, margin entire.

• Grassy slopes, swamps, scrub; 2400–4300 m. SW Sichuan (Muli), W Yunnan.

**85b. *Ligularia kanaitzensis* var. *subnudicaulis* (Handel-Mazzetti) S. W. Liu, Fl. Reipubl. Popularis Sin. 77(2): 92. 1989.**

菱苞橐吾 ling bao tuo wu

*Ligularia subnudicaulis* Handel-Mazzetti, Bot. Jahrb. Syst. 69: 73. 1938.

Leaflike bracts shortly petiolate, purplish red when dry, rhombic, margin dentate.

• Grasslands in valleys, scrub; 2400–3700 m. NW Yunnan.

**86. *Ligularia lidjiangensis* Handel-Mazzetti, Bot. Jahrb. Syst. 69: 134. 1938.**

丽江橐吾 li jiang tuo wu

Stem erect, 36–45 cm tall, 5–10 mm in diam. at base, proximally glabrous, distally white arachnoid-puberulent and shortly pilose. Basal leaves petiolate; petiole to 18 cm, glabrous; wings 2–4 mm wide; sheath ca. 5.5 cm; leaf blade ovate-cordate, 13–15 × 10–11 cm, glabrous, pinnately veined, lateral veins 8–10 pairs, base shallowly cordate or rarely subtruncate, margin regularly denticulate, apex acute or obtuse. Proximal stem leaves 2 or 3, similar to basal leaves but smaller; petiole winged; sheath ovate, subopposite, 4–8 × to 2 cm, mouth of sheath spreading toward outside, forming an oblique petiole. Middle to distal stem leaves erect, ovate-lanceolate, to 7 × 1 cm, smaller distally, base semiamplexicaul or not, margin denticulate, apex acute. Synflorescence racemose, 10–12 cm, clustered initially; leaflike bracts ovate-lanceolate or narrowly lanceolate, to 3 cm × 3–6 mm, denticulate, narrowed at base into a short petiole; peduncles ca. 5 mm, slender. Capitula numerous; supplementary bracts linear-lanceolate, 8–10 mm. Involucre cupular, 5–8 mm, mouth ca. 1 cm in diam., outside glabrous;

phyllaries in 2 rows, broadly obovate or elliptic, 3–4 mm wide, apex brown, broadly triangular, acute and recurved mucronate; inner phyllaries broadly membranous at margin. Ray florets 5–10, yellow; lamina oblong, 1.3–1.5 cm × 2–4.5 mm, apex obtuse; tube ca. 3 mm. Tubular florets numerous, 6–7 mm; tube ca. 4 mm. Achenes cylindrical, ca. 4 mm. Pappus white, as long as tubular corolla. Fl. and fr. Aug–Sep.

• Stream banks, grassy slopes; 2600–3300 m. NW Yunnan.

**87. *Ligularia ghatsukupa* Kitamura, Acta Phytotax. Geobot. 15: 73. 1953.**

粗茎橐吾 cu jing tuo wu

Stem erect, 15–120 cm tall, to 2.8 cm in diam. at base, hollow, proximally glabrous, distally white arachnoid-puberulent. Basal leaves petiolate; petiole 4–20 × 1–3 cm, base semiamplexicaul; leaf blade ovate-oblong or broadly ovate, 8–20 × 4–20 cm, both surfaces initially white arachnoid-puberulent, pinnately veined, with robust midvein to 2 cm wide, with prominent reticulate veins, base truncate or oblique, margin irregularly dentate, apex rounded. Middle stem leaves sessile or shortly petiolate, base semi- or auriculate-amplexicaul; leaf blade ovate or oblong, to 15 × 12 cm. Distalmost stem leaves smaller, sessile, ovate-lanceolate. Synflorescence racemose, clustered initially, elongating in fruit, to 40 cm; leaflike bracts linear-lanceolate, to 2 cm, apex acuminate; peduncles unequal, smaller distally, proximal peduncles to 8 cm, distal peduncles curved. Capitula numerous; supplementary bracts linear. Involucre broadly campanulate or hemispheric, 1.5–2 × to 2.5 cm, outside glabrous or sparsely white arachnoid-puberulent; phyllaries 8–13, in 2 rows, oblong or lanceolate, 3–8 mm wide, apex acute. Ray florets 6–8, yellow; lamina ovate-oblong or elliptic, to 16 × ca. 6.5 mm; tube ca. 4 mm. Tubular florets numerous, ca. 1 cm; tube ca. 3 mm. Achenes brown, cylindrical, 4–8 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Sep.

• Lake shores, gravelly areas on high mountains; 4700–5000 m. C and S Xizang.

**88. *Ligularia tsangchanensis* (Franchet) Handel-Mazzetti, Symb. Sin. 7: 1140. 1936.**

苍山橐吾 cang shan tuo wu

*Senecio tsangchanensis* Franchet, Bull. Soc. Bot. France 39: 299. 1893; *Senecillis tsangchanensis* (Franchet) Kitamura; *Senecio remipes* W. W. Smith.

Stem erect, 15–120 cm tall, 3–8 mm in diam. at base, proximally glabrous, distally and synflorescence white arachnoid-puberulent and shortly yellowish brown pilose. Basal leaves petiolate; petiole 10–20 cm, base sheathed; wing margin entire or denticulate; leaf blade ovate-oblong or ovate, rarely orbicular, 3.5–18 × 3–14 cm, glabrous, pinnately veined, base truncate or broadly cuneate, margin dentate, apex acute, mucronate. Middle to distal stem leaves sessile, oblong, 7–20 × 3–9 cm, base semiamplexicaul. Distalmost stem leaves smaller, lanceolate. Synflorescence racemose, 7–25 cm, proximally sometimes branched; leaflike bracts linear-lanceolate to linear, to 3 cm; peduncles 1–1.5 cm. Capitula numerous; supplementary bracts linear. Involucre campanulate, 7–9 × 4–7 mm, out-

side green, glabrous; phyllaries 7 or 8, in 2 rows, oblong or lanceolate, apex dark brown, triangular or acuminate. Ray florets yellow; lamina oblong, 8–12 × 2–3 mm; tube 3–4 mm. Tubular florets numerous, 6–7 mm; tube ca. 2.5 mm. Achenes greenish brown, cuneate-cylindric, 5–6 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jun–Sep.  $2n = 58^*$ .

• Grassy slopes, forest understories, scrub, alpine meadows; 2800–4100 m. SW Sichuan, SE Xizang, NW Yunnan.

**89. *Ligularia muliensis*** Handel-Mazzetti, Bot. Jahrb. Syst. 69: 117. 1938.

木里橐吾 mu li tuo wu

Stem erect, 28–32 cm tall, 4–6 mm in diam. at base, proximally glabrous, distally and synflorescence shortly yellowish brown pilose. Rosette of leaves not seen. Stem leaves oblong or ovate-oblong, 7–15 × 4.5–6 cm, smaller distally, glabrous or abaxially shortly pilose along veins, pinnately veined, base cuneate or rounded, margin denticulate, apex rounded; proximal stem leaves shortly petiolate, sheath amplexicaul; distal stem leaves sessile, base semiamplexicaul. Synflorescence racemose, 7–22 cm; leaflike bracts linear (except lower one ovate); peduncles 1–5 cm. Capitula 4–13; supplementary bracts linear. Involucre green or blackish purple, campanulate, 8–10 × 6–7 mm, outside shortly pilose; phyllaries 8–12, in 2 rows, lanceolate, apex acuminate; inner phyllaries membranous at margin. Ray florets 8–10, yellow; lamina linear-oblong, ca. 10 × 2 mm, apex obtuse. Tubular florets numerous, 6.5–7 mm; tube 2.5–3 mm. Achenes cylindric, ca. 5 mm. Pappus white, shorter than tubular corolla. Fl. and fr. Jul–Oct.

• Grassy slopes, forest understories, scrub; 3800–4200 m. SW Sichuan, NW Yunnan.

**90. *Ligularia sibirica*** (Linnaeus) Cassini in F. Cuvier, Dict. Sci. Nat. 26: 402. 1823.

橐吾 tuo wu

*Othonna sibirica* Linnaeus, Sp. Pl. 2: 924. 1753; *Cineraria sibirica* (Linnaeus) Linnaeus; *Hoppea sibirica* (Linnaeus) Reichenbach; *Ligularia arctica* Pojarkova; *L. bucovinensis* Nakai; *L. longipes* Pojarkova (1961), not C. C. Chang (1951); *L. pojarkovana* S. W. Liu & T. N. Ho; *L. sibirica* var. *alpestris* Turczaninow; *L. sibirica* subsp. *arctica* (Pojarkova) V. G. Sergienko; *L. sibirica* var. *gigantea* Sergievskaya; *L. sibirica* var. *glaberrima* Candolle; *L. sibirica* var. *gracilis* Sergievskaya; *L. sibirica* var. *vulgaris* Candolle; *L. ucrainica* Minderova; *Senecillis sibirica* (Linnaeus) Simonkai; *Senecio cacaliifolius* Schultz Bipontinus.

Stem erect, 20–200 cm tall, 2–11 mm in diam. at base, proximally glabrous, distally and synflorescence shortly yellowish brown pilose. Basal leaves petiolate; petiole 14–39 cm, glabrous, base sheathed; leaf blade ovate-cordate, triangular-cordate, reniform-cordate, or broadly cordate, 3.5–32 × 4.5–29 cm, glabrous, palmately veined, base cordate, margin regularly dentate, apex rounded or obtuse; sinus 1/4–1/3 as long as leaf blade, basal lobes oblong or suborbicular. Middle stem leaves similar, but shortly petiolate; petiole 3–14 cm; sheath enlarged, 3–6 cm. Distal stem leaves with only dentate sheaths. Synflorescence racemose, 4.5–42 cm, often clustered; leaflike

bracts ovate or ovate-lanceolate, proximally to 3 × 0.8–2 cm, smaller distally, margin entire or denticulate, herbaceous; peduncles 4–12 mm, rarely proximally to 8 cm. Capitula numerous; supplementary bracts narrowly lanceolate, glabrous, margin entire, submembranous. Involucre sometimes purplish red, broadly campanulate, campanulate, or campanulate-turbinate, 7–11 × 6–11 mm, outside glabrous, base rounded; phyllaries 7–12, in 2 rows, lanceolate or oblong, 7–11 mm, margin membranous, apex acute, obtuse-triangular, or acuminate. Ray florets 5–8(–11), yellow; lamina oblanceolate or oblong, 1–2.2 cm × 3–5 mm, apex obtuse; tube 5–10 mm. Tubular florets numerous, 8–13 mm; tube 4–7 mm. Achenes brown, cylindric, 4–7 mm. Pappus yellowish, as long as tubular corolla. Fl. and fr. Jul–Oct.  $2n = 60$ .

Swamps, wet grasslands, stream banks; below 2200 m. Heilongjiang, Jilin, Nei Mongol [Mongolia, Russia; Europe].

**91. *Ligularia cyathiceps*** Handel-Mazzetti, Bot. Jahrb. Syst. 69: 135. 1938.

浅苞橐吾 qian bao tuo wu

Stem erect, 57–90 cm tall, 3.5–6 mm in diam. at base, proximally glabrous, distally sparsely white arachnoid-puberulent and shortly yellowish brown pilose. Basal leaves petiolate; petiole 20–49 cm, shortly yellowish brown pilose, abaxially with prominent palmate veins, base narrowly long sheathed; leaf blade broadly ovate or reniform, 8.5–13 × 10.5–22 cm, abaxially shortly pilose, adaxially glabrous, margin coarsely dentate, apex rounded, mucronate; sinus ca. 1/3 as long as leaf blade, broad; basal lobes oblong, 6–8 × 6.5–9 cm. Middle stem leaves shortly petiolate; sheath enlarged, densely shortly pilose; leaf blade reniform-cordate, to 8 × 14 cm. Synflorescence racemose, 10–40 cm, lax, spreading; leaflike bracts purplish red, yellowish red when dry, ovate-lanceolate, to 3 × ca. 1 cm, smaller distally, membranous, apex caudate-acuminate; peduncles unequal, proximal peduncles to 5 cm, shorter distally, shortly yellow pilose. Capitula numerous; supplementary bracts ovate-lanceolate, as long as involucre, submembranous. Involucre shallowly cupular, 7–8 × 8–10 mm, base truncate, outside sparsely shortly pilose; phyllaries 9–13, in 2 rows, broadly oblong, to 4 mm, apex acute; inner phyllaries broadly membranous at margin. Ray florets yellow; lamina oblong, 8–10 × 2–3.5 mm; tube ca. 3 mm. Tubular florets numerous, 6.5–8 mm; tube 2–3 mm; limb cuneate. Achenes brown, cylindric, 4–6 mm. Pappus yellowish, as long as tubular corolla. Fl. Jul–Aug.

• Stream banks, valleys, grassy slopes; 3000–4000 m. NW Yunnan.

**92. *Ligularia leveillei*** (Vaniot) Handel-Mazzetti, Symb. Sin. 7: 1136. 1936.

贵州橐吾 gui zhou tuo wu

*Senecio leveillei* Vaniot, Bull. Acad. Int. Géogr. Bot. 11: 346. 1902; *Senecillis leveillei* (Vaniot) Kitamura.

Stem erect, ca. 60 cm tall, ca. 4 mm in diam. at base, proximally glabrous, distally and synflorescence shortly brown pilose. Rosette of leaves not seen. Proximal stem leaves petiolate; petiole to 20 cm, glabrous, base sheathed; leaf blade reniform or cordate, 3–3.5 × 5–5.5 cm, subleathery, glabrous, pal-

mately veined, margin triangular-dentate, apex rounded or acute; sinus ca. 1/3 as long as leaf blade, broad, basal lobes orbicular. Middle stem leaves shortly petiolate; sheath enlarged, ca. 3 cm; leaf blade smaller, reniform or cordate. Distal stem leaves smaller, sessile, shortly sheathed. Synflorescence paniculate-racemose, ca. 10 cm, proximally branched; leaflike and supplementary bracts linear, 4–6 mm, glabrous; peduncles 3–7 mm. Capitula numerous. Involucre broadly campanulate or cupular, 7–9 mm, mouth to 1 cm in diam., outside glabrous; phyllaries 8, in 2 rows, oblong or ovate-oblong, 3–4 mm, nitid, apex obtuse or acute; inner phyllaries broadly membranous at margin. Tubular florets 6–7 mm; tube ca. 2 mm; limb campanulate. Pappus brown, slightly shorter than tubular corolla. Fl. Aug.

- Grasslands; 2000–2200 m. C Guizhou.

**93. *Ligularia nanchuanica*** S. W. Liu, Bull. Bot. Res., Harbin 5(4): 70. 1985.

南川橐吾 nan chuan tuo wu

Stem erect, to 120 cm tall, ca. 6 mm in diam. at base, proximally glabrous, distally often purplish red, densely shortly yellow pilose. Basal leaves petiolate; petiole 30–40 cm, slender, glabrous, base narrowly sheathed; sheath to 5 cm, glabrous; leaf blade ovate-cordate or ovate-reniform, 4–9 × 5–11 cm, abaxially densely shortly yellow pilose, adaxially glabrous, palmately veined, margin undulate-dentate, apex rounded or acute, mucronate; sinus ca. 1/3 as long as leaf blade, narrow, basal lobes suborbicular, 4–6 cm, margin coarsely dentate. Middle to distal stem leaves similar but shortly petiolate or sessile; sheath enlarged. Synflorescence paniculate-racemose, to 53 cm, proximally branched; branches ascending, shortly yellow pilose, basal ones to 18 cm, with small capitula; leaflike bracts linear-lanceolate, to 2 cm, smaller distally; peduncles 3–9 mm, shortly yellow pilose. Capitula numerous. Involucre narrowly campanulate, 8–11 × 4–5 mm, outside densely shortly yellow pilose; phyllaries 8, in 2 rows, lanceolate or narrowly lanceolate, 1.5–3 mm wide, margin narrowly membranous, apex acute or acuminate. Tubular florets 7–8 mm; tube ca. 3 mm. Pappus yellow, slightly shorter than tubular corolla. Fl. Aug.  $2n = 58^*$ .

- Grasslands; 1300–2000 m. Chongqing (Nanchuan).

**94. *Ligularia hookeri*** (C. B. Clarke) Handel-Mazzetti, Bot. Jahrb. Syst. 69: 127. 1938.

细茎橐吾 xi jing tuo wu

*Cremanthodium hookeri* C. B. Clarke, Compos. Ind. 169. 1876; *C. hookeri* f. *angustiligulatum* R. D. Good; *C. hookeri* f. *irregulare* R. D. Good; *C. hookeri* subsp. *polycephalum* R. D. Good; *C. hookeri* f. *regulare* R. D. Good; *Ligularia evaginata* C. C. Chang; *L. hookeri* var. *polycephala* (R. D. Good) Handel-Mazzetti; *Senecio calthifolius* J. D. Hooker (1881), not (Maximowicz) Maximowicz (1871); *S. feddei* H. Léveillé; *S. ficarifolius* H. Léveillé & Vaniot; *S. nimborum* Franchet; *S. saccosoflabellatus* H. Léveillé; *S. sikkimensis* Franchet.

Stem erect, 17–40 cm tall, slender, 1.5–2 mm in diam. at base, proximally glabrous, distally white arachnoid-puberulent and shortly pilose. Basal leaves petiolate; petiole 5–10 cm,

slender, glabrous, base sheathed; leaf blade cordate-sagittate or reniform, 7–24 × 15–55 mm, glabrous, palmately veined, abaxially with conspicuous reticulate veins, margin triangularly or coarsely dentate, between teeth shortly pilose, apex rounded; sinus 1/3–1/2 as long as leaf blade, broad; basal lobes oblong, divergent or not. Middle stem leaf solitary, shortly petiolate; sheath slightly enlarged, 1.5–2.5 cm, glabrous; leaf blade reniform, as large as basal leaves. Distalmost stem leaf solitary, bracteal, cymbiform, to 2.5 cm, margin dentate. Capitula solitary or 2–7(–16), in raceme; leaflike bracts narrowly lanceolate; peduncles to 3.5 cm, slender, arachnoid-puberulent and shortly pilose; supplementary bracts filiform. Involucre campanulate or broadly campanulate, 8–11 × 6–8(–10) mm, outside glabrous; phyllaries 8–10, in 2 rows, oblong, to 3 mm wide, apex acute; inner phyllaries broadly membranous at margin. Ray florets yellow; lamina linear, 1–1.5 cm × 1.5–2 mm, apex acute; tube 3–5 mm. Tubular florets numerous, 7–8 mm; tube 3.5–4 mm. Achenes brown, cylindric, 4.5–6 mm. Pappus brown or pale brown, as long as tubular corolla. Fl. and fr. May–Sep.  $2n = 58$ .

Grassy slopes, scrub, forest understories, stream banks, alpine meadows; 3000–4500 m. Shaanxi (Taibai Shan), Sichuan, Xizang, NW Yunnan [Bhutan, India (Sikkim), Nepal].

**95. *Ligularia parvifolia*** C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 64. 1935.

小叶橐吾 xiao ye tuo wu

Stem erect, to 100 cm tall, 2–4 mm in diam. at base, slender, glabrous. Basal leaves petiolate; petiole to 25 cm, slender, glabrous, base narrowly sheathed; leaf blade hastate or triangular, 1.7–3.5 × 2–5.5 cm, glabrous, palmately veined, base truncate or rarely shallowly cordate, margin revolute, obtusely denticulate, apex obtuse or rounded, mucronate. Middle to distal stem leaves 2–4, shortly petiolate or sessile; sheath enlarged amplexicaul; leaf blade smaller, triangular to lanceolate. Synflorescence racemose, 8–15 cm; leaflike and supplementary bracts narrowly linear, 5–20 mm; peduncles 5–55 mm, slender, smaller distally. Capitula 3–6. Involucre campanulate, 1–1.3 × to 1 cm, outside glabrous; phyllaries 7–10, in 2 rows, oblong, 2–3 mm wide, apex acute; inner phyllaries membranous at margin. Ray florets 5–8, yellow; lamina oblong, 1.2–2 × to 5 mm, apex obtuse; tube to 1 cm. Tubular florets numerous, 8–11 mm; tube 4–7 mm, slender; limb ca. 2 mm wide. Pappus rufous, 6–8 mm, shorter than tubular corolla. Fl. Jul.

- Stream banks, swamps; 1900–2300 m. Yunnan (Kunming).

**96. *Ligularia lamarum*** (Diels) C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 65. 1935.

沼生橐吾 zhao sheng tuo wu

*Senecio lamarum* Diels, Repert. Spec. Nov. Regni Veg. Beih. 12: 508. 1922; *Ligularia angustiligulata* C. C. Chang.

Stem erect, 37–52 cm tall, slender, 2–4 mm in diam. at base, proximally glabrous, distally and synflorescence shortly pilose. Basal leaves petiolate; petiole 8.5–29 cm, slender, glabrous, base sheathed; leaf blade triangular-sagittate or ovate-

cordate, 3–9 × 2.2–12.5 cm, glabrous, palmately veined, margin dentate and ciliate, apex acute; sinus 1/4–1/3 as long as leaf blade, broad; basal lobes triangular, apex obtuse or acute. Middle to distal stem leaves shortly petiolate; sheath enlarged, amplexicaul; leaf blade smaller, cordate or ovate-cordate. Synflorescence racemose, 10–16 cm, clustered, spicate or lax; leaflike bracts linear, to 1.7 cm; peduncles 3–4(–8) mm, slender, shortly brown pilose. Capitula numerous; supplementary bracts subulate. Involucre campanulate-turbinate, 6–9 × 3–5 mm, outside glabrous; phyllaries 6–8, in 2 rows, oblong, apex acute; inner phyllaries membranous at margin. Ray florets 5–8, yellow; lamina oblong, 7–10 mm, ca. 1.5 mm wide, apex obtuse; tube 3–4 mm. Tubular florets numerous, 5–7 mm; tube 2–3 mm; limb broadly campanulate, ca. 2 mm wide. Achenes brown, cylindrical, 4–5 mm. Pappus yellowish, slightly shorter than tubular corolla. Fl. Jul–Aug, fr. Aug–Sep.

Swamps, wet grasslands, scrub, forest understories; 3300–5300 m. SW Gansu, W Sichuan, SE Xizang, NW Yunnan [NE Myanmar].

**97. *Ligularia subspicata*** (Bureau & Franchet) Handel-Mazzetti, Bot. Jahrb. Syst. 69: 127. 1938.

穗序橐吾 sui xu tuo wu

*Senecio subspicatus* Bureau & Franchet, J. Bot. (Morot) 5: 75. 1891; *Ligularia nudicaulis* C. C. Chang; *Senecillis subspicata* (Bureau & Franchet) Kitamura; *Senecio fibrillosus* Dunn.

Stem erect, 50–100 cm tall, slender, 3–4 mm in diam. at base, proximally glabrous, distally and synflorescence white puberulent. Basal leaves petiolate; petiole 5–30 cm, slender, glabrous, base sheathed; leaf blade ovate-cordate, hastate, or sagittate, 3.2–10.5 × 4–15 cm, abaxially pubescent, adaxially glabrous, palmately veined, margin triangular- or sharply dentate and ciliate, apex obtuse or rounded, mucronate; sinus 1/4–1/3 as long as leaf blade, broad; basal lobes oblong, margin coarsely dentate, sometimes divergent. Middle stem leaves similar but smaller, shortly petiolate; sheath narrow, usually not amplexicaul. Distal stem leaves sessile, smaller. Synflorescence racemose, to 30 cm, proximally branched; leaflike bracts linear-lanceolate, 6–35 mm, margin entire; peduncles 2–8 mm. Capitula numerous; supplementary bracts linear. Involucre campanulate, 4–10 mm, mouth 4–8 mm in diam., outside glabrous; phyllaries 6 or 7, in 2 rows, oblong or lanceolate, 2–3 mm wide, apex triangular or acute; inner phyllaries membranous at margin. Florets all tubular, numerous, yellow, 6–7 mm; tube as long as limb. Pappus white, slightly shorter than tubular corolla. Fl. Jul–Sep, fr. Aug–Sep.

• Stream banks, forest margins, forest understories, alpine scrub; 2800–5300 m. SW and W Sichuan, NW Yunnan.

**98. *Ligularia wilsoniana*** (Hemsley) Greenman in L. H. Bailey, Stand. Cycl. Hort. 6: 3153. 1917.

川鄂橐吾 chuan e tuo wu

*Senecio wilsonianus* Hemsley, Gard. Chron., ser. 3, 38: 212. 1905; *Ligularia polycephala* (Hemsley) Nakai; *L. sibirica* (Linnaeus) Cassini var. *polycephala* (Hemsley) Diels; *Senecillis wilsoniana* (Hemsley) Kitamura; *Senecio cacaliifolius* Schultz Bipontinus var. *polycephalus* (Hemsley) Franchet; *S. ligularia*

*J. D. Hooker* var. *polycephalus* Hemsley.

Stem erect, robust, 60–120 cm tall, to 1 cm in diam. at base, shortly pilose. Basal leaves petiolate; petiole 19–51 cm, robust, shortly pilose, base sheathed; leaf blade reniform, 6.5–13 × 11–24 cm, abaxially densely shortly pilose, adaxially glabrous, palmately veined, abaxially with prominent reticulate veins, base cordate, margin densely sharply dentate, apex rounded; sinus ca. 1/3 as long as leaf blade, broad. Middle stem leaves similar but smaller. Distal stem leaves reduced. Synflorescence racemose, 15–34 cm; leaflike bracts filiform; peduncles 1–1.5 cm. Capitula numerous; supplementary bracts subulate. Involucre campanulate to broadly turbinate, 7–8 × 6–7 mm, outside glabrous; phyllaries 7 or 8, in 2 rows, oblong or lanceolate, 2–4 mm wide, apex acute or triangular; inner phyllaries membranous at margin. Ray florets 5 or 6, yellow; lamina oblong, 7–9 × 3–4 mm, apex rounded. Tubular florets numerous, 6–7 mm; tube 2.5–3 mm. Pappus white, as long as tubular corolla. Fl. Jul–Sep.

• Grassy slopes, forest understories; 1600–2100 m. W Hubei, E Sichuan.

**99. *Ligularia atkinsonii*** (C. B. Clarke) S. W. Liu, Acta Biol. Plateau Sin. 7: 31. 1988.

亚东橐吾 ya dong tuo wu

*Senecio atkinsonii* C. B. Clarke, Compos. Ind. 207. 1876; *S. cacaliifolius* Schultz Bipontinus var. *atkinsonii* (C. B. Clarke) Franchet; *S. ligularia* J. D. Hooker var. *atkinsonii* (C. B. Clarke) J. D. Hooker.

Stem erect, 60–83 cm tall, 5–9 mm in diam. at base, proximally glabrous, distally and synflorescence shortly brown pilose and white puberulent. Basal leaves petiolate; petiole 38–45 cm, slender, glabrous, base narrowly sheathed; leaf blade abaxially pale green, adaxially dark green, reniform or cordate-ovate, 7–11 × 8–16 cm, abaxially shortly pilose along veins, adaxially glabrous, palmately veined, base broadly cordate or sagittate, margin irregularly triangularly dentate and ciliate, apex rounded; sinus ca. 1/3 as long as leaf blade. Middle to distal stem leaves similar but smaller, petiolate; petiole to 12 cm; sheath ca. 7 × 1 cm. Synflorescence racemose, 9–30 cm; leaflike bracts linear, shorter than peduncle or proximal ones linear-lanceolate, longer; peduncles 5–11 mm, equal or proximal peduncles longer. Capitula numerous; supplementary bracts linear, as long as involucre. Involucre campanulate, 7–11 × ca. 5(–7) mm, outside glabrous; phyllaries 8 or 9, in 2 rows, oblong or lanceolate, 1.5–2.5 mm wide, apex acute; inner phyllaries broadly membranous at margin. Ray florets yellow; lamina narrowly oblong, 8–10 × ca. 2 mm, apex rounded or subtruncate. Tubular florets 10–13, 6–7 mm; tube 2–3 mm; limb to 2 mm wide. Pappus white, slightly shorter than tubular corolla. Fl. Jun–Jul.

Stream banks, forest understories; 3000–3500 m. S Xizang [Bhutan, India (Sikkim)].

**100. *Ligularia pubifolia*** S. W. Liu, Acta Biol. Plateau Sin. 7: 32. 1988.

毛叶橐吾 mao ye tuo wu

Stem erect, to 100 cm tall, 5–6 mm in diam. at base, proximally glabrous, distally shortly pilose. Basal leaves petiolate; petiole 20–29 cm, slender, glabrous, base sheathed; leaf blade reniform, 4.5–5.5 × 6–10 cm, abaxially densely shortly white pilose, adaxially glabrous, palmately veined, margin triangular-dentate, apex obtuse or rounded; sinus ca. 3/5 as long as leaf blade, broad. Stem leaves 2 or 3, petiolate and sheathed; sheath enlarged, 4–8 × 2.5–4 cm, conspicuously parallel-veined and shortly white pilose, margin entire; petiole 1–9 cm, slender; leaf blade reniform, smaller than basal leaves, abaxially shortly white pilose, adaxially glabrous, apex acute. Synflorescence racemose, 30–35 cm, with 1 or 2 branches at base; leaflike bracts ovate-lanceolate, 2.5–4 × 1–1.3 cm, denticulate, smaller distally, linear; peduncles 3–35 mm, shortly pilose. Capitula numerous; supplementary bracts linear. Involucre campanulate, 6–9 × 5–8 mm, outside shortly pilose, base subtruncate; phyllaries 12 or 13, in 2 rows, oblong, 1.5–2.5 mm wide, margin brown membranous, apex acute or acuminate. Ray florets yellow; lamina linear-oblong, 8–9 × ca. 1 mm; tube ca. 4 mm. Tubular florets numerous, 7–8 mm; limb campanulate, as long as tube. Achenes cylindrical, ca. 5 mm. Pappus pale yellowish brown, as long as tubular corolla. Fl. and fr. Jul–Aug.

- Alpine scrub; ca. 3600 m. Xizang (Bomi).

**101. *Ligularia phyllocolea*** Handel-Mazzetti, Bot. Jahrb. Syst. 69: 138. 1938.

叶状鞘囊吾 ye zhuang qiao tuo wu

*Ligularia longipes* C. C. Chang.

Stem erect, 100–120 cm tall, 1–1.2 cm in diam. at base, densely shortly brown pilose. Basal leaves petiolate; petiole to 63 cm, slender, glabrous, middle to distal half entirely winged, base sheathed; leaf blade ovate-cordate, 18–40 × 16–30 cm, glabrous or abaxially sparsely arachnoid-puberulent, palmately veined, base cordate, margin densely sharply dentate, apex acute or obtuse. Middle stem leaves similar but smaller, shortly petiolate and winged; wing margin entire, undulate; sheath much enlarged, to 6 × ca. 3 cm, margin lacinate-dentate or sometimes entire. Distalmost stem leaves sessile; sheath enlarged, suborbicular, margin lacinate-dentate; leaf blade ovate, ca. 3 cm, margin lacinate-dentate. Synflorescence racemose, to 65 cm; leaflike bracts ovate-lanceolate to linear-lanceolate, proximal ones to 6.5 cm, smaller distally, margin lacinate-dentate or entire, apex acuminate; peduncles 3–15 mm, slender, densely shortly yellowish brown pilose. Capitula numerous; supplementary bracts linear-lanceolate. Involucre narrowly campanulate, 1–1.4 cm × ca. 5 mm, outside glabrous; phyllaries 6–8, in 2 rows, oblong, 2–3 mm wide, apex acuminate; inner phyllaries membranous at margin. Ray florets 4–6, yellow; lamina linear-oblong, 1–1.8 cm × 2–3 mm, apex obtuse; tube 7–9 mm. Tubular florets numerous, 1.1–1.3 cm, extending from involucre; tube 6–8 mm, slender. Pappus yellow, ca. 4 mm, ca. 1/2 as long as tube of tubular corolla. Fl. and fr. Aug–Sep.

- Stream banks, forests; 2100–3400 m. W Yunnan [E Myanmar].

**102. *Ligularia changiana*** S. W. Liu ex Y. L. Chen & Z. Yu Li in W. T. Wang et al., Vasc. Pl. Hengduan Mts. 2: 2071. 1994.

长毛囊吾 chang mao tuo wu

*Ligularia heterophylla* C. C. Chang, Acta Phytotax. Sin. 1: 314. 1951, not Ruprecht (1869); *L. phyllocolea* Handel-Mazzetti var. *villosa* Handel-Mazzetti; *L. villosa* (Handel-Mazzetti) S. W. Liu (1988), not Ecklon & Zeyher (1834–1835).

Stem erect, 74–125 cm tall, 4–8 mm in diam. at base, densely reddish brown pilose. Basal leaves petiolate; petiole 22–30 cm, densely reddish brown pilose, base narrowly sheathed; leaf blade hastate or triangular-hastate, 6–18 × 10–18 cm, abaxially densely brown pilose, adaxially deciduously shortly scabrous-pilose, palmately veined, margin irregularly dentate, apex acute or subrounded; sinus ca. 1/3 as long as leaf blade, broad; basal lobes suborbicular, slightly divergent. Middle stem leaves numerous, dense, shortly petiolate; sheath enlarged, densely reddish brown pilose; leaf blade triangular-cordate, 5.5–11 × 7.5–12 cm, margin denticulate, apex acuminate; sinus broad, basal lobes divergent. Distal stem leaves sessile, ovate, abaxially brown pilose, adaxially scabrous, base semiamplexicaul. Synflorescence racemose, 22–45 cm, reddish brown pilose; leaflike bracts ovate to lanceolate, 8–30 mm, proximal ones larger, sessile, distal ones smaller, shortly petiolate; peduncles to 1 cm. Capitula numerous; supplementary bracts linear-lanceolate. Involucre narrowly campanulate, 7–12 × 3–5 mm, outside glabrous; phyllaries 6–8, in 2 rows, oblong or narrowly oblong, 1.5–2.5 mm wide, apex acute; inner phyllaries broadly membranous at margin. Ray florets 2 or 3, yellow; lamina oblanceolate, 1–1.2 cm × 3–4 mm, apex obtuse; tube 5–6 mm. Tubular florets numerous, 1–1.1 cm; tube 5–6 mm. Pappus yellow, as long as or slightly shorter than tube of tubular corolla. Fl. Jul–Aug.

- Alpine meadows; 2900–3100 m. W Yunnan.

**103. *Ligularia latihastata*** (W. W. Smith) Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 60: 101. 1923.

宽戟囊吾 kuan ji tuo wu

*Senecio latihastatus* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 8: 116. 1913; *Ligularia brachyphylla* Handel-Mazzetti; *Senecillis latihastata* (W. W. Smith) Kitamura.

Stem erect, 35–60 cm tall, 3.5–5 mm in diam. at base, proximally glabrous, distally and synflorescence white puberulent and shortly yellowish brown pilose. Basal leaves petiolate; petiole 15–35 cm, glabrous, base narrowly sheathed, distally narrowly winged; leaf blade broadly hastate or triangular-hastate, 4–11 × 9–15 cm, glabrous, palmately veined, margin regularly dentate, apex rounded or triangular-acute; sinus broad; basal lobes divergent, 2.5–5 cm, outer margin coarsely dentate. Middle stem leaves petiolate or sessile; sheath enlarged, to 7 cm, margin dentate or rarely entire; leaf blade smaller, triangular- or cordate-hastate. Distal stem leaves sheathlike, broadly ovate to ovate-lanceolate, margin dentate. Synflorescence racemose, 10–30 cm, clustered or lax; leaflike bracts ovate to lanceolate, proximal ones to 5 cm, smaller upward, margin dentate, apex acute; peduncles to 1.3 cm. Capitula 7–24; supplementary bracts narrowly lanceolate, margin dentate. Involucre broadly

campanulate, 9–11 × 8–12 mm, outside glabrous; phyllaries 8–10, in 2 rows, oblong, 3–5 mm wide, apex triangular-acute, mucronate; inner phyllaries broadly brown membranous at margin. Ray florets yellow; lamina linear-oblong or linear-lanceolate to linear, 2.5–4 cm × 2–5 mm, apex acute or acuminate; tube ca. 7 mm. Tubular florets numerous, 1–1.2 cm, extending from involucre; tube 6–7 mm. Achenes cylindrical, ca. 6 mm. Pappus pale brown or reddish brown in fruit, as long as tube of tubular corolla. Fl. and fr. Jul–Oct.  $2n = 58^*$ .

• Stream banks, grassy areas in swamps, forest understories, grasslands; 2400–4000 m. SW Sichuan (Muli), NW Yunnan.

**104. *Ligularia caloxantha*** (Diels) Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 60: 101. 1923.

黄亮橐吾 huang liang tuo wu

*Senecio caloxanthus* Diels, Notes Roy. Bot. Gard. Edinburgh 5: 194. 1912; *Senecillis caloxantha* (Diels) Kitamura.

Stem erect, 40–115 cm tall, 4–6 mm in diam. at base, proximally glabrous, distally and synflorescence shortly yellow pilose. Basal leaves petiolate; petiole to 45 cm, glabrous, base sheathed, distally narrowly winged; leaf blade triangular- or ovate-cordate, (4.5–)6–14 × (3.5–)8–18 cm, glabrous, palmately veined, base cordate, margin regularly dentate, apex obtuse or acute; sinus ca. 1/3 as long as leaf blade; basal lobes slightly divergent, oblong, outer margin coarsely dentate. Middle stem leaves petiolate or sessile, small; petiole winged; sheath enlarged, tubular or leaflike, suborbicular, base sometimes auriculate, margin dentate; leaf blade ovate-triangular or triangular, to 9 × 11 cm. Distal stem leaves sessile, ovate or orbicular. Synflorescence racemose, 9–30 cm, lax; leaflike bracts ovate-lanceolate, proximal ones to 4 × 3 cm, smaller distally, margin dentate, apex acuminate; peduncles erect, 5–10 mm, slender, sometimes proximal ones to 8 cm. Capitula 10–25; supplementary bracts narrowly lanceolate, margin dentate. Involucre broadly campanulate, 9–11 × 5–9 mm, outside glabrous; phyllaries 8–10, in 2 rows, oblong, 2–4 mm wide, apex triangular-acute; inner phyllaries broadly brown membranous at margin. Ray florets yellow; lamina oblanceolate, 1.2–2 cm × 3–6 mm, apex obtuse; tube 5–6 mm. Tubular florets numerous, 1–1.1 cm; tube ca. 5 mm. Achenes brown, oblong, 5–6 mm. Pappus pale yellow, as long as tube of tubular corolla. Fl. Jul–Oct.

• Stream banks, grassy slopes, alpine grasslands at montane summits; 1600–4000 m. S Sichuan, NE to NW Yunnan.

**105. *Ligularia odontomanes*** Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 12. 1925.

马蹄叶橐吾 ma ti ye tuo wu

Plants long yellowish red pilose. Stem erect, to 60 cm tall, ca. 3 mm in diam. at base. Basal leaves petiolate; petiole 7–16 cm, slender, long yellowish red pilose, base narrowly sheathed; leaf blade horseshoe-shaped, 3–20 × 4–9 cm, abaxially densely hairy, adaxially glabrous or sparsely hairy, palmately veined, base deeply cordate, margin regularly dentate and ciliate, apex rounded, triangular-mucronate; sinus ca. 1/2 as long as leaf blade, narrow; basal lobes not divergent, margin laciniate-den-

tate. Middle to distal stem leaves sessile; sheath enlarged, cymbiform or suborbicular, amplexicaul, margin dentate; leaf blade triangular-reniform, 3–4 cm, to 6 cm wide, apex acute. Synflorescence racemose, short, clustered; leaflike bracts ovate, 1.5–1.8 × ca. 1 cm, margin laciniate-dentate and ciliate; peduncles 3–12 mm. Capitula 5–10; supplementary bracts narrowly ovate, longer than involucre, shortly petiolate, margin laciniate-dentate and ciliate. Involucre narrowly campanulate, ca. 10 × 5 mm, outside glabrous; phyllaries 7 or 8, in 2 rows, narrowly oblong, 2–3 mm wide, apex triangular-acute; inner phyllaries membranous at margin. Ray florets 5, yellow; lamina linear-oblong, 1.3–2 cm × ca. 4 mm, apex obtuse; tube ca. 6 mm. Tubular florets numerous, 11–11.5 mm; tube 5–6 mm. Pappus reddish yellow, ca. 5 mm, shorter than tube of tubular corolla. Fl. Jul–Aug.

• Forest margins, grassy slopes; 2500–2800 m. S Sichuan.

**106. *Ligularia fischeri*** (Ledebour) Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 11: 95. 1838.

蹄叶橐吾 ti ye tuo wu

*Cineraria fischeri* Ledebour, Index Sem. Horti Dorpat. 1820: 17. 1820; *C. speciosa* Schrader ex Link; *Hoppea speciosa* (Schrader ex Link) Reichenbach; *Ligularia sibirica* (Linnaeus) Cassini var. *speciosa* (Schrader ex Link) Candolle; *L. speciosa* (Schrader ex Link) Fischer & C. A. Meyer; ?*L. splendens* (H. Léveillé & Vaniot) Nakai; *Senecillis fischeri* (Ledebour) Kitamura; *Senecio cacaliifolius* Schultz Bipontinus var. *speciosus* (Schrader ex Link) Franchet; ?*S. splendens* H. Léveillé & Vaniot.

Stem erect, 80–200 cm tall, 5–10 mm in diam. at base, proximally glabrous or shortly yellowish brown pilose, distally and synflorescence densely shortly yellowish brown pilose. Basal leaves petiolate; petiole 18–59 cm, shortly brown pilose, base sheathed; leaf blade abaxially pale green, adaxially green, reniform, 8–30 × 13–40 cm, abaxially shortly brown pilose, adaxially glabrous, palmately veined, with 5–7 prominent principal veins, margin regularly dentate, apex rounded, sometimes mucronate; sinus ca. 1/3 as long as leaf blade, broad; basal lobes suborbicular, not divergent. Middle to distal stem leaves shortly petiolate; sheath enlarged; leaf blade reniform, 4.5–5.5 × 5–6 cm. Synflorescence racemose, 27–75 cm; proximal leaflike bracts ovate or ovate-lanceolate, to 6 × 2 cm, smaller distally, herbaceous, margin dentate, apex mucronate; distal leaflike bracts lanceolate; peduncles: proximal ones to 9 cm, smaller distally, slender. Capitula numerous; supplementary bracts narrowly lanceolate to linear. Involucre campanulate, 7–20 × 5–14 mm, outside shortly brown pilose; phyllaries 8–14, in 2 rows, oblong, 3–5 mm wide, apex acute; inner phyllaries broadly membranous at margin. Ray florets 5–9, yellow; lamina oblong, 1.5–2.5 cm × to 6 mm wide, apex obtuse; tube 5–11 mm. Tubular florets numerous, 8–17 mm; tube 5–9 mm. Achenes dark brown, fusiform-cylindrical, 6–8 mm. Pappus yellowish brown, shorter than tubular corolla. Fl. and fr. Jul–Oct,  $2n = 60$ .

Stream banks, swamp meadows, grassy slopes, scrub, forest margins; below 2500 m. Anhui, Heilongjiang, Henan, Hubei, Jilin, Liaoning, Nei Mongol, Shaanxi, Sichuan, Zhejiang [Bhutan, India, Japan, Kashmir, Korea, Mongolia, Myanmar, Nepal, Russia (Far East, E Siberia)].

One of us (Illarionova) treats *Ligularia splendens* (syn. *Senecio splendens*) as a distinct species. *Ligularia splendens* is similar to *L. fischeri* but differs in having leaflike bracts ovate around the whole synflorescence and glabrous phyllaries. According to Illarionova, *Ligularia fischeri* is distributed only in NE China (Heilongjiang, Jilin, Nei Mongol), Mongolia, and Russia (Far East, E Siberia).

**107. *Ligularia chekiangensis*** Kitamura, J. Jap. Bot. 21: 53. 1947.

浙江橐吾 zhe jiang tuo wu

Stem erect, to 100 cm tall, distally shortly pilose. Basal leaves petiolate; petiole to 21 cm, shortly pilose, base narrowly sheathed; leaf blade abaxially pale green, adaxially green, cordate, ca. 8.5 × 13 cm, abaxially shortly pilose along veins, margin mucronate-dentate. Proximal stem leaves petiolate; petiole to 21 cm; leaf blade cordate, to 18 cm, base cordate-sagittate. Middle to distal stem leaves small, shortly petiolate; leaf blade reniform-cordate. Distalmost stem leaves bracteal, lanceolate. Synflorescence racemose, narrow; leaflike bracts lanceolate; peduncles shorter. Capitula numerous. Involucre tubular, ca. 1.6 × 1.2–1.4 cm; phyllaries 8, in 2 rows, lanceolate, apex densely ciliate. Florets 27 or 28, all tubular, 1.4–1.7 cm; tube 6.5–9 mm. Pappus dirty brown, to 9 mm, as long as tube of tubular corolla. Fl. and fr. unknown.

• Forest understories, grassy slopes; ca. 1100 m. ?Anhui, Zhejiang (W Tianmu Shan).

**108. *Ligularia anoleuca*** Handel-Mazzetti, Bot. Jahrb. Syst. 69: 136. 1938.

白序橐吾 bai xu tuo wu

Stem erect, to 90 cm tall, to 1.2 cm in diam. at base, proximally glabrescent, distally and synflorescence densely white arachnoid-puberulent. Basal leaves petiolate; petiole to 36 cm, white arachnoid-puberulent, base narrowly sheathed, not winged or distally narrowly winged; wing margin dentate; leaf blade reniform, 13–14 × 17.5–20 cm, abaxially sparsely arachnoid-puberulent along veins, adaxially glabrous, palmately veined, with 9 principal veins, abaxially conspicuously prominent, margin minutely sharply dentate, apex rounded or obtuse; sinus ca. 1/3 as long as leaf blade, broad; basal lobes suborbicular, outer margin coarsely dentate. Middle to distal stem leaves similar but smaller, shortly winged petiolate; wing margin dentate; sheath enlarged, 3–5 cm, margin entire or dentate. Synflorescence racemose, 15–20 cm, distally clustered, proximally lax; leaflike bracts spatulate, proximal ones to 6 cm, smaller distally, submembranous, shortly petiolate, margin dentate, apex acuminate; peduncles: proximal ones to 6 cm, smaller distally, slender. Capitula numerous; supplementary bracts narrowly lanceolate, as long as or slightly longer than involucre. Involucre broadly campanulate, 1–1.5 × 1.5–2 cm, outside shortly pilose; phyllaries 10–14, in 2 rows, oblong, 3–4 mm wide, apex broadly triangular; inner phyllaries broadly brown membranous at margin. Ray florets 5 or 6, yellow; lamina linear, 1.5–2 cm × ca. 2 mm, apex obtuse; tube 6–7 mm. Tubular florets numerous, 1–1.2 cm, extending from involucre; tube 6–7 mm. Pappus yellow, as long as tubular corolla. Fl. Aug.

• Grassy slopes; 3400–3500 m. NW Yunnan.

**109. *Ligularia sachalinensis*** Nakai, J. Jap. Bot. 20: 140. 1944.

黑龙江橐吾 hei long jiang tuo wu

*Ligularia fischeri* (Ledebour) Turczaninow f. *diabolica* Kitamura.

Stem erect, 60–150 cm tall, 4–7 mm in diam. at base, distally and synflorescence shortly yellowish brown pilose, sometimes intermixed white arachnoid-puberulent. Basal leaves petiolate; petiole 9–53 cm, shortly yellowish brown pilose, base sheathed; leaf blade reniform or reniform-cordate, 3–30 × 5–45 cm, abaxially densely shortly yellowish brown pilose or hairy only along veins, adaxially glabrous, palmately veined, margin regularly dentate, apex rounded or acute; sinus 1/5–1/4 as long as leaf blade, broad; basal lobes oblong or suborbicular, divergent, outer margin coarsely dentate. Middle to distal stem leaves similar but smaller, shortly petiolate to sessile; sheath enlarged, shortly yellowish brown pilose, margin entire. Synflorescence racemose, 8–35 cm; proximalmost leaflike bracts (2–5 at base of synflorescence) ovate, distal ones lanceolate to linear, 9–25 × to 15 mm, herbaceous, margin dentate and ciliate, apex acuminate; peduncles 2–12 cm, smaller distally. Capitula numerous; supplementary bracts linear. Involucre campanulate, 1–1.1 cm × 5–7 mm, outside shortly yellowish brown pilose; phyllaries 6–8, in 2 rows, oblong, 2–3 mm wide, apex triangular; inner phyllaries membranous at margin. Ray florets 2–6, yellow; lamina oblong, 1.2–1.8 cm × 2–4 mm, apex rounded or acute. Tubular florets numerous, 1–1.1 cm; tube 5–6 mm. Achenes dark brown, fusiform-cylindric, 5–8 mm. Pappus yellowish brown, shorter than tubular corolla. Fl. Jul–Aug.

Grassy slopes, meadows, swamp meadows, scrub, forest margins; below 1200 m. Heilongjiang [Russia (Far East)].

**110. *Ligularia veitchiana*** (Hemsley) Greenman in L. H. Bailey, Stand. Cycl. Hort. 6: 3153. 1917.

离舌橐吾 li she tuo wu

*Senecio veitchianus* Hemsley, Gard. Chron., ser. 3, 38: 212. 1905; *Senecillis veitchiana* (Hemsley) Kitamura.

Stem erect, 60–200 cm tall, 4–9 mm in diam. at base, proximally glabrous, distally and synflorescence white arachnoid-puberulent and shortly yellowish brown pilose, later white arachnoid hairs deciduous. Basal leaves petiolate; petiole 15–104 cm, solid, base narrowly sheathed; leaf blade triangular- or ovate-cordate, sometimes subreniform, 7–24 × 12–35 cm, glabrous, or abaxially shortly white pilose along veins, palmately veined, base subhastate, margin regularly sharply dentate, apex rounded or obtuse; sinus ca. 1/3 as long as leaf blade, broad; basal lobes oblong or suborbicular, divergent. Middle to distal stem leaves similar but smaller, shortly petiolate to sessile; sheath enlarged, margin entire. Synflorescence racemose, 13–40 cm; leaflike bracts at middle of peduncle, surrounding involucre, pale reddish brown when dry, broadly ovate to ovate-lanceolate, 8–30 × to 20 mm, smaller distally, submembranous, glabrous, margin entire or middle to distal half dentate, apex long acuminate; peduncles 5–35 mm. Capitula numerous; supplementary bracts narrowly lanceolate to linear. Involucre campanulate or tubular-campanulate, 8–10(–15) × 5–8 mm, outside shortly pilose; phyllaries 7–9, in 2 rows, oblong, 2–3 mm wide, apex acute; inner phyllaries membranous at margin. Ray florets

6–10, yellow; lamina narrowly oblanceolate, 1.3–2.5 cm × ca. 2 mm, apex rounded; tube 5–11 mm. Tubular florets numerous, 9–15 mm; tube 5–8 mm. Pappus yellowish white, sometimes dirty white, ca. 1/2 as long as or equal to tube of tubular corolla. Fl. Jul–Sep, fr. Aug–Sep.

• Stream banks, grassy slopes, forest understories; 1100–3300 m. SW Gansu, Guizhou, ?Henan, W Hubei, S Shaanxi, Sichuan, NW Yunnan.

**111. *Ligularia ianthochaeta*** C. C. Chang, Acta Phytotax. Sin. 1: 321. 1950.

岷县橐吾 min xian tuo wu

Stem erect, to 45 cm tall, ca. 3 mm in diam. at base, proximally glabrous, distally shortly yellowish brown pilose. Basal leaves petiolate; petiole purplish red, ca. 13 cm × 1.5 mm, shortly pilose, base narrowly sheathed; leaf blade orbicular-cordate or subreniform, 8–8.5 × 7–8.5 cm, glabrous, palmately veined, margin coarsely dentate, apex rounded or truncate; sinus 1/3–1/2 as long as leaf blade, broad. Stem leaves similar but smaller, shortly petiolate. Distal stem leaves ovate, margin entire. Synflorescence racemose, ca. 6 cm, proximally branched; leaflike bracts lanceolate, shortly pilose; peduncles to 2.5 cm, shortly purplish red pilose. Capitula few; supplementary bracts narrowly lanceolate to linear, ca. 5 mm. Involucre campanulate, ca. 1 cm, outside shortly pilose; phyllaries 6–9, in 2 rows, 1.5–2.5 mm wide, apex triangular; inner phyllaries broadly membranous at margin. Florets 8, all tubular, 6–7 mm, higher than involucre; tube as long as limb. Achenes (immature) cylindrical. Pappus yellowish brown, as long as tube of tubular corolla. Fl. Jul.

• Grassy slopes; ca. 2400 m. Gansu (Minxian).

**112. *Ligularia intermedia*** Nakai, Bot. Mag. (Tokyo) 31: 125. 1917.

狭苞橐吾 xia bao tuo wu

*Ligularia intermedia* var. *oligantha* Nakai; *L. sibirica* (Linnaeus) Cassini subsp. *intermedia* (Nakai) Kitamura; *L. sinica* Kitagawa; *Senecillis intermedia* (Nakai) Kitamura.

Stem erect, to 100 cm tall, to 1 cm in diam. at base, proximally glabrous, distally white arachnoid-puberulent. Basal leaves petiolate; petiole 16–43 cm, glabrous, base narrowly sheathed; leaf blade cordate or reniform, 8–16 × 12–23.5 cm, glabrous, palmately veined, margin regularly sharply triangular-dentate, apex obtuse or mucronate; sinus ca. 1/3 as long as leaf blade, broad. Middle to distal stem leaves similar but smaller, shortly petiolate or sessile; sheath slightly enlarged. Distal stem leaves bracteal, ovate-lanceolate. Synflorescence racemose, 22–25 cm; leaflike bracts linear or linear-lanceolate, proximal ones to 3 cm, smaller distally; peduncles 3–10 mm, glabrescent. Capitula numerous; supplementary bracts linear. Involucre campanulate, 8–11 × 4–5 mm, outside glabrous; phyllaries 6–8, in 2 rows, oblong, ca. 3 mm wide, margin membranous, apex triangular-acute. Ray florets 4–6, yellow; lamina oblong, 1.7–2 cm × ca. 3 mm, apex obtuse; tube ca. 7 mm. Tubular florets 7–12, extending from involucre, 1–1.1 cm; tube

ca. 6 mm, base slightly thick. Achenes cylindrical, 5–7 mm. Pappus purplish brown, sometimes white, shorter than tube of tubular corolla. Fl. and fr. Jul–Oct.

Stream banks, grassy slopes, forest understories, alpine meadows; 100–3400 m. Gansu, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jilin, Liaoning, Nei Mongol, Shaanxi, Shanxi, Sichuan, NE and NW Yunnan [Korea].

**113. *Ligularia hopeiensis*** Nakai, J. Jap. Bot. 16: 76. 1940.

河北橐吾 he bei tuo wu

Stem erect, to 100 cm tall, ca. 1 cm in diam. at base, proximally glabrous, distally shortly yellowish brown pilose. Rosette of leaves early deciduous. Stem leaves 3, proximal leaves petiolate; petiole to 80 cm, base sheathed; leaf blade reniform, ca. 30 × 50 cm, palmately veined, margin dentate. Middle stem leaves with petiole to 37 cm; leaf blade reniform, ca. 7 × 15.5 cm, abaxially shortly pilose, adaxially glabrous, margin dentate. Distal stem leaves smaller; leaf blade ca. 3.7 × 6 cm. Synflorescence racemose, to 18 cm; leaflike bracts linear; peduncles 5–10 mm, shortly pilose. Capitula numerous. Involucre campanulate, ca. 1.3 cm, outside shortly pilose; phyllaries 7 or 8, in 2 rows, 1.5–2 mm wide, apex acute. Florets all tubular, 8 or 9; tube 4–5 mm. Achenes ca. 5 mm. Pappus early deciduous. Fl. and fr. unknown.

• Hebei (Xiaowutai Shan).

**114. *Ligularia chimiliensis*** C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 61. 1935.

緬甸橐吾 mian dian tuo wu

*Ligularia pianmaensis* Y. L. Chen ex T. L. Ming.

Stem erect, 25–70 cm tall, 3–5 mm in diam. at base, glabrescent. Basal leaves petiolate; petiole to 25.5 cm, slender, glabrous, base narrowly sheathed; leaf blade cordate-hastate or ovate-sagittate, rarely reniform, 4.2–11 × 8–10 cm, abaxially shortly pilose, adaxially glabrous, palmately veined, base broadly cordate, margin regularly coarsely dentate, apex acute or subrounded; sinus ca. 1/3 as long as leaf blade, broad; basal lobes orbicular or oblong. Middle stem leaves sessile, cordate, 4–7 × 5–9 cm, apex acute; sheath enlarged, 2–3 cm. Distal stem leaves only with enlarged sheaths. Synflorescence racemose, to 10 cm; leaflike bracts smaller distally, proximal ones lanceolate, to 4 cm, middle to distal ones linear; peduncles to 3 cm, shortly yellowish brown pilose. Capitula numerous; supplementary bracts linear, 6–10 mm. Involucre campanulate, 8–10 × 5–7 mm, outside glabrous; phyllaries 7–10, in 2 rows, oblong, 2–4 mm wide, apex acute; inner phyllaries broadly membranous at margin. Ray florets yellow; lamina oblong, 8–10 × 2–6 mm, apex rounded, denticulate; tube 3.5–5 mm. Tubular florets 7–10 mm; tube 3.5–5 mm. Achenes cylindrical, 5–6 mm. Pappus pale yellowish brown, as long as tube of tubular corolla. Fl. and fr. Aug.

Grassy slopes; ca. 3600 m. ?Xizang, W Yunnan [NE Myanmar].

*Ligularia pianmaensis*, according to the original description (Fl. Yunnan. 13: 833. 2004), is similar to *L. chimiliensis*, but differs in having fewer (7–9) capitula and ovate leaflike bracts 1–5.5 × 0.5–2.5 cm.

**115. *Ligularia longihastata*** Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 11. 1925.

长戟橐吾 chang ji tuo wu

Stem erect, to 56 cm tall, ca. 4 mm in diam. at base, proximally glabrous, distally white arachnoid-puberulent and shortly yellowish brown pilose. Basal leaves petiolate; petiole to 30 cm, glabrous, base sheathed, apically narrowly winged; leaf blade narrowly triangular-hastate or ovate-cordate, 4–8.5 × 5–9 cm, abaxially shortly yellowish brown pilose only along veins, adaxially shortly yellowish brown pilose, palmately veined, margin denticulate, rarely crenate, apex acuminate or acute, rarely retuse; sinus 1/4–1/3 as long as leaf blade, broad; basal lobes divergent. Middle stem leaves smaller, cordate-reniform, shortly petiolate; sheath slightly enlarged, to 6 cm. Distal stem leaves sessile, broadly triangular; sheath enlarged. Synflorescence racemose, to 7 cm; leaflike bracts linear-lanceolate; peduncles 7–15 mm, shortly yellowish brown pilose. Capitula numerous. Involucre campanulate, 1–1.2 cm × 7–9 mm, outside glabrous; phyllaries 8 or 9, in 2 rows, lanceolate, 2–4 mm wide, margin membranous, apex acuminate. Ray florets yellow; lamina linear, 1.5–2(–3) cm × 1.5–2 mm, apex 3-lobed; tube ca. 5 mm. Tubular florets ca. 9 mm; tube ca. 4 mm; limb ca. 2 mm wide. Pappus pale yellow, as long as tube of tubular corolla. Fl. Jul–Aug.

- Grassy slopes; 3400–3800 m. NW Yunnan.

**116. *Ligularia ruficoma*** (Franchet) Handel-Mazzetti, Bot. Jahrb. Syst. 69: 134. 1938.

节毛橐吾 jie mao tuo wu

*Senecio ruficomus* Franchet, Bull. Soc. Bot. France 39: 298. 1893; *Senecillus ruficoma* (Franchet) Kitamura.

Stem erect, 35–50(–75) cm tall, 3–4 mm in diam. at base, proximally glabrous, distally shortly yellowish brown pilose. Basal leaves petiolate; petiole 8–15 cm, base sheathed, abaxially glabrous, adaxially shortly pilose; leaf blade triangular-sagittate or cordate, 3–10.5 × 4.5–9 cm, both surfaces shortly white pilose, later adaxial hairs deciduous, glabrescent, palmately veined, margin regularly denticulate, apex acute; sinus ca. 1/3 as long as leaf blade, broad; basal lobes short, slightly divergent, outer margin coarsely dentate. Middle stem leaf solitary, subsessile; sheath enlarged, 3–5 cm, margin entire; leaf blade ovate or ovate-cordate, 3–4 × 3.5–5 cm. Distal stem leaves sessile, bracteal, ovate-lanceolate. Synflorescence racemose, 7–13 cm; leaflike bracts linear, 1–1.5 cm, submembranous, shortly pilose, margin entire; peduncles 1.5–2.5 cm, shortly pilose. Capitula numerous; supplementary bracts linear. Involucre campanulate, 9–11 × 7–9 mm, outside shortly white pilose; phyllaries 7 or 8, in 2 rows, oblong or lanceolate, 2–3 mm wide, apex obtuse or acuminate; inner phyllaries brown membranous at margin. Ray florets 5 or 6, yellow; lamina linear, to 20 × 1.5 mm; tube 5–6 mm. Tubular florets 8–9 mm; tube as long as limb. Pappus yellowish brown, as long as tube of tubular corolla. Fl. Jul–Sep.

- Grassy slopes; 3500–4200 m. NW and W Yunnan.

**117. *Ligularia przewalskii*** (Maximowicz) Diels, Bot. Jahrb. Syst. 29: 621. 1901.

掌叶橐吾 zhang ye tuo wu

*Senecio przewalskii* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 26: 493. 1880; *Senecillus przewalskii* (Maximowicz) Kitamura.

Stem erect, 30–130 cm tall, slender, 3–4 mm in diam. at base, glabrous. Basal leaves petiolate; petiole to 50 cm, glabrous, base sheathed; leaf blade ovate, 4.5–10 × 8–18 cm, glabrous or rarely shortly pilose on both surfaces, palmately veined, 4–7-palmatisect; lobes 3–7-divided, middle lobes duplicitely 3-divided; segments marginally laciniate-dentate. Middle to distal stem leaves fewer, small, palmately divided, often with enlarged sheaths. Synflorescence racemose, 30–48(–60) cm; leaflike bracts linear-subulate; peduncles 3–4 mm, slender, glabrous. Capitula numerous (40–100); supplementary bracts often absent. Involucre narrowly cylindrical, 7–11 × 2–3 mm, outside glabrous; phyllaries (3 or) 4–6(or 7), in 2 rows, linear-oblong, ca. 2 mm wide, margin narrowly membranous, apex rounded, brown ciliate. Ray florets 2 or 3, yellow; lamina linear-oblong, to 17 × 2–3 mm, transparent, apex obtuse; tube 6–7 mm. Tubular florets usually 3, extending from involucre, 1–1.2 cm; tube as long as limb. Achenes brown, fusiform, 5–7 mm, attenuate at apex. Pappus purplish brown, ca. 4 mm, shorter than tube of tubular corolla. Fl. and fr. Jun–Oct.  $2n = 58^*$ .

- Stream banks, grassy slopes, forest margins, forest understories, scrub; 1100–3700 m. Gansu, ?Henan, Jiangsu, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan.

*Ligularia przewalskii* is cultivated in Europe.

**118. *Ligularia qiaojiaensis*** Y. S. Chen & H. J. Dong, Nordic J. Bot. 28: 683. 2010.

巧家橐吾 qiao jia tuo wu

Stem erect, to 70 cm tall, ca. 3 mm in diam. at base, longitudinally angulate. Basal leaves petiolate; petiole 12–20 cm, glabrous, base sheathed; leaf blade abaxially pale green, adaxially green, cordate-orbicular, 7–24 × 8–25 cm, papery, abaxially glabrous, adaxially with sparse white glandular hairs, pinnately dissected. Stem leaves 3 or 4; petiole 5–23 cm, base enlarged, sheathing; upper leaves with smaller blades and shorter petioles. Synflorescence racemose, to 25 cm, densely covered with rust-colored glandular hairs; peduncles 0.3–1.2(–8) cm. Capitula 7–15; supplementary bracts subulate. Involucre green, turbinate, 8–10 mm in diam.; phyllaries 8 or 9, in 2 rows, equal in length, broadly oblong, ca. 1 cm × 2–3 mm, apex acute. Ray florets yellow, 4 or 5; lamina lanceolate, 16–18 × ca. 3 mm, apex acute and dentate; tube ca. 4 mm. Tubular florets 16–18; tube ca. 5 mm; limb campanulate, ca. 5 mm; lobes lanceolate, ca. 2 × 0.3 mm. Style ca. 12 mm; stigma brownish yellow. Achenes cylindrical, ca. 5 × 0.6 mm, longitudinally ribbed, apex truncate. Pappus brown, 4–5 mm, as long as or shorter than tube of tubular corolla. Fl. Jul–early Aug.

- Wet grassy slopes along forest margins, alpine meadows along streams; 2700–3400 m. NE Yunnan (Dongchuan, Qiaojia).

The population size is very small at two known localities, so *Ligularia qiaojiaensis* should be categorized as “endangered” (Dong & Chen, Nordic J. Bot. 28: 683. 2010).

One of us (Illarionova) believes that *Ligularia qiaojiaensis* is an

occasional hybrid of *L. przewalskii* and some species from the same section.

**119. *Ligularia confertiflora*** C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 63. 1935.

密花橐吾 mi hua tuo wu

Stem erect, 60–100 cm tall, 5–10 mm in diam. at base, proximally glabrous, distally shortly yellowish brown pilose. Basal leaves petiolate; petiole 15–50 cm, glabrous, base sheathed; leaf blade ovate-cordate or reniform-cordate, 9.5–19 × 9–22 cm, both surfaces shortly pilose or abaxially hairy only along veins, palmately veined, margin irregularly dentate, apex triangular, obtuse; sinus ca. 1/3 as long as leaf blade, narrow; basal lobes 5–6 mm, coarsely dentate on outer margin, lowermost with larger teeth. Middle to distal stem leaves similar but smaller, shortly petiolate; sheath narrower, margin entire. Synflorescence racemose, lax, 15–35 cm; leaflike bracts narrowly lanceolate, margin entire or denticulate; peduncles to 5 mm, shortly yellowish brown pilose. Capitula numerous; supplementary bracts linear-lanceolate. Involucre narrowly cylindrical, ca. 1 cm × to 4 mm, outside glabrous; phyllaries 5 or 6, in 2 rows, oblong, 2–3 mm wide, apex acute. Florets 5–14, all tubular, extending from involucre, 1–1.2 cm; tube 5.5–7 mm. Pappus pale yellow, 4–5 mm, as long as tube of tubular corolla. Fl. Aug–Oct.

• Grassy slopes, forest understories; 3200–3300 m. NW Yunnan.

**120. *Ligularia stenocephala*** (Maximowicz) Matsumura & Koidzumi, Bot. Mag. (Tokyo) 24: 149. 1910.

窄头橐吾 zhai tou tuo wu

Stem erect, 40–170 cm tall, 3–6 mm in diam. at base, rarely to 2 cm in diam., glabrous. Basal leaves petiolate; petiole 23–75 cm, slender, glabrous or apically arachnoid-puberulent, base narrowly sheathed; leaf blade cordate-hastate or reniform-hastate, rarely sagittate, 2.5–16.5 × 6–32 cm, glabrous or shortly pilose on both surfaces, abaxially sometimes hairy only along veins, palmately veined, base broadly cordate, margin regularly sharply dentate, apex triangular, acute or shortly mucronate; sinus 1/5–1/3 as long as leaf blade, broad; basal lobes sharply triangular, divergent, margin sharply dentate and 1- or 2-dentate on each outer margin. Middle to distal stem leaves similar but smaller, shortly petiolate or sessile; sheath enlarged. Synflorescence racemose, to 90 cm, glabrescent; leaflike bracts ovate-lanceolate to linear, proximal ones to 5 cm, distal ones linear, shorter; peduncles 1–7 mm, rarely proximal ones to 3 cm. Capitula numerous; supplementary bracts linear. Involucre narrowly or broadly cylindrical, 8–12 × 2–4 mm, rarely to 17–18 × ca. 8 mm, outside glabrous; phyllaries 5(–7), in 2 rows, oblong, 1.5–3(–6) mm wide, apex triangular, acute; inner phyllaries membranous at margin. Ray florets 1–4(or 5), yellow; lamina linear-oblong or oblanceolate, 1–1.7 cm × 2–4 mm, apex obtuse; tube 5–13 mm. Tubular florets 5–10, 1–1.9 cm; tube 6–13 mm. Achenes fusiform, 5–7 mm. Pappus white, yellowish white, or sometimes brown, 5–8 mm, shorter than tube of tubular corolla. Fl. and fr. Jul–Dec. *2n* = 60.

Stream banks, grassy slopes, forest understories, at base of rocks, on trees; 900–3300 m. Anhui, ?Fujian, Guangdong, Guangxi, Hebei,

Henan, Hubei, Jiangsu, Jiangxi, Shandong, Shanxi, Sichuan, Taiwan, Xizang, NW Yunnan, Zhejiang [Japan].

There are three different populations with differing involucre widths:

1) Narrow-involucre population: Plants large; leaves to 28.5 cm wide; involucre narrowly cylindrical, 8–12 × 2–3 mm, phyllaries 5. Anhui, Jiangsu, Taiwan, Zhejiang [Japan].

2) Broad-involucre population: Plants robust, taller; leaves to 32 cm wide; raceme to 90 cm; involucre broadly tubular, 17–18 × 5–8 mm, phyllaries 5(–7). Guangdong, Guangxi, Jiangxi, Zhejiang.

3) Mid-sized involucre population: between populations 1 and 2 in size. C, N, SW China. The plants of Xizang and Yunnan are the smallest.

- 1a. Leaves glabrous ..... 120a. var. *stenocephala*  
 1b. Leaves shortly pilose on both surfaces, tip of petiole arachnoid-puberulent ..... 120b. var. *scabrida*

**120a. *Ligularia stenocephala* var. *stenocephala***

窄头橐吾(原变种) zhai tou tuo wu (yuan bian zhong)

*Senecio stenocephalus* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 16: 218. 1871; *Cacalia subglabra* C. C. Chang; *Ligularia oligantha* (Miquel) Handel-Mazzetti; *L. sibirica* (Linnaeus) Cassini var. *oligantha* Miquel; *L. sibirica* var. *stenocephala* (Maximowicz) Diels [“*stenoloba*”]; *L. stenocephala* f. *longipedicellata* Y. Ling; *L. stenocephala* f. *quinquebracteata* Yamamoto; *Parasenecio subglaber* (C. C. Chang) Y. L. Chen; *Senecillis stenocephala* (Maximowicz) Kitamura; *Senecio cacaliifolius* Schultz Bipontinus var. *stenocephalus* (Maximowicz) Franchet.

Leaves glabrous on both surfaces.

Stream banks, grassy slopes, forest understories, at base of rocks; 900–3300 m. Anhui, Guangdong, Guangxi, Hebei, Henan, Hubei, Jiangsu, Jiangxi, Shandong, Shanxi, Sichuan, Taiwan, Xizang, NW Yunnan, Zhejiang [Japan].

**120b. *Ligularia stenocephala* var. *scabrida*** Koidzumi, Bot. Mag. (Tokyo) 24: 264. 1910.

糙叶窄头橐吾 cao ye zhai tou tuo wu

Leaves shortly pilose on both surfaces, tip of petiole arachnoid-puberulent.

Grassy slopes, forest understories, on trees; 2000–3300 m. Guangxi, SW Sichuan, NW Yunnan [Japan].

**121. *Ligularia dolichobotrys*** Diels, Bot. Jahrb. Syst. 36(Beibl. 82): 107. 1905.

太白山橐吾 tai bai shan tuo wu

*Senecillis dolichobotrys* (Diels) Kitamura.

Stem erect, 20–80 cm tall, 2–3 mm in diam. at base, glabrous. Basal leaves petiolate; petiole to 15 cm, slender, glabrous, base narrowly sheathed; leaf blade cordate-hastate, 3–11 × 7–14 cm, glabrous, abaxially sometimes hairy only along veins, palmately veined, margin irregularly dentate, apex

rounded, mucronate; sinus ca. 1/3 as long as leaf blade, broad; basal lobes divergent, with a coarse triangular tooth on each outer margin. Middle stem leaves reniform, 4–6 × 5.5–11.5 cm, shortly petiolate; sheath enlarged. Distal stem leaves smaller, sessile. Synflorescence racemose, to 15 cm; leaflike and supplementary bracts subulate, 2–3 mm; peduncles 1.5–2 mm, shortly pilose or glabrous. Capitula numerous. Involucre narrowly cylindrical, 6–7 × ca. 2 mm, outside glabrous; phyllaries 4 or 5, in 2 rows, narrowly oblong, ca. 1.5 mm wide, apex obtuse, purplish brown; inner phyllaries membranous at margin. Ray florets 2 or 3, yellow; lamina oblong or narrowly oblanceolate, to 1 cm × 2–3 mm, apex rounded; tube ca. 5 mm. Tubular florets 2 or 3, 9–12 mm; tube 3–4 mm. Achenes narrowly cylindrical, ca. 4 mm. Pappus brown, as long as tube of tubular corolla. Fl. and fr. Jun–Aug.  $2n = 58^*$ .

• Stream banks, grassy slopes, forest understories, at base of rocks; 2000–3300 m. Henan, S Shaanxi (Qin Ling).

**122. *Ligularia kojimae*** Kitamura, Acta Phytotax. Geobot. 3: 135. 1934.

台湾橐吾 tai wan tuo wu

*Senecillis kojimae* (Kitamura) Kitamura.

Stem erect, ca. 30 cm tall, slender, ca. 2.5 mm in diam. at base, proximally glabrous, distal stem and synflorescence sparsely white arachnoid-puberulent. Basal leaves petiolate; petiole to 10 cm, base sheathed; leaf blade abaxially pale green, reniform, 2.3–3 × ca. 3.5 cm, glabrous, margin regularly denticulate, apex rounded; sinus broad or narrow. Middle stem leaves 1 or 2, reniform; petiolar base enlarged, sheath amplexicaul. Synflorescence racemose; leaflike bracts lanceolate, 8–12 mm; peduncles to 9 mm. Capitula ca. 11. Involucre cylindrical,

ca. 10 × 4 mm; phyllaries 5, in 2 rows, linear, apex pubescent. Ray florets 2 or 3, yellow; lamina ca. 13 × 1.5 mm, apex 3-divided; tube ca. 7 mm. Tubular florets ca. 6, ca. 1.2 cm. Achenes (immature) truncate at apex, narrowed at base. Pappus ca. 4 mm. Fl. and fr. Aug–Oct.

• Alpine areas; ca. 3000 m. Taiwan (Xinzhu).

**123. *Ligularia fargesii*** (Franchet) Diels, Bot. Jahrb. Syst. 29: 621. 1901.

矢叶橐吾 shi ye tuo wu

*Senecio fargesii* Franchet, Bull. Soc. Bot. France 39: 300. 1893; *Senecillis fargesii* (Franchet) Kitamura.

Stem erect, 24–70 cm tall, slender, 1.5–3 mm in diam. at base, glabrous. Basal leaves petiolate; petiole to 30 cm, slender, glabrous, base sheathed; leaf blade ovate- or cordate-hastate, 3.5–8 × 5–6 cm, glabrous, margin denticulate, apex rounded, mucronate; sinus ca. 1/3 as long as leaf blade, narrow; basal lobes divergent, coarsely 2- or 3-dentate on each outer margin. Middle stem leaves similar but smaller, shortly petiolate, sheath amplexicaul. Synflorescence racemose, 4.5–9 cm; leaflike and supplementary bracts linear; peduncles less than 3 mm, shortly pilose. Capitula ca. 11. Involucre narrowly cylindrical, 6–10 × 2–3 mm, outside glabrous; phyllaries 4 or 5, in 2 rows, oblong, apex triangular. Ray florets 2, yellow; lamina linear, ca. 15 × 1 mm, apex rounded; tube ca. 7 mm. Tubular florets ca. 3, 9–10 mm; tube ca. 4 mm. Achenes dark brown, cylindrical, ca. 6 mm. Pappus white, rarely blackish gray, ca. 3 mm, shorter than tube of tubular corolla. Fl. and fr. Jul–Sep.

• Forest understories, grassy slopes, at base of rocks; 1400–2700 m. Chongqing, W Hubei, S Shaanxi, E Sichuan.

**95. CREMANTHODIUM** Bentham, Hooker’s Icon. Pl. 12: 37. 1873.

垂头菊属 chui tou ju shu

Liu Shangwu (刘尚武); Irina D. Illarionova

Herbs, perennial. Rhizomes short, with rosette leaves, very rarely without rosette leaves. Roots fleshy, numerous. Stem arising from outer axil of rosette leaves, solitary, or 2- or 3-crowded, usually scapellike. Leaves all or many crowded and basal, petiolate; petiolar base broadly sheathed; leaf blade palmately, pinnately, or parallel veined. Stem leaves alternate, bracteate, with or without sheath. Capitula solitary or many in raceme, nodding; leaflike bracts linear, rarely broadly ovate or elliptic. Involucre hemispheric, rarely broadly campanulate, base rounded; phyllaries in 2 rows, imbricate, outer phyllaries narrow; inner phyllaries broad, often margin membranous, or phyllaries in 1 row, equal in size, base united; all phyllaries outside glabrous or hairy, apex ciliate. Receptacle flat, without scales. Outer florets female, radiate or rarely narrowly tubular; lamina well developed, diverse, usually several times as long as involucre, rarely absent. Central florets tubular, bisexual; limb 5-lobed. Anthers basally obtuse. Style branches compressed, apex obtuse or triangular, papillose-hairy. Achenes glabrous, ribbed. Pappus of denticulate hairs as long as or shorter than tubular corolla, rarely absent.

About 69 species: Bhutan, China, India, Kashmir, Myanmar, Nepal, Pakistan; 69 species (46 endemic) in China.

- 1a. Leaves reniform or orbicular-reniform, cordate-reniform, or hastate, palmately or palmate-pinnately veined.
- 2a. Capitula without ray florets; phyllaries apically rounded or obtuse.
- 3a. Phyllaries petaloid, membranous, purplish red or rarely yellowish white, broadly elliptic or obovate-oblong, outside purplish red pilose, rarely white pilose, apex rounded.
- 4a. Leaf margin regularly crenate or lobed ..... 1. *C. campanulatum*
- 4b. Leaves palmatisect ..... 2. *C. pinnatisectum*
- 3b. Phyllaries leaflike, herbaceous, dark brown, oblong or oblanceolate, outside glabrous or pilose, apex obtuse.

- 5a. Phyllaries oblong, margin broadly brown membranous, apex entire; pappus shorter than tubular corolla; leaves glabrous, abaxially pale green, adaxially dark green ..... 3. *C. calcicola*
- 5b. Phyllaries usually oblanceolate, margin not membranous, apex denticulate or erose; pappus as long as tubular corolla; leaves concolorous on both surfaces.
- 6a. Sheaths of stem leaves tubular, outside glabrous; phyllaries black, base shortly pilose, outside glabrous; pappus white ..... 4. *C. atrocapitatum*
- 6b. Sheaths of stem leaves cucullate, outside white arachnoid-puberulent; phyllaries outside glabrous; pappus yellowish brown ..... 5. *C. cucullatum*
- 2b. Capitula with ray florets; phyllaries apically acute or acuminate.
- 7a. Ray lamina yellow, oblong to lanceolate, apex acuminate, rarely obtuse.
- 8a. Ray lamina oblong, apex acute or obtuse.
- 9a. Leaves glabrous, with conspicuous white reticulate veins on both surfaces or at least abaxially; involucre outside initially shortly pilose, glabrescent; ray lamina apically obtuse ..... 6. *C. smithianum*
- 9b. Leaves abaxially brown pilose, without reticulate veins; involucre outside brown pilose; ray lamina apically acute ..... 7. *C. decaisnei*
- 8b. Ray lamina ovate- or linear-lanceolate, apex acuminate or caudate.
- 10a. Ray lamina linear-lanceolate, membranous, transparent; pappus as long as tubular corolla; leaves angular dentate ..... 8. *C. stenoglossum*
- 10b. Ray lamina ovate-lanceolate, not transparent; pappus shorter than to as long as tubular corolla; leaves crenate or coarsely dentate.
- 11a. Pappus brown, shorter than tubular corolla; leaves green on both surfaces, margin crenate ..... 9. *C. citriflorum*
- 11b. Pappus yellowish brown, as long as tubular corolla; leaves abaxially pale green, adaxially green, margin coarsely dentate ..... 10. *C. pulchrum*
- 7b. Ray lamina purplish red or yellow, broadly oblanceolate or cuneate, apex truncate or rounded, 3-lobed, rarely 3-denticulate.
- 12a. Ray lamina purple; pappus white.
- 13a. Leaves palmatipartite; tubular florets purplish red ..... 11. *C. palmatum*
- 13b. Leaf margin regularly crenate; tubular florets yellow or purplish red.
- 14a. Leaves abaxially densely white arachnoid-pilose; tubular florets yellow; styles proximally yellowish white, distally blackish gray, as long as tubular corolla ..... 12. *C. farreri*
- 14b. Leaves abaxially sparsely pilose; tubular florets purplish red, styles purplish red, 2–2.5 cm, longer than tubular corolla ..... 13. *C. rhocephalum*
- 12b. Ray lamina yellow; pappus white or brown.
- 15a. Leaves cordate-reniform or hastate.
- 16a. Stem simple; leaves hastate, leaf margin usually entire or sparsely irregularly dentate; pappus as long as tubular corolla ..... 18. *C. forrestii*
- 16b. Stems several; leaves cordate-reniform to hastate, leaf margin dentate; pappus shorter than tubular corolla.
- 17a. Leaves cordate-reniform; involucre ca. 20 mm; pappus brown, ca. 4 mm, much shorter than tubular corolla ..... 19. *C. medogense*
- 17b. Leaves cordate-reniform to hastate; involucre 30–32 mm; pappus yellowish, 7–8 mm, slightly shorter than tubular corolla ..... 20. *C. latilobum*
- 15b. Leaves reniform or orbicular-reniform.
- 18a. Plants slender; leaves thin, margin angular dentate; ray lamina apically rounded, denticulate; pappus white ..... 14. *C. reniforme*
- 18b. Plants robust; leaves thick, margin regularly dentate; ray lamina apically truncate, 3- or 4-lobed.
- 19a. Stem leaves with bulbil inside sheaths; pappus white ..... 15. *C. bulbiferum*
- 19b. Stem leaves without bulbil inside sheaths; pappus brown.
- 20a. Basal leaves glabrous; petiole glabrous or distally brown pilose; petiole of stem leaves enlarged into leaf blade, margin sharply dentate; pappus shorter than tubular corolla ..... 16. *C. phyllodineum*
- 20b. Basal leaves abaxially shortly black pilose along veins; petiole glabrous; petiole of stem leaves sheathlike, margin entire; pappus as long as tubular corolla ..... 17. *C. thomsonii*
- 1b. Leaves variable in shape, pinnately or parallel veined.
- 21a. Leaves bluish green or grayish green, linear to broadly elliptic, parallel or straight veined.
- 22a. Involucre outside densely brown or purplish brown pilose; leaves lanceolate to elliptic.
- 23a. Capitulum solitary, without ray florets ..... 21. *C. angustifolium*
- 23b. Capitula 1–13, in raceme or solitary, with ray florets; lamina membranous, transparent, linear-lanceolate, 25–70 × 1.5–5 mm, apex acuminate.
- 24a. Leaflike bracts linear to lanceolate, herbaceous, green ..... 22. *C. brunneopilosum*

- 24b. Leaflike bracts ovate, membranous, yellowish white ..... 23. *C. stenactinium*
- 22b. Involucre outside glabrous; leaves linear to oblanceolate.
  - 25a. Ray lamina linear-lanceolate, to 4 cm, apex acuminate or absent; leaves linear to linear-lanceolate, usually 2–5 mm wide, rarely to 30 mm wide ..... 24. *C. lineare*
  - 25b. Ray lamina oblong, elliptic, or oblanceolate, 12–16 × 3–6 mm, apex obtuse or truncate; leaves oblong or oblanceolate to linear, 2–11 mm wide.
    - 26a. Leaves linear, 2–3.5 mm wide, margin revolute, entire, apex rounded ..... 25. *C. bhutanicum*
    - 26b. Leaves oblong or oblanceolate, 6–11 mm wide, margin remotely denticulate, apex acute ..... 26. *C. conaense*
- 21b. Leaves green or differently colored on both surfaces, lanceolate to oblong, pinnately veined.
  - 27a. Ray lamina broadly oblanceolate or cuneate, apex truncate, lobed.
  - 28a. Leaves pinnatifid to pinnatisect.
    - 29a. Leaves ovate, lobes narrowly lanceolate, 10–30 × 1–4 mm; involucre glabrous ..... 27. *C. dissectum*
    - 29b. Leaves oblong, lobes oblong, 4–8 × ca. 1 mm; involucre blackish pilose ..... 28. *C. pinnatifidum*
  - 28b. Leaf margin entire or dentate, rarely lobed.
    - 30a. Leaves spatulate, margin triangularly dentate or denticulate, base truncate; pappus white; stem densely white pilose ..... 29. *C. sino-oblongatum*
    - 30b. Leaves hastate or ovate-cordate, margin entire to lobed or crenate, base cordate; pappus pale brown; stem glabrous ..... 30. *C. trilobum*
- 27b. Ray lamina elliptic or lanceolate to linear-lanceolate, apex acute or acuminate.
  - 31a. Plants greenish gray or bluish green, glabrous, usually mealy; stem leaves numerous, erect, adnate, tubular-amplexicaul or only base amplexicaul.
  - 32a. Leaflike bracts as leaf blade, usually surrounding involucre; ray lamina narrowly lanceolate, apex acuminate.
    - 33a. Leaves ovate-elliptic to broadly elliptic, base cuneate ..... 31. *C. helianthus*
    - 33b. Leaves narrowly elliptic or spatulate, base gradually narrowed ..... 32. *C. suave*
  - 32b. Leaflike bracts linear, not surrounding involucre.
    - 34a. Capitula 5–10, in raceme; ray lamina 5–7 mm, slightly longer than involucre; pappus pale yellow, 2–3 mm, ca. 1/2 as long as tubular corolla.
      - 35a. Basal leaves broadly elliptic, base gradually narrowed into a narrowly winged petiole; stem leaves apically obtuse ..... 33. *C. botryocephalum*
      - 35b. Basal leaves broadly spatulate-oblong, base gradually narrowed into a broadly winged petiole; stem leaves apically acuminate ..... 34. *C. spatulifolium*
  - 34b. Capitulum solitary; ray lamina longer than involucre; pappus white or pale yellow.
    - 36a. Leaves petiolate; petiole 3–11 cm, slender; leaf blade oblong or elliptic, base rounded.
      - 37a. Pappus white, as long as tubular corolla; ray lamina apically acuminate ..... 35. *C. glaucum*
      - 37b. Pappus much shorter than tubular corolla or absent; ray lamina apically obtuse, acute, or acuminate.
        - 38a. Pappus absent; ray lamina apically acuminate ..... 36. *C. bupleurifolium*
        - 38b. Pappus pale yellow, 1–2 mm, 1/5–1/2 as long as tubular corolla; ray lamina apically acute or obtuse ..... 37. *C. brachychaetum*
    - 36b. Leaves sessile or shortly petiolate; leaf blade ovate or lingulate-spatulate; ray lamina apically acuminate; pappus white, as long as tubular corolla.
      - 39a. Leaves lingulate-spatulate, base gradually narrowed into a broad petiole ..... 38. *C. lingulatum*
      - 39b. Leaves ovate or cordate, base cordate, narrowly petiolate.
        - 40a. Leaves ovate; petiole glabrous ..... 39. *C. yadongense*
        - 40b. Leaves cordate; petiole brown pilose ..... 40. *C. cordatum*
- 31b. Plants green, hairy, at least stem distally and involucre at base, rarely glabrous.
  - 41a. Phyllaries in 1 row, equal in size, base united, cupular.
    - 42a. Leaves 12–15 × 6–9 cm; petiole 15–30 cm; capitula 3, in corymb-raceme, long pedunculate; involucre outside black pilose; ray lamina linear-lanceolate ..... 41. *C. petiolatum*
    - 42b. Leaves 0.7–6 × 1–4 cm, shortly petiolate; capitulum solitary; involucre outside black or white pilose; ray lamina oblong.
      - 43a. Ray lamina as long as involucre or tubular florets; phyllaries apically rounded; leaves abaxially white pilose.
        - 44a. Outer florets radiate; lamina yellow, as long as involucre ..... 42. *C. nanum*
        - 44b. Outer florets radiate or narrowly tubular, as long as tubular florets in center; lamina white, smaller or absent; slender tubular florets with short corolla ..... 43. *C. microglossum*
      - 43b. Ray lamina longer than involucre; phyllaries apically acute or acuminate; leaves glabrous or abaxially pilose.

- 45a. Plants with rosette leaves; underground stems absent; leaves glabrous, margin revolute ..... 44. *C. microphyllum*
- 45b. Plants without rosette leaves; leaves all stem, abaxially densely white pilose, adaxially glabrous; underground stem rhizomelike, with scale leaves.
- 46a. Leaf margin entire to shallowly dentate ..... 45. *C. humile*
- 46b. Leaf margin pinnately lacinate; segments linear-oblong ..... 46. *C. laciniatum*
- 41b. Phyllaries in 2 rows, separate, outer narrow, inner broad, outside glabrous or hairy.
- 47a. Ray florets absent; involucre outside densely dark brown pilose; leaves abaxially greenish white, adaxially dark green, margin entire ..... 47. *C. discoideum*
- 47b. Ray florets present, if ray florets absent or with short lamina then involucre outside blackish gray pilose; leaf margin coarsely dentate.
- 48a. Capitula large; ray lamina tapelike, narrowly lanceolate to linear-lanceolate, usually 2–4 × as long as involucre, apex acuminate.
- 49a. Leaves densely hairy, oblong, obovate to orbicular; involucre outside white and black pilose.
- 50a. Leaves densely white pilose, base narrowed into a broadly winged petiole; capitula 1–4, solitary or in corymb-raceme ..... 48. *C. obovatum*
- 50b. Leaves densely shortly white pilose, base rounded, narrowly petiolate; capitulum solitary ..... 49. *C. puberulum*
- 49b. Leaves glabrous, variable in shape; involucre outside blackish purple-brown or white pilose, rarely glabrous.
- 51a. Leaf base cordate or truncate.
- 52a. Leaves ovate, base cordate, margin entire; ray lamina linear-lanceolate, 2–5 mm wide; pappus white ..... 50. *C. prattii*
- 52b. Leaves triangular or sagittate, margin dentate; ray lamina broadly lanceolate, 6–9 mm wide; pappus pale brown.
- 53a. Leaves concolorous on both surfaces, triangular, 6–13 cm, base truncate ..... 51. *C. delavayi*
- 53b. Leaves abaxially pale green, adaxially dark green, sagittate, 1.5–3 cm, base cordate ..... 52. *C. sagittifolium*
- 51b. Leaf base cuneate.
- 54a. Involucre outside purplish red or white pilose; stem glabrous; leaves abaxially pale green, adaxially green, broadly lanceolate, margin coarsely dentate ..... 53. *C. daochengense*
- 54b. Involucre outside brown or dark brown pilose; stem shortly black pilose; leaves glabrous or yellow pilose, obovate or broadly elliptic, margin subentire or denticulate.
- 55a. Leaves glabrous, margin subentire ..... 54. *C. nobile*
- 55b. Leaves yellow pilose, margin denticulate or subentire ..... 55. *C. pilosum*
- 48b. Capitula small; ray lamina oblong, elliptic to linear, often 1–2 × as long as involucre.
- 56a. Capitula 2–13, in raceme; stem leaves normal; plants robust, tall.
- 57a. Involucre outside black pilose; ray lamina broadly elliptic; stem leaves ovate ..... 56. *C. arnicoides*
- 57b. Involucre outside white pilose; ray lamina oblong; stem leaves oblong or ovate-oblong.
- 58a. Leaves herbaceous, white arachnoid-puberulent, scarcely veined; stem leaves with sheath amplexicaul; peduncles equal, to 1 cm; raceme not spreading ..... 57. *C. chungdienense*
- 58b. Leaves leathery, glabrous, prominently veined; stem leaves not amplexicaul; peduncles unequal, 2–6 cm; raceme spreading ..... 58. *C. coriaceum*
- 56b. Capitulum solitary, rarely 3; stem leaves bracteal, ovate-oblong to linear; plants dwarf.
- 59a. Pappus brown; leaf base cordate.
- 60a. Basal leaves ovate-cordate or ovate-lanceolate to lanceolate; involucre broadly campanulate; ray lamina linear ..... 59. *C. potaninii*
- 60b. Basal leaves ovate-cordate to orbicular-cordate or squarelike; involucre hemispheric; ray lamina oblong.
- 61a. Leaves small, leathery, nitid, conspicuously reticulate veined ..... 60. *C. cyclaminanthum*
- 61b. Leaves large, herbaceous, scarcely reticulate veined, abaxially glabrous or brown pilose along veins ..... 61. *C. principis*
- 59b. Pappus white; leaf base usually cuneate, truncate, or rounded, if base cordate then involucre outside shortly black pilose.
- 62a. Involucre outside shortly black pilose or glabrous; leaf base cordate or rounded; ray lamina slightly longer than involucre.
- 63a. Leaves thin, often purplish red, scarcely reticulate veined ..... 62. *C. purpureifolium*
- 63b. Leaves thick, green, conspicuously prominently reticulate veined.
- 64a. Basal leaves reticulate veined on both surfaces; capitula sometimes 3; ray lamina broadly elliptic ..... 63. *C. nervosum*
- 64b. Basal leaves abaxially reticulate veined; capitulum solitary; ray lamina oblong ..... 64. *C. nepalense*

- 62b. Involucre outside white or blackish gray pilose, rarely glabrous; leaf base usually cuneate, rarely truncate.
- 65a. Basal leaves narrowly petiolate; petiole densely pilose, not winged; stem leaves numerous, linear, erect, margin entire; involucre outside glabrous; ray lamina slightly longer than involucre, apex truncate ..... 65. *C. variifolium*
- 65b. Basal leaves broadly petiolate; petiole winged, glabrous or hairy, sometimes enlarged into a leaflike blade; stem leaves ovate-oblong to lanceolate, margin dentate; ray lamina 2–3 × as long as involucre, apex acute.
- 66a. Involucre outside glabrous, phyllaries narrowly lanceolate, apex acuminate ... 66. *C. pseudo-oblongatum*
- 66b. Involucre outside densely hairy, phyllaries lanceolate or ovate-lanceolate, apex acute or obtuse.
- 67a. Involucre outside white arachnoid-puberulent ..... 67. *C. oblongatum*
- 67b. Involucre outside blackish gray pilose.
- 68a. Leaves and petiole glabrous ..... 68. *C. ellisii*
- 68b. Leaves and petiole densely glandular pilose ..... 69. *C. glandulipilosum*

**1. Cremanthodium campanulatum** Diels, Notes Roy. Bot. Gard. Edinburgh 5: 190. 1912.

钟花垂头菊 zhong hua chui tou ju

Stems solitary, rarely 2, erect, purplish red, 10–30 cm tall, 2–3 cm in diam., proximally glabrous, distally purple pilose. Basal leaves petiolate; petiole 6–12 cm, purple pilose, base sheathed; leaf blade reniform, 0.7–2.5 × 1–5 cm, glabrous, sometimes abaxially purple, pilose, margin purple pilose, shallowly crenate or lobed; lobes 7–12, with white prominent palmate veins on both surfaces. Middle stem leaves shortly petiolate, base sheathed; leaf blade smaller, reniform. Distal stem leaves ovate or lanceolate, margin sharply dentate, without sheaths. Capitulum solitary, nodding. Involucre campanulate, 1.5–2.8 × 1.5–4.5 cm, outside blackish purple pilose or glabrous, but base hairy; phyllaries 10–14, in 2 rows, purplish red, rarely yellowish white, petaloid, obovate-oblong or broadly elliptic, 0.7–2.5 cm, thin, submembranous, conspicuously veined, margin subentire, ciliate, outside sometimes pilose, apex rounded or rarely acute. Florets numerous, all tubular, purplish red, 6–8 mm; tube ca. 2 mm; styles extending from corolla, slender; style branches blackish purple papillate. Achenes brown, cuneate, 3–5 mm, slightly compressed, apex truncate, with denticulate corona. Pappus white or brown, as long as or shorter than tubular corolla. Fl. and fr. May–Sep.

Forest understories, forest margins, grassy slopes, scrub, alpine meadows, gravelly areas on mountains; 3200–4800 m. Sichuan, SE Xizang, NW and W Yunnan [NE Myanmar].

- 1a. Phyllaries yellowish white, outside long white pilose ..... 1c. var. *flavidum*
- 1b. Phyllaries purplish red.
  - 2a. Leaves abaxially shortly pilose; phyllaries outside shortly black pilose; pappus brown, much shorter than tubular corolla .... 1b. var. *brachytrichum*
  - 2b. Leaves glabrous; phyllaries outside blackish purple pilose or glabrous; pappus white, as long as corolla ..... 1a. var. *campanulatum*

**1a. Cremanthodium campanulatum** var. **campanulatum**

钟花垂头菊(原变种) zhong hua chui tou ju (yuan bian zhong)

*Senecio campanulatus* Franchet, Bull. Soc. Bot. France 39: 284. 1892, not Schultz Bipontinus ex Klatt (1888); *Cremanthodium larium* Handel-Mazzetti; *C. wardii* W. W. Smith.

Leaves glabrous. Phyllaries purplish red, outside glabrous. Pappus white, as long as tubular corolla.

Forest understories, forest margins, grassy slopes, scrub, alpine meadows, gravelly areas on mountains; 3200–4800 m. SW and W Sichuan, SE Xizang, NW Yunnan [NE Myanmar].

**1b. Cremanthodium campanulatum** var. **brachytrichum** Y. Ling & S. W. Liu, Acta Biol. Plateau Sin. 1: 52. 1982.

短毛钟花垂头菊 duan mao zhong hua chui tou ju

Leaves abaxially shortly pilose. Phyllaries purplish red, outside shortly black pilose. Pappus brown, much shorter than tubular corolla.

- Gravelly areas on mountains; ca. 4300 m. W Yunnan.

**1c. Cremanthodium campanulatum** var. **flavidum** S. W. Liu & T. N. Ho, Acta Phytotax. Sin. 39: 558. 2001.

黄苞钟花垂头菊 huang bao zhong hua chui tou ju

Leaves glabrous. Phyllaries yellowish white, outside long white pilose. Pappus white, as long as tubular corolla.

- Gravelly areas on mountains; 3800–4500 m. Sichuan (Muli).

**2. Cremanthodium pinnatisectum** (Ludlow) Y. L. Chen & S. W. Liu, Acta Biol. Plateau Sin. 3: 65. 1984.

裂叶垂头菊 lie ye chui tou ju

*Cremanthodium campanulatum* Diels var. *pinnatisectum* Ludlow, Bull. Brit. Mus. (Nat. Hist.), Bot. 5: 279. 1976.

Stem solitary, erect, 6–13 cm tall, yellowish brown pilose. Basal leaves petiolate; petiole 2–5 cm, glabrous; leaf blade subreniform, 1.5–4 × 2–4.5 cm, glabrous, 2-ternate-palmatisect or sometimes pinnatisect; lobes lanceolate, 4–6 mm, apex acute, mucronate. Middle stem leaves smaller, pinnatisect. Distal stem leaves linear, margin entire or dentate. Distalmost stem leaves bracteal, linear, margin entire. Capitulum solitary, nodding. Involucre campanulate, 1.2–1.7 × 1.5–3.5 cm, outside purple pilose; phyllaries 8–12, in 2 rows, blackish purple, petaloid, ob-

long or suborbicular, 5–15 mm, submembranous, apex rounded or obtuse. Florets numerous, all tubular, purple, ca. 6 mm; tube ca. 1.5 mm; limb narrowly cylindrical. Pappus pale brown, as long as tubular corolla. Fl. Jul–Aug, fr. Aug–Sep.

Grassy slopes; ca. 4200 m. SE Xizang, NW Yunnan [NE Myanmar].

**3. *Cremanthodium calcicola*** W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 12: 201. 1920.

长鞘垂头菊 chang qiao chui tou ju

Stem solitary, erect, 20–50 cm tall, to 7 mm in diam. at base, proximally glabrous, distalmost shortly yellowish brown pilose. Basal leaves petiolate; petiole 5–13 cm, to 5 mm wide, base sheathed; sheath 6–9 cm, submembranous, not split and fibriform when dry; leaf blade abaxially green, adaxially dark green, orbicular-reniform or reniform, 6–8 cm in diam., palmately veined, abaxially with prominent veins, glabrous, margin regularly crenate, apex of teeth mucronate; sinus narrow. Stem leaves 1 or 2; middle leaves reniform, petiolate, base sheathed; distal leaves sessile, bracteal, ovate-oblong, without sheath. Capitulum solitary, nodding. Involucre hemispheric, 1.1–1.3 × 2.5–3 cm, outside blackish purple, glabrous; phyllaries 20, in 2 rows, oblong, 2–5 mm wide, margin entire, apex obtuse or acute; inner phyllaries broadly membranous at margin. Florets numerous, all tubular, yellow, ca. 6 mm; tube ca. 2 mm; limb cylindrical. Achenes oblong, to 6 mm. Pappus pale brown, slightly shorter than tubular corolla. Fl. and fr. Jun–Jul.

• Grassy slopes, stream banks, calcitic cliffs; 3400–3500 m. NW Yunnan.

**4. *Cremanthodium atrocipitatum*** R. D. Good, J. Linn. Soc., Bot. 48: 282. 1929.

黑垂头菊 hei chui tou ju

Stem solitary, erect, 15–35 cm tall, proximally glabrous, distally black pilose. Basal leaves petiolate; petiole 10–13 cm, glabrous, sheath amplexicaul; leaf blade reniform, 3–5 × 3.5–9 cm, glabrous, abaxially with conspicuous palmate veins, margin regularly triangular-dentate; sinus slightly broad. Stem leaf solitary, bracteal, ovate, ca. 1.5 cm, base enlarged sheathed; sheath to 6 × 1–2 cm, amplexicaul. Capitulum solitary, nodding. Involucre dark purple or black, hemispheric, ca. 1 × to 2 cm, base shortly black pilose, outside glabrous; phyllaries in 2 rows, often oblanceolate, apex obtuse, sparsely denticulate or erose; inner phyllaries 3–4 mm wide. Florets numerous, all tubular, deep yellowish brown, 6–7 mm; tube 2–2.5 mm; limb ca. 2 mm wide. Achenes yellowish brown, cylindrical, ca. 5 mm. Pappus white, as long as tubular corolla. Fl. Jul–Aug, fr. Aug–Sep.

Grassy slopes; ca. 4000 m. Yunnan (Zhongdian) [NE Myanmar].

**5. *Cremanthodium cucullatum*** Y. Ling & S. W. Liu, Acta Biol. Plateau Sin. 1: 53. 1982.

兜鞘垂头菊 dou qiao chui tou ju

Stem solitary, erect, 20–25 cm tall, 1.5–2 mm in diam. at base, white arachnoid-pilose, distally intermixed yellowish brown pilose. Basal leaves petiolate; petiole to 8 cm, hairy,

sheath amplexicaul; leaf blade reniform, 1–1.5 × 1.5–2.7 cm, both surfaces white arachnoid-pilose or adaxially glabrescent, palmately veined, margin regularly denticulate, apex rounded. Stem leaves 2 or 3, smaller distally. Middle stem leaves reniform; petiole enlarged into a cucullate sheath, white arachnoid-puberulent, amplexicaul. Distal stem leaves bracteal, lanceolate to linear. Capitulum solitary, nodding. Involucre hemispheric, 0.9–1 × ca. 2 cm, outside dark brown, glabrous, base hairy; phyllaries 12–24, in 2 rows, oblanceolate, 2–4 mm wide, apex erose. Florets numerous, all tubular, yellow, 5–6 mm; tube 1.5–2 mm; limb campanulate. Achenes brown, obovoid, 3–4 mm. Pappus yellowish brown, as long as tubular corolla. Fl. and fr. Aug.

• Grassy slopes; ca. 3500 m. W Yunnan.

**6. *Cremanthodium smithianum*** (Handel-Mazzetti) Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 14. 1925.

紫茎垂头菊 zi jing chui tou ju

*Cathcartia smithiana* Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 60: 182. 1923; *Cremanthodium acernuum* R. D. Good; *C. heterocephalum* Y. L. Chen; *Mecoposis smithiana* (Handel-Mazzetti) Taylor ex Handel-Mazzetti.

Stem solitary, erect, 10–25 cm tall, ca. 3 mm in diam. at base, proximally glabrous, distally shortly white and brown pilose. Basal leaves long petiolate; petiole purplish red, 2–15 cm, base sheathed, distally shortly purplish red pilose or glabrous; leaf blade purplish red, reniform, 0.5–5 × 1.2–7 cm, glabrous, abaxially rarely initially shortly pilose, palmately veined, with white prominent reticulate veins on both surfaces, margin regularly denticulate, apex rounded or retuse. Middle to distal stem leaves 1 or 2, smaller, shortly petiolate or sessile, reniform to linear-lanceolate. Capitulum solitary, nodding or suberect. Involucre hemispheric, 0.8–1.6 × 1.5–2.5 cm, outside initially shortly pilose, glabrescent; phyllaries 12–14, in 2 rows, outer phyllaries lanceolate, apex acute or acuminate; inner phyllaries oblong or narrowly oblanceolate, to 5 mm wide, margin broadly membranous, apex acute or obtuse. Ray florets yellow; lamina oblong, 1–2 cm × 3–5 mm, apex obtuse, entire or lobed; tube ca. 1 mm. Tubular florets numerous, yellow, 6–9 mm; tube ca. 2 mm; limb cylindrical. Achenes oblanceolate, ca. 4 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Sep.

Grassy slopes, stream banks, gravelly areas on mountains, alpine meadows; 3000–5200 m. SW Sichuan, SE Xizang, NW Yunnan [Myanmar].

**7. *Cremanthodium decaisnei*** C. B. Clarke, Compos. Ind. 168. 1876.

喜马拉雅垂头菊 xi ma la ya chui tou ju

*Cremanthodium decaisnei* f. *clarkei* R. D. Good; *C. decaisnei* f. *sinense* R. D. Good; *Senecio renatus* Franchet.

Stem solitary, erect, 6–25 cm tall, 1.5–3 mm in diam. at base, proximally glabrous, distally densely brown pilose. Basal leaves long petiolate; petiole 3–14 cm, glabrous, base narrowly sheathed; leaf blade reniform or orbicular-reniform, 0.5–4.5 × 0.9–5 cm, abaxially densely brown pilose, rarely glabrescent,

adaxially glabrous, palmately veined, margin irregularly shallowly crenate, rarely lobed, apex rounded. Middle to distal stem leaves 1 or 2, petiolate or sessile, smaller, with leaf blade or not. Capitulum solitary, nodding. Involucre hemispheric or rarely campanulate, 0.7–1.5 × 1–2 cm, outside densely brown pilose or sometimes glabrescent; phyllaries 8–12, in 2 rows, apex acuminate, mucronate; outer phyllaries narrowly lanceolate; inner phyllaries oblong-lanceolate, margin broadly membranous. Ray florets yellow; lamina narrowly elliptic or oblong, 1–2 cm × 3–6 mm, apex acute, rarely acuminate, 3-denticulate. Tubular florets numerous, dark yellow, 5–7 mm; tube 1–2 mm. Achenes brown, oblong, 3–7 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Sep.

Grassy slopes, gravelly areas on mountains, alpine meadows; 3500–5400 m. SW Gansu, SW Qinghai, SW Sichuan, Xizang, NW Yunnan [Bhutan, India (Sikkim), Kashmir, Nepal].

**8. *Cremanthodium stenoglossum*** Y. Ling & S. W. Liu, Acta Biol. Plateau Sin. 1: 55. 1982.

狭舌垂头菊 xia she chui tou ju

Stem solitary, erect, scapelike, 10–32 cm tall, 1.5–3 mm in diam. at base, proximally glabrous, distally white floccose and shortly brown pilose. Basal leaves petiolate; petiole glabrous, 2.6–11.5 cm, base enlarged sheathed; leaf blade orbicular-reniform or reniform, 0.7–2 × 1.5–4 cm, glabrous, palmately veined, margin angular-dentate, white pilose; sinus narrow, basal lobes convergent, subsucculent. Proximal stem leaf solitary, shortly petiolate or sessile, smaller, broadly reniform, base sheathed, margin coarsely angularly dentate. Middle to distal stem leaves absent or bracteal and oblong. Capitulum solitary, nodding. Involucre hemispheric, 1.3–1.6 × 2 cm, outside glabrous; phyllaries 9–14, in 2 rows, purple; outer phyllaries narrowly lanceolate, 1.5–2 mm wide; inner phyllaries oblong, 3–5 mm wide, margin brown ciliate, apex acuminate or acute, mucronate. Ray florets yellow; lamina linear-lanceolate, 2.5–3.5 cm, ca. 5 mm wide at base, membranous, transparent, with 6 or 7 brown veins, apex long acuminate, 3-lobed. Tubular florets numerous, yellow, 7–9 mm; tube ca. 3 mm; limb 2–2.5 mm wide. Achenes cylindrical, ca. 7 mm, ribbed. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Aug.  $2n = 58^*$ .

• Swamps, stream banks, scrub, alpine meadows, alpine crevices, gravelly areas on mountains; 3700–5000 m. W Qinghai, NW Sichuan.

**9. *Cremanthodium citriflorum*** R. D. Good, J. Linn. Soc., Bot. 48: 277. 1929.

柠檬色垂头菊 ning meng se chui tou ju

Stem solitary, erect, 25–42 cm tall, ca. 4 mm in diam. at base, proximally glabrous, distally white arachnoid-pilose. Basal leaves petiolate; petiole ca. 11.5 cm, glabrous, base enlarged sheathed; sheath to 6 cm; leaf blade green on both surfaces, reniform, ca. 5 × to 6 cm, glabrous, palmately veined, margin minutely crenate and ciliate, apex rounded; sinus broad. Middle to distal stem leaves only enlarged sheathed; sheath 4–7 × to 4 cm, glabrous, margin obtusely dentate. Capitulum solitary, nodding. Involucre black when dry, hemispheric, ca. 2 × to 2.5 cm, outside glabrous, base pilose; phyllaries 12, in 2 rows, purple,

apex obtuse or acute; outer phyllaries lanceolate or oblong, 4–6 mm wide; inner phyllaries broadly elliptic, 7–10 mm, margin broadly membranous. Ray florets yellow or lemon-colored; lamina ovate-lanceolate, 4–5 cm, base to 1 cm wide, with brown veins, apex caudate-acuminate, 3-lobed; tube 4–5 mm. Tubular florets numerous, yellowish brown, 8–10 mm; tube ca. 2 mm; limb campanulate-tubular, ca. 3 mm wide. Achenes fusiform, 6–7 mm, narrowed at both ends, ribbed. Pappus brown, shorter than tubular corolla. Fl. and fr. Aug.

Alpine meadows; 3600–4000 m. NW Yunnan [Myanmar].

**10. *Cremanthodium pulchrum*** R. D. Good, J. Linn. Soc., Bot. 48: 274. 1929.

美丽垂头菊 mei li chui tou ju

Stem solitary, erect, 15–40 cm tall, slender, ca. 2 mm in diam. at base, proximally glabrous, distally white and brown pilose. Basal leaves petiolate; petiole 8–12 cm, slender, glabrous, base enlarged sheathed; leaf blade abaxially pale green, adaxially green, reniform or ovate-cordate, 1.2–2 × 2.7–3 cm, glabrous, palmately veined, with conspicuous reticulate veins, margin coarsely triangular- or orbicular-dentate, apex rounded or subrounded. Middle to distal stem leaf solitary, bracteal, ovate-lanceolate, ca. 1.5 cm. Capitulum solitary, nodding. Involucre hemispheric, ca. 1 × to 1.5 cm, outside initially white and brown pilose, glabrescent; phyllaries 10–12, in 2 rows, blackish purple, oblong or elliptic, 3–5 mm wide, apex obtuse or acute; inner phyllaries broadly membranous at margin. Ray florets yellow; lamina ovate-lanceolate, to 2.5 cm, ca. 7 mm wide at base, apex acuminate, 3-lobed. Tubular florets numerous, 4–5 mm; tube ca. 1 mm; limb funnelform, ca. 2.5 mm wide. Achenes (immature) obovoid, ca. 2 mm. Pappus initially white, later yellowish brown, as long as tubular corolla. Fl. Jul–Sep, fr. Aug–Sep.

Grassy slopes, stream banks; ca. 4000 m. NW Yunnan [Myanmar].

**11. *Cremanthodium palmatum*** Benthams, Hooker's Icon. Pl. 12: 38. 1873.

掌叶垂头菊 zhang ye chui tou ju

*Cremanthodium palmatum* var. *benthamii* R. D. Good; *Senecio benthamianus* Franchet.

Stem solitary, erect, to 25 cm tall, proximally glabrous, distally purplish brown pilose. Basal leaves long petiolate, reniform, 1.3–2.5 cm in diam., palmately veined, palmatipartite; lobes 6–12, oblong, glabrous or abaxially sparsely purplish red pilose, very rarely purplish brown pilose on both surfaces, apex mucronate. Middle to distal stem leaves petiolate or sessile, reniform to linear. Capitulum solitary, nodding. Involucre hemispheric, 3.8–6.3 cm in diam., outside glabrous, base blackish purple pilose; phyllaries in 2 rows, oblong or lanceolate, ca. 1.5 cm, margin membranous, apex obtuse. Ray florets purplish red; lamina broadly oblanceolate, apex subtruncate, 2–4-lobed; tube shorter. Tubular florets numerous, purplish red. Achenes short. Pappus white, as long as tubular corolla. Fl. and fr. Jun–Sep.

Alpine meadows, gravelly areas on mountains; 3000–4000 m. S Xizang [Bhutan, India (Sikkim)].

**12. *Cremanthodium farreri*** W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 12: 202. 1920.

红花垂头菊 hong hua chui tou ju

Stem solitary, erect, 30–47 cm tall, 3–4 mm in diam. at base, densely initially white arachnoid-puberulent, proximally glabrescent. Basal leaves petiolate; petiole to 21 cm, slender, white arachnoid-puberulent, base sheathed; leaf blade reniform, 1.5–3.5 × 2.5–6 cm, abaxially white arachnoid-pilose, adaxially glabrous, palmately veined, abaxially with prominent veins, margin regularly shallowly crenate, tips of teeth mucronate, apex rounded. Middle stem leaves smaller, reniform; petiole enlarged into a leaf blade, abaxially white arachnoid-puberulent, base cordate, semiamplexicaul, margin denticulate. Distal stem leaves sessile, broadly ovate, base semiamplexicaul, margin dentate. Capitulum solitary, nodding. Involucre hemispheric, 1.5–2 × 3–4 cm, outside blackish purple, glabrous; phyllaries 12–14, in 2 rows, 3–4 mm wide, apex acute, mucronate and white ciliate; outer phyllaries lanceolate; inner phyllaries ovate-lanceolate or elliptic, margin broadly membranous. Ray florets purplish red; lamina oblanceolate, 2.5–3 × ca. 1 cm, apex obtuse, denticulate; tube ca. 1.5 mm. Tubular florets numerous, yellow, ca. 8 mm; tube ca. 1 mm; limb campanulate-cylindric; styles slightly extending from corolla, proximally yellowish white, distally blackish gray. Achenes yellowish brown, cuneate, 4–6 mm, ribbed. Pappus white, as long as tubular corolla. Fl. and fr. Aug–Sep.

Alpine meadows, gravelly slopes; 4000–4600 m. W Yunnan [Myanmar].

**13. *Cremanthodium rhodocephalum*** Diels, Notes Roy. Bot. Gard. Edinburgh 5: 190. 1912.

长柱垂头菊 chang zhu chui tou ju

*Cremanthodium gracillimum* W. W. Smith; *C. palmatum* Benth. var. *rhodocephalum* (Diels) R. D. Good; *C. sherriffii* H. R. Fletcher.

Stem solitary, erect, 8–33 cm tall, densely purplish red pilose. Stem leaves crowded in middle to proximal part of stem, petiolate; petiole 2–12 cm, pilose, semiamplexicaul; leaf blade abaxially purplish red, adaxially green, reniform, 0.7–4 × 1–6 cm, abaxially sparsely white pilose, adaxially glabrous, palmately veined, with prominent veins on both surfaces, margin regularly crenate, tips of teeth mucronate. Middle to distal stem leaves shortly petiolate, without sheath; leaf blade orbicular-reniform to linear, margin dentate or entire. Capitula solitary or few, on apex of stem or branches, nodding. Involucre hemispheric, 1–1.5 × 1.5–3 cm, outside long purplish red pilose; phyllaries 10–16, in 2 rows, oblong-lanceolate, 3–5 mm wide, apex acute or acuminate; inner phyllaries broadly white membranous at margin. Ray florets purplish red; lamina oblanceolate, 1.5–2 cm × 5–8 mm, apex rounded or truncate, 2- or 3-lobed; tube ca. 5 mm; styles purplish red, to 3 cm. Tubular florets numerous, purplish red, 1–1.2 cm; tube ca. 1.5 mm; limb cylindrical; styles purplish red, 2–2.5 cm. Achenes oblong, ca. 5 mm. Pappus white, slightly shorter than tubular corolla. Fl. and fr. Jun–Sep.

• Alpine meadows, grassy slopes, forest margins, gravelly areas on mountains; 3000–5000 m. SW Sichuan, SE Xizang, NW Yunnan.

**14. *Cremanthodium reniforme*** (Candolle) Benth. Hooker's Icon. Pl. 12: 37. 1873.

肾叶垂头菊 shen ye chui tou ju

*Ligularia reniformis* Candolle, Prodr. 6: 315. 1838.

Stem solitary, erect, 30–40 cm tall, ca. 3 mm in diam. at base, proximally glabrous, distally purplish brown pilose. Basal leaves petiolate; petiole 6–17 cm, slender, glabrous, base sheathed; leaf blade reniform, orbicular-reniform, or cordate-reniform, 2–3.5 × 2.5–7 cm, thin, soft, glabrous, palmate veins prominent abaxially, margin angular-dentate and ciliate, apex rounded. Stem leaves 1 or 2, smaller, proximal leaves shortly petiolate, base enlarged sheathed; leaf blade reniform, distal ones with only sheath. Capitulum solitary, nodding. Involucre hemispheric, 1–1.5 × 2–2.5 cm, outside black pilose; phyllaries 10–12, in 2 rows, 4–6 mm wide, apex acute; outer phyllaries lanceolate; inner phyllaries oblong, margin membranous. Ray florets yellow; lamina oblanceolate, 1.5–2 cm × 4–8 mm, apex rounded, denticulate; tube ca. 1 mm. Tubular florets numerous, deep yellow, 6–7 mm; tube ca. 1 mm; limb campanulate. Achenes brown, cuneate, 4–5 mm. Pappus white, slightly shorter than corolla. Fl. and fr. Aug.

Alpine meadows, forest margins; 3300–4500 m. S Xizang, NW Yunnan [Bhutan, India (Sikkim), Nepal].

**15. *Cremanthodium bulbiferum*** W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 12: 201. 1920.

珠芽垂头菊 zhu ya chui tou ju

Stems 1 or 2, erect, 8–25 cm tall, ca. 3 mm in diam. at base, proximally glabrous, often purplish red, distally shortly black pilose. Basal leaves long petiolate; petiole 4–10 cm, glabrous, base sheathed; leaf blade abaxially purple, reniform or broadly reniform, 1–2.5 × 1.2–5 cm, glabrous, palmate veins prominent abaxially, margin shallowly crenate, apex rounded or retuse. Stem leaves 3 or 4, reniform, smaller distally, distal most stem leaves with only sheath; sheath cucullate, inside with bulbil, black, ovate, ca. 4 mm. Capitulum solitary, nodding or semierect. Involucre hemispheric, 1–1.2 × 1.5–2 cm, outside dark brown pilose; phyllaries in 2 rows, oblong or linear-oblong, apex acute; inner phyllaries broader, 3–5 mm wide, margin broadly membranous. Ray florets yellow; lamina oblanceolate, 1.2–1.8 cm × 3–5 mm, apex truncate, 3- or 4-lobed; tube ca. 4 mm. Tubular florets numerous, yellow, ca. 8 mm; tube ca. 2 mm; limb cylindrical. Achenes oblong, ca. 3 mm. Pappus white, as long as tubular corolla. Fl. and fr. Aug–Oct.

• Grassy slopes, rocky slopes; 3000–4000 m. SE Xizang, NW Yunnan.

**16. *Cremanthodium phyllodineum*** S. W. Liu, Acta Biol. Plateau Sin. 3: 60. 1984.

叶状柄垂头菊 ye zhuang bing chui tou ju

Stem solitary, erect, 35–60 cm tall, 2–4 mm in diam. at base, proximally glabrous, distally dark brown pilose. Basal leaves long petiolate; petiole 10–24 cm, base sheathed, glabrous or distally brown pilose; leaf blade reniform or triangular-reniform, 3.5–7 × 4–8.5 cm, glabrous, palmate veins prominent abaxially, margin regularly crenate or coarsely dentate, apex

rounded. Stem leaves 1–3, proximal to middle leaves petiolate, proximal part of petiole enlarged into a blade, thus whole leaf dumbbell-shaped and larger than distal stem leaves, margin irregularly sharply dentate. Distal stem leaves ovate, lobed. Capitulum solitary, nodding. Involucre hemispheric, 1–1.5 × 2.5–3 cm, outside black pilose; phyllaries 12, in 2 rows, 3–7 mm wide, apex acute, ciliate; outer phyllaries lanceolate; inner phyllaries ovate, margin broadly membranous. Ray florets yellow; lamina broadly oblanceolate, 2–2.5 cm × 8–10 mm, apex truncate, 3- or 4-lobed; tube ca. 1 mm. Tubular florets numerous, 7–8 mm, apex brown; tube ca. 1.5 mm; limb narrowly cylindrical. Achenes (immature) 2–3 mm. Pappus pale brown, shorter than tubular corolla. Fl. Jul–Aug.

• Alpine meadows, wet grassy slopes; 3700–4200 m. SE Xizang, NW Yunnan.

**17. *Cremanthodium thomsonii*** C. B. Clarke, Compos. Ind. 169. 1876.

叉舌垂头菊 cha she chui tou ju

*Senecio nephelagetus* Franchet.

Stem solitary, erect, 25–50 cm tall, ca. 3 mm in diam. at base, proximally glabrous, distally dark brown pilose. Basal leaves long petiolate; petiole 10–15 cm, glabrous, base narrowly sheathed; leaf blade reniform or orbicular-reniform, 2–4 × 3–5.5 cm, abaxially sparsely shortly black pilose along veins, adaxially glabrous, palmate veins prominent abaxially, margin shallowly crenate or coarsely dentate. Middle stem leaf solitary, petiolate; petiolar base with entire sheath; leaf blade smaller, reniform. Distal stem leaves 1 or 2, sessile, linear-lanceolate, margin entire. Capitulum solitary, nodding. Involucre hemispheric, 1–1.5 × 1.5–2.5 cm, outside brown pilose or glabrous; phyllaries 10–14, in 2 rows, 3–7 mm wide, apex acute; outer phyllaries narrower, lanceolate, 3–4 mm wide; inner phyllaries broader, oblong, 4–6 mm wide, margin brown membranous. Ray florets yellow; lamina broadly oblanceolate or cuneate, 1.6–2.3 cm × 6–9 mm, apex truncate, 3-lobed; lobes 2–4 mm; tube ca. 1 mm. Tubular florets numerous, yellow, 7–10 mm; tube 1.5–2 mm; limb cylindrical. Achenes yellowish brown, cuneate, 4–5 mm. Pappus brown, proximal part dark brown, as long as tubular corolla. Fl. and fr. Jun–Aug.

Alpine meadows, grassy slopes, forest understories, gravelly areas on mountains; 3500–4800 m. SE Xizang, NW Yunnan [Bhutan, India (Sikkim), Nepal].

**18. *Cremanthodium forrestii*** Jeffrey, Notes Roy. Bot. Gard. Edinburgh 5: 191. 1912.

矢叶垂头菊 shi ye chui tou ju

*Cremanthodium lobatum* Grierson.

Stem solitary, erect, 10–30 cm tall, slender, 1–2 mm in diam. at base, proximally glabrous, distally white pilose. Basal leaves petiolate; petiole 2–17 cm, slender, glabrous, base narrowly sheathed; leaf blade greenish gray, hastate, 0.8–5 × 1.5–7.5 cm, glabrous or abaxially sparsely white pilose, veins ternate, palmate or palmate-pinnate, prominent abaxially, margin

entire or sparsely irregularly dentate, rarely lobed, apex acute or acuminate; lobes oblong or suborbicular; basal lobes divergent, sharply triangular. Stem leaves 1 or 2; proximal one hastate, smaller; middle to distal one sessile, linear-oblong, 1–1.5 cm × ca. 2 mm. Capitulum solitary, nodding. Involucre hemispheric, 1–1.5 × 1.5–2 cm, base yellowish brown pilose, outside glabrous; phyllaries 8–10, in 2 rows; outer phyllaries lanceolate, 2–3 mm wide, apex acuminate, sometimes caudate; inner phyllaries ovate-lanceolate, 5–6 mm wide, margin brown membranous, apex acute. Ray florets yellow; lamina oblanceolate, 1.4–2.2 cm × 6–7 mm, with brown veins, apex truncate, 3-lobed; tube ca. 1.5 mm. Tubular florets numerous, yellow, 6–7 mm; tube ca. 1 mm. Achenes yellowish brown, oblong, ca. 5 mm. Pappus brown, as long as tubular corolla. Fl. and fr. Jul–Oct.

• Grassy slopes, alpine meadows; 3500–4000 m. ?Xizang, NW Yunnan.

**19. *Cremanthodium medogense*** Y. S. Chen, Nordic J. Bot. 28: 757. 2010.

墨脱垂头菊 mo tuo chui tou ju

Stems caespitose, erect, 18–38 cm tall, slender, 1.5–2 mm in diam. at base, glabrous. Basal leaves numerous, petiolate; petiole 5–19 cm, slender, glabrous, base narrowly sheathed; leaf blade cordate-reniform, 1.2–3.5 × 1.8–5.2 cm, abaxially glabrous, veins palmate-pinnate, margin coarsely dentate, with (11–)16–20 teeth in mature leaves, apex acute. Stem leaves 2 or 3; proximal leaves ovate, shortly petiolate; middle leaves sessile, linear-oblong, 10–23 × 2–4 mm; distal leaves usually 3, subulate, 2–5(–7) mm. Capitulum solitary, nodding. Involucre hemispheric, 1.5–2 × 1.2–1.5 cm, base yellowish brown pilose, outside glabrous; phyllaries 8, in 2 rows; outer phyllaries lanceolate-oblong, 2–2.5 mm wide, apex acuminate; inner phyllaries ovate-lanceolate, 5–6 mm wide, margin brown membranous, apex acute. Ray florets yellow, 8–10; lamina oblong, 20–23 × 9–13 mm, with brown veins, apex truncate, 3-lobed; lobes 3–5 × 3–4 mm; tube ca. 2 mm; style 8–10 mm; stigma black. Tubular florets numerous, yellow, 6–7 mm; style 10–12 mm. Achenes cylindrical, 4–5 mm. Pappus brown, 3.5–4 mm, shorter than tubular corolla. Fl. Aug.

• Alpine thickets and meadows; 3700–4200 m. SE Xizang (Médog).

**20. *Cremanthodium latilobum*** Y. S. Chen, Nordic J. Bot. 28: 756. 2010.

宽裂垂头菊 kuan lie chui tou ju

Stems several, erect, 30–40 cm tall, glabrous. Basal leaves petiolate; petiole 8–14 cm, slender, glabrous, base slightly sheathed; leaf blade green, cordate-reniform to hastate, 4–5 × 5.2–6.5 cm, thin, glabrous, veins palmate-pinnate, prominent abaxially, margin angular-dentate, apex acute. Stem leaves usually 3(or 4), sessile, ovate to triangular-cordate, 4–5.2 × 2.6–3.5 cm, base auriculate; distal leaves ovate, 7–9 × 3–5 mm. Capitulum solitary, nodding. Involucre hemispheric, 3–3.2 × 1.6–1.8 cm, almost glabrous; phyllaries 10–12, in 2 rows; outer phyllaries lanceolate, 15–16 × 4–5 mm, apex acuminate; inner phyllaries oblong-ovate, 15–16 × 7–8 mm, margin reddish membranous, apex acute. Ray florets yellow; lamina obovate-cuneate,

2–2.4 × 1.6–1.8 cm, apex truncate, usually 3-lobed; lobes 3–5 × 5–8 mm; tube ca. 2 mm. Tubular florets numerous, brownish yellow, 10–11 mm; tube ca. 2 mm; limb campanulate; style pale yellow, ca. 2 cm, stigma black. Achenes obovoid, ca. 3 mm. Pappus yellowish, 7–8 mm, slightly shorter than tubular corolla. Fl. Aug.

• Moist meadows around small lakes surrounded by bamboo thickets; 3600–3700 m. NW Yunnan (Fugong: Gaoligong Shan).

**21. *Cremanthodium angustifolium*** W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 12: 200. 1920.

狭叶垂头菊 xia ye chui tou ju

Stem solitary, erect, purplish red, 20–50 cm tall, 3–5 mm in diam. at base, proximally glabrous, distally purplish brown pilose. Basal leaves lanceolate to narrowly lanceolate, 7–23 cm × 3–45 mm, parallel veined, glabrous, base narrowed into a winged petiole, margin entire, apex acute or acuminate. Middle to distal stem leaves 4 or 5, smaller distally, narrowly lanceolate to linear, base semiamplexicaul. Capitula solitary or rarely 2, nodding. Involucre hemispheric, 0.7–1.5 × 1.3–3.2 cm, outside densely purplish brown pilose; phyllaries 16–24, in 2 rows, lanceolate, 2–4 mm wide, apex acuminate; inner phyllaries narrowly membranous at margin. Florets numerous, yellow, all tubular, 7–8 mm; tube 2–3 mm; limb cylindrical. Achenes brown, cylindrical, 5–6 mm, ribbed. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Oct.

• Alpine swamps, stream banks, scrub; 3200–4800 m. SW Sichuan, SE Xizang, NW Yunnan.

**22. *Cremanthodium brunneopilosum*** S. W. Liu, Acta Biol. Plateau Sin. 3: 63. 1984 [*“brunneo-pilosum”*].

褐毛垂头菊 he mao chui tou ju

Plants grayish green or bluish green. Stem solitary, erect, to 100 cm tall, to 1.5 cm in diam. at base, proximally glabrous, distally white and brown pilose. Basal leaves numerous, broadly petiolate; petiole 6–15 × 1.5–2.5 cm, pinnate-parallel or parallel veined, glabrous, base broadly sheathed; leaf blade narrowly elliptic to lanceolate, 6–40 × 2–8 cm, abaxially shortly pilose along veins, adaxially glabrous, base cuneate, narrowed into a petiole, margin entire or minutely denticulate, apex acute. Middle to distal stem leaves 4 or 5, smaller distally, elliptic, base sheathed. Distalmost stem leaves bracteal, lanceolate, apex acuminate. Capitula 1–13, in raceme, rarely solitary, nodding; peduncles 1–9 cm, brown pilose. Involucre hemispheric, 1.2–1.6 × 1.5–2.5 cm, outside densely brown pilose; leaflike bracts green, lanceolate to linear, herbaceous; phyllaries 10–16, in 2 rows, lanceolate or oblong, 3–5 mm wide, apex long acuminate; inner phyllaries brown membranous at margin. Ray florets yellow; lamina linear-lanceolate, 25–60 × 2–5 mm, membranous, translucent, apex long acuminate or caudate; tube 5–7 mm. Tubular florets numerous, brownish yellow, 8–10 mm; tube ca. 2 mm; limb narrowly cylindrical. Achenes yellowish brown, cylindrical, ca. 5 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jun–Sep.  $2n = 58^*$ .

• Alpine swamp meadows, stream banks and associated meadows; 3000–4300 m. SW Gansu, W Qinghai, NW Sichuan, NE Xizang.

**23. *Cremanthodium stenactinium*** Diels, Repert. Spec. Nov. Regni Veg. Beih. 12: 510. 1922.

膜苞垂头菊 mo bao chui tou ju

*Cremanthodium stenactinium* var. *evillosum* Handel-Mazetti.

Plants grayish green or bluish green. Stem solitary, erect, 40–50 cm tall, ca. 1.1 cm in diam. at base, middle to proximal part glabrous, distalmost part brown pilose. Basal leaves broadly petiolate; petiole 4–8 cm, to 2.5 cm wide, glabrous, base broadly sheathed; leaf blade oblong or elliptic, 6–15 × 2–6 cm, pinnate-parallel or parallel veined, glabrous, base narrowed into a petiole, margin entire, apex acute or obtuse. Stem leaves 5 or 6, erect; middle to proximal stem leaves oblong, 4–8 cm, tubular-amplexicaul, apex obtuse, mucronate; distalmost stem leaves bracteal, membranous, apex obtuse. Capitula 1–13, in raceme, rarely solitary, nodding; peduncles 0.5–8 cm, brown pilose; leaflike bracts yellowish white, ovate, membranous. Involucre hemispheric, 1.3–1.5 × 1.5–3 cm, outside brown pilose or glabrescent; phyllaries 12–16, in 2 rows, elliptic or oblong, 6–8 mm wide, apex acute or acuminate; inner phyllaries broadly membranous at margin. Ray florets pale yellow; lamina linear-lanceolate, 3–7 cm × 1.5–2.5 mm, apex long acuminate; tube ca. 5 mm. Tubular florets numerous, yellow, ca. 1 cm; tube ca. 3 mm. Achenes yellowish brown, cylindrical, ca. 5 mm. Pappus white, as long as tubular corolla. Fl. Jul–Sep.

• Grasslands, stream banks; ca. 3600 m. NW Sichuan, NE Xizang.

**24. *Cremanthodium lineare*** Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 482. 1882.

条叶垂头菊 tiao ye chui tou ju

Plants bluish green. Stems 1(–4), erect, to 45 cm tall, 1–3 mm in diam. at base, glabrous or distalmost part sparsely white pilose. Basal leaves broadly shortly petiolate or sessile, linear or linear-lanceolate, to 23 cm × 2.5–5(–30) mm, parallel veined, glabrous, base narrowed, margin entire, apex acute. Stem leaves numerous, bracteal, lanceolate to linear. Capitulum solitary, nodding. Involucre hemispheric, 1–1.2 × 1–2.5 cm, outside blackish gray, glabrous or base sparsely pilose; phyllaries 12–14, in 2 rows, lanceolate or ovate-lanceolate, 2–4 mm wide, margin narrowly membranous, apex acute, white ciliate. Ray florets sometimes absent, pale yellow; lamina yellow or purplish red, linear-lanceolate, to 4 cm × 2–3 mm, apex long acuminate; tube ca. 2 mm. Tubular florets numerous, yellow, 5–7 mm; tube 1.5–2 mm. Achenes yellowish brown, oblong, 2–3 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Oct.  $2n = 58^*$ .

• Alpine meadows, stream banks, swamp meadows, scrub; 2400–4800 m. SW Gansu, Qinghai, NW Sichuan, E Xizang.

- 1a. Capitulum without ray florets ..... 24c. var. *eligulatum*
- 1b. Capitulum with ray florets.
  - 2a. Ray lamina yellow ..... 24a. var. *lineare*
  - 2b. Ray lamina purplish red ..... 24b. var. *roseum*

**24a. Cremanthodium lineare** var. **lineare**

条叶垂头菊(原变种) tiao ye chui tou ju (yuan bian zhong)

*Senecio armeriifolius* Franchet (1892), not Philippi (1891).

Ray lamina yellow.

• Alpine meadows, stream banks, swamp meadows, scrub; 2400–4800 m. SW Gansu, Qinghai, NW Sichuan, E Xizang.

**24b. Cremanthodium lineare** var. **roseum** Handel-Mazzetti, *Acta Horti Gothob.* 12: 307. 1938.

红花条叶垂头菊 hong hua tiao ye chui tou ju

Ray lamina purplish red.

• Alpine meadows, scrub; 3900–4300 m. NW Sichuan.

**24c. Cremanthodium lineare** var. **eligulatum** Y. Ling & S. W. Liu, *Acta Biol. Plateau Sin.* 1: 54. 1982.

无舌条叶垂头菊 wu she tiao ye chui tou ju

Capitulum without ray florets.

• Alpine meadows, stream banks; 4000–4600 m. NW Sichuan.

**25. Cremanthodium bhutanicum** Ludlow, *Bull. Brit. Mus. (Nat. Hist.)*, Bot. 5: 278. 1976.

不丹垂头菊 bu dan chui tou ju

Plants bluish green. Stem solitary, erect, 10–25 cm tall, 1–2 mm in diam. at base, glabrous or distalmost part sparsely white arachnoid-puberulent. Basal leaves petiolate; petiole 1–2 cm, glabrous, base sheathed; leaf blade abaxially grayish green, adaxially green, linear, linear-lanceolate, or linear-oblong, 1.5–8 cm × 2–3.5 mm, parallel veined, glabrous, base narrowed into a petiole, margin entire, revolute, apex rounded. Middle to distal stem leaves linear, 1.5–2.5 cm, apex obtuse. Capitulum solitary, nodding. Involucre hemispheric, ca. 1 × 1.5 cm, outside glabrous; phyllaries 12, in 2 rows, lanceolate or narrowly lanceolate, 2–3 mm wide, margin narrowly membranous, apex acute, white ciliate. Ray florets yellow; lamina elliptic, 1.2–1.4 cm × 4–6 mm, with brown veins, apex obtuse. Tubular florets numerous, yellow, 5–6 mm; tube ca. 1 mm. Achenes (immature) ca. 2 mm. Pappus white, as long as tubular corolla. Fl. Aug.

Alpine meadows; ca. 4300 m. SE Xizang [Bhutan, ?NE India].

**26. Cremanthodium conaense** S. W. Liu, *Acta Biol. Plateau Sin.* 3: 56. 1984.

错那垂头菊 cuo na chui tou ju

Plants bluish grayish green. Stem solitary, erect, 10–15 cm tall, 1–1.5 mm in diam. at base, proximally glabrous, distalmost part white and blackish gray pilose. Basal leaves petiolate; petiole 1–3 cm, glabrous, base sheathed; leaf blade abaxially grayish green, adaxially green, oblong or oblanceolate, 1.5–5 × 0.6–1.1 cm, glabrous, pinnate-parallel veined, margin revolute, denticulate, apex acute. Middle to distal stem leaves 3 or 4, oblong to linear, to 2.5 cm, base semiamplexicaul. Capitulum solitary, nodding. Involucre purplish red, hemispheric, 8–11 mm × to 2.5 cm, outside glabrous, base black and white pilose; phyllaries 10–12, in 2 rows, lanceolate or oblong, 2.5–3.5 mm

wide, white ciliate, apex acute; inner phyllaries brown membranous at margin. Ray florets yellow; lamina oblong or oblanceolate, 1.2–1.6 cm × 3–4 mm, with 6 or 7 brown veins, apex subtruncate, 3-dentate; tube ca. 3 mm. Tubular florets numerous, yellow, ca. 6 mm; tube ca. 2 mm. Achenes (immature) 2–3 mm. Pappus white, as long as tubular corolla. Fl. Jul–Aug.

• Alpine meadows, mountain summits; 4300–4600 m. SE Xizang.

**27. Cremanthodium dissectum** Grierson, *Notes Roy. Bot. Gard. Edinburgh* 22: 431. 1958.

细裂垂头菊 xi lie chui tou ju

Stem solitary, erect, 25–40 cm tall, slender, 1.5–2 mm in diam. at base, proximally glabrous, distally brown pilose. Basal leaves long petiolate; petiole 3.5–13 cm, slender, glabrous, base sheathed; leaf blade ovate, 1.5–4 × 2–6 cm, glabrous, pinnately veined, subpinnatisect; lobes narrowly lanceolate, 1–3 cm × 1–4 mm, apex acuminate, mucronate. Middle stem leaves fewer, pinnatisect or linear. Capitulum solitary, nodding. Involucre hemispheric, 1.2–1.4 × 1.5–2 cm, outside glabrous; phyllaries 10–12, in 2 rows, oblong-lanceolate, 3–5 mm wide, margin brown membranous, apex acuminate, white ciliate. Ray florets yellow; lamina oblanceolate, 1.5–1.7 cm × 6–9 mm, apex truncate, 3-lobed. Tubular florets numerous, yellow, 7–9 mm; tube ca. 1 mm. Achenes (immature) ca. 3 mm. Pappus brown, 6–7 mm, slightly shorter than tubular corolla. Fl. and fr. Aug–Sep.

• Grassy slopes; ca. 3000 m. NW Yunnan.

**28. Cremanthodium pinnatifidum** Bentham, *Hooker's Icon. Pl.* 12: 39. 1873.

羽裂垂头菊 yu lie chui tou ju

*Senecio himalayensis* Franchet.

Stem solitary, erect, 8–15 cm tall, proximally glabrous, distally black pilose. Basal leaves shortly petiolate; petiole to 4 cm, base enlarged sheathed; leaf blade oblong, 1.8–5 cm, glabrous, pinnately veined, irregularly pinnatipartite; lobes 5–12 pairs, oblong, 4–8 × ca. 1 mm, margin 1- or 2-dentate. Middle to distal stem leaf absent or solitary, bracteal, base sheathed, distally lobed. Capitulum solitary, nodding. Involucre hemispheric, ca. 8 × 12 mm, outside densely black pilose; phyllaries in 2 rows, oblong, lanceolate, or ovate, ca. 1 cm × to 6 mm, apex acute or obtuse; inner phyllaries membranous at margin. Ray florets yellow; lamina oblong, to 1 cm × 4–7 mm, apex truncate, deeply dentate. Tubular florets numerous, yellow, ca. 6 mm; tube ca. 1 mm. Pappus white, as long as tubular corolla. Fl. Aug.

Alpine rocky places; 4300–4600 m. SE Xizang [Bhutan, India (Sikkim), Nepal].

**29. Cremanthodium sino-oblongatum** R. D. Good, *J. Linn. Soc., Bot.* 48: 288. 1929.

铲叶垂头菊 chan ye chui tou ju

Stem solitary, erect, often purplish red, 15–25 cm tall, 1.5–2.5 mm in diam. at base, distally branched or simple, densely white arachnoid-pilose. Basal leaves petiolate; petiole 2–4 cm, white pilose, base sheathed; leaf blade spatulate, 2–5 × 1.5–4

cm, abaxially sparsely white pilose, adaxially glabrous, pinnate veins prominent abaxially, base truncate or shallowly cordate, margin triangular-dentate or denticulate, apex rounded. Stem leaves numerous, sessile or shortly petiolate, spatulate to linear, smaller distally, not amplexicaul. Capitulum usually solitary, very rarely solitary at apex of branch, nodding. Involucre hemispheric, 1.5–1.7 × 2.5–3.5 cm, outside white pilose; phyllaries 14–18, in 2 rows, lanceolate, apex acute. Ray florets yellow; lamina oblanceolate, 1.3–1.6 cm, apex truncate, lobed; tube ca. 2 mm. Tubular florets numerous, yellow, ca. 6 mm; tube ca. 1 mm. Achenes yellowish brown, cylindrical, 3–4 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Sep.

- Grassy slopes, scrub; 3900–5000 m. NW Yunnan.

**30. *Cremanthodium trilobum*** S. W. Liu, Acta Biol. Plateau Sin. 3: 61. 1984.

裂舌垂头菊 lie she chui tou ju

Stem solitary, erect, 12–15 cm tall, slender, 1.5–2 mm in diam. at base, proximally glabrous, distally brown pilose. Basal leaves petiolate; petiole 2.5–9 cm, slender, glabrous, base sheathed; leaf blade abaxially pale green or purplish red when dry, adaxially dark green, ovate or ovate-cordate, 1.5–5.5 × 1–4.5 cm, thick, nitid, glabrous, white pinnate veins prominent abaxially, base shallowly cordate or subtruncate, margin crenate-dentate, apex rounded. Stem leaves smaller distally, proximal leaves shortly petiolate, sheath amplexicaul, leaf blade ovate; distal stem leaves sessile, bracteal, linear. Capitulum solitary, nodding. Involucre hemispheric, 1.2–1.4 × to 2 cm, outside glabrous, base brown pilose; phyllaries 12–14, in 2 rows, lanceolate, 2–4 mm, white ciliate, apex acuminate; inner phyllaries membranous at margin. Ray florets yellow; lamina broadly oblanceolate, 2–3 cm × 7–9 mm, apex truncate, 3-lobed; tube ca. 2 mm. Tubular florets numerous, yellow, 8–10 mm; tube ca. 1.5 mm. Pappus pale brown, slightly shorter than tubular corolla. Fl. and fr. Aug.

- Rocky slopes; 3700–4300 m. SE Xizang.

**31. *Cremanthodium helianthus*** (Franchet) W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 14: 289. 1924.

向日垂头菊 xiang ri chui tou ju

*Senecio helianthus* Franchet, Bull. Soc. Bot. France 39: 286. 1892.

Plants grayish green, mealy. Stem solitary, erect, 7–56 cm tall, 2–4 mm in diam. at base, glabrous. Basal leaves petiolate; petiole 1–12 cm, slender, glabrous, base long sheathed; leaf blade ovate-elliptic to broadly elliptic, 3–15 × 1.2–9 cm, glabrous, pinnately veined, base cuneate, margin entire, apex obtuse. Stem leaves 6–8, sessile, erect, adnate, tubular-amplexicaul. Capitulum solitary, nodding; leaflike bracts several, ovate-lanceolate or broadly elliptic, 1.5–2.5 × to 1.5 cm, grayish green, glabrous, margin entire, usually surrounding capitulum. Involucre hemispheric, 1–1.5 × 2–2.5 cm, outside glabrous, grayish green or blackish gray when dry; phyllaries 12–20, in 2 rows, lanceolate or ovate-lanceolate, 3–7 mm wide, apex acute or acuminate. Ray florets yellow; lamina narrowly lanceolate, to 3.5 cm × 3–4 mm, apex acuminate or caudate, 3-lobed; tube

ca. 2 mm. Tubular florets numerous, yellow, 6–7 mm; tube ca. 1 mm; limb cylindrical. Achenes pale brown, oblong, 3–5 mm, ribbed. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Nov.

- Forest understories, scrub, grassy slopes, alpine meadows; 2800–4500 m. SW Sichuan, NW Yunnan.

**32. *Cremanthodium suave*** W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 12: 203. 1920.

木里垂头菊 mu li chui tou ju

Plants grayish green, mealy. Stem solitary, erect, 20–40 cm tall, 2–4 mm in diam. at base, glabrous. Basal leaves petiolate; petiole to 6 cm, glabrous, with narrow wings, base sheathed; leaf blade narrowly elliptic or narrowly spatulate, 10–18 × to 2.5 cm, thick, succulent, glabrous, pinnately veined, base gradually narrowed into petiole, margin entire, apex acute or obtuse. Stem leaves 4–6, sessile, bracteal, lanceolate, 2–9 cm, smaller distally. Capitulum solitary, nodding; leaflike bracts 5 or 6, grayish green, ovate or ovate-lanceolate, to 1.5 × 1.2 cm, apex acute, glabrous. Involucre hemispheric, ca. 1 × to 2.5 cm, outside glabrous; phyllaries in 2 rows, lanceolate or ovate-lanceolate, 3–5 mm wide, apex acuminate. Ray florets yellow; lamina linear-lanceolate, to 3 cm, apex acuminate. Tubular florets numerous, yellow, ca. 8 mm; tube ca. 3 mm. Achenes (immature) oblong, 3–5 mm. Pappus white, ca. 4 mm, shorter than tubular corolla. Fl. Jul–Aug, fr. Aug–Sep.

- Forest understories, grassy slopes, alpine meadows; 3000–4300 m. SW Sichuan, NW Yunnan.

**33. *Cremanthodium botryocephalum*** S. W. Liu, Acta Biol. Plateau Sin. 3: 55. 1984 [*“botryocephalum”*].

总状垂头菊 zong zhuang chui tou ju

Plants grayish green, mealy. Stem solitary, erect, 50–55 cm tall, 4–5 mm in diam. at base, proximally glabrous, distally white puberulent and brown pilose. Basal leaves petiolate; petiole 5–6 cm, slender, glabrous, winged; leaf blade broadly elliptic or oblong, 10–11 × 4–7 cm, pinnately veined, glabrous, base narrowed into a petiole, margin entire, apex obtuse. Stem leaves 7–9, smaller distally; middle leaves sessile, broadly elliptic or oblong, to 8 × 5 cm, base rounded, semiamplexicaul, margin entire, apex obtuse. Distal stem leaves lanceolate to linear, erect, adnate, base semiamplexicaul. Capitula 5 or 6, in lax raceme, nodding; peduncles 1–2 cm, white puberulent and brown pilose. Involucre nearly hemispheric, 6–8 × ca. 10 mm, outside glabrous, base hairy; phyllaries 8–10, in 2 rows, oblong, 3–4 mm wide, ciliate, apex acute; inner phyllaries broadly membranous at margin. Ray florets yellow; lamina elliptic, 5–6 × ca. 4 mm, apex obtuse, 2- or 3-dentate; tube ca. 1 mm. Tubular florets numerous, ca. 5 mm, apex dark brown; tube ca. 1 mm. Achenes (immature) oblong, ca. 4 mm. Pappus pale yellow, 2–3 mm, shorter than tubular corolla. Fl. Jul.

- Grassy slopes; ca. 3100 m. S Xizang.

**34. *Cremanthodium spathulifolium*** S. W. Liu, Acta Biol. Plateau Sin. 3: 56. 1984.

匙叶垂头菊 shi ye chui tou ju

*Cremanthodium hirtiflorum* S. W. Liu.

Plants grayish green, mealy. Stem solitary, erect, to 100 cm tall, 4–5 mm in diam. at base, proximally glabrous, distally shortly white pilose. Basal leaves petiolate; petiole 5–12 cm, glabrous, base sheathed; leaf blade oblong-spatulate, 10–15 × 4–7.5 cm, glabrous, pinnately veined, base gradually narrowed into a winged petiole, margin entire, apex rounded or obtuse. Middle to distal stem leaves 6 or 7, erect, adnate, sessile, smaller distally, oblong to lanceolate, base semiamplexicaul, apex acuminate. Capitula ca. 10, in raceme, nodding; peduncles to 3 cm, shortly white pilose. Involucre hemispheric, 6–7 × ca. 10 mm, outside glabrous; phyllaries 13, in 2 rows, 1.5–3 mm wide, apex acuminate, ciliate; outer phyllaries lanceolate; inner phyllaries oblong, margin white membranous. Ray florets yellow, lamina oblong, ca. 7 × 2 mm, apex acute; tube ca. 1 mm. Tubular florets numerous, ca. 5 mm; tube ca. 1.5 mm. Achenes pale brown, obovoid, ca. 5 mm, ribbed. Pappus pale yellow, 2–3 mm, shorter than tubular corolla. Fl. and fr. Sep.

- Scrub; ca. 2900 m. S Xizang.

**35. *Cremanthodium glaucum*** Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 641. 1937.

## 灰绿垂头菊 hui lü chui tou ju

Plants grayish green, mealy. Stem solitary, erect, 12–40 cm tall, ca. 3 mm in diam. at base, proximally glabrous, distally white puberulent. Basal leaves petiolate; petiole 3–7 cm, slender, glabrous, base sheathed; leaf blade oblong or elliptic, 2.5–14 × 1.4–7.3 cm, glabrous, pinnately veined, abaxially prominent, base cuneate or subtruncate, margin entire, apex rounded or acute. Stem leaves 4–6, sessile, oblong to lanceolate, base amplexicaul, margin entire, apex acute or acuminate. Capitulum solitary, nodding. Involucre hemispheric, 1–1.2 × 1.5–2 cm, outside glabrous, grayish green; phyllaries 12–14, in 2 rows, lanceolate or ovate-lanceolate, 3–5 mm wide, white ciliate, apex acute; inner phyllaries membranous at margin. Ray florets yellow; lamina lanceolate, 1.5–2 cm × 3–4 mm, apex acuminate; tube ca. 1 mm. Tubular florets numerous, yellow, ca. 6 mm; tube ca. 1 mm. Achenes dark brown, oblong, ca. 5 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Oct.

- Grassy slopes, alpine meadows; 3400–4000 m. NW Yunnan.

**36. *Cremanthodium bupleurifolium*** W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 8: 112. 1913.

## 柴胡叶垂头菊 chai hu ye chui tou ju

Plants grayish green, mealy. Stem solitary, erect, 20–40 cm tall, 2–3 mm in diam. at base, proximally glabrous, distally black pilose. Basal leaves long petiolate; petiole 5–11 cm, glabrous; leaf blade grayish green, elliptic to oblong, 3.5–11 × 1.5–4.5 cm, glabrous, pinnately veined, base cuneate or subtruncate, margin entire or slightly denticulate, apex rounded or acute. Stem leaves 2–4, sessile, obovate-oblong to oblanceolate, erect, adnate, base amplexicaul. Capitulum solitary, nodding. Involucre black, hemispheric, 7–10 × ca. 15 mm, outside glabrous, base black pilose; phyllaries in 2 rows, 3–7 mm wide, apex acute; outer phyllaries linear to lanceolate; inner phyllaries oblong or oblanceolate, margin membranous. Ray florets yellow; lamina lanceolate, 7–15 × ca. 4 mm, apex acuminate; tube

1.5–2 mm. Tubular florets numerous, yellow, ca. 6 mm; tube ca. 1 mm. Achenes brown, oblong, ca. 4 mm. Pappus absent. Fl. Jun–Aug.

- Grassy slopes, gravelly places; 3500–4100 m. SW Sichuan, SE Xizang, NW Yunnan.

**37. *Cremanthodium brachychaetum*** C. C. Chang, Acta Phytotax. Sin. 1: 322. 1951.

## 短缨垂头菊 duan ying chui tou ju

Plants grayish green, mealy. Stem solitary, erect, 25–35 cm tall, proximally glabrous, distally black pilose. Basal leaves petiolate; petiole 5–11 cm, slender, glabrous; leaf blade oblong or elliptic, 2–5 × 1–3 cm, glabrous, pinnately veined, base cuneate or truncate, margin sparsely dentate, apex obtuse. Stem leaves 3, sessile, erect, adnate, oblong, 2.5–4 × ca. 1.5 cm, base semiamplexicaul. Capitulum 1(or 2), nodding; peduncles 4–9 cm, black pilose. Involucre hemispheric, 8–10 × ca. 15 mm, outside black, glabrous; phyllaries in 2 rows, oblong, 2–4 mm wide, apex acute; inner phyllaries membranous at margin. Ray florets yellow; lamina oblong, 1.1–1.3 cm × to 6 mm, apex obtuse or acute, 2- or 3-dentate; tube ca. 1 mm. Tubular florets numerous, yellowish brown, ca. 5 mm; tube ca. 1 mm; limb ca. 2 mm wide. Achenes oblanceolate, ca. 5 mm. Pappus yellowish white, 1–2 mm, shorter than tubular corolla. Fl. Jul–Aug.

- Grassy slopes; ca. 3500 m. NW Yunnan.

**38. *Cremanthodium lingulatum*** S. W. Liu, Acta Biol. Plateau Sin. 3: 57. 1984.

## 舌叶垂头菊 she ye chui tou ju

Plants grayish green, mealy. Stem solitary, erect, 25–56 cm tall, 2–3 mm in diam. at base, glabrous. Basal leaves petiolate; petiole 2–5 cm, narrowly winged, base narrowly sheathed; leaf blade oblong or lingulate-spatulate, 2.5–10 × 1.5–3 cm, glabrous, pinnately veined, base cuneate, gradually narrowed into petiole, margin entire or denticulate, apex rounded. Stem leaves 3–5, erect, adnate, tubular-amplexicaul; leaf blade obovate-oblong or oblong, 2.5–5.5 cm, apex rounded. Capitulum solitary, nodding. Involucre hemispheric, ca. 1.5 × to 2 cm, outside glabrous, blackish gray when dry; phyllaries 10–14, in 2 rows; outer phyllaries lanceolate, 2–3 mm wide, apex acuminate; inner phyllaries oblong, 4–7 mm wide, apex acute or obtuse. Ray florets yellow; lamina linear-lanceolate, 2.5–3 cm × 2–2.5 mm, apex acuminate; tube 4–5 mm. Tubular florets numerous, blackish gray when dry, 5–6 mm; tube to 1.5 mm. Achenes yellowish brown, cylindrical, ca. 5 mm. Pappus white, as long as tubular corolla. Fl. Jul–Aug.

- Scrub, alpine meadows; 2800–5000 m. SE Xizang, NW Yunnan.

**39. *Cremanthodium yadongense*** S. W. Liu, Acta Biol. Plateau Sin. 3: 62. 1984.

## 亚东垂头菊 ya dong chui tou ju

Plants gray-green, mealy. Stem solitary, erect, 25–56 cm tall, 2–3 mm in diam. at base, lower part glabrous, upper part brown pilose. Basal leaves petiolate; petiole 1–3 cm, glabrous and mealy, base narrowly sheathing; leaf blade ovate, 3–6 × 2.5–4.5 cm, glabrous, pinnately veined, base cordate, cuneate,

margin entire or denticulate, apex obtuse. Stem leaves 1–3, erect, adnate, tubular-amplexicaul. Capitulum solitary, nodding. Involucre hemispherical, 1–1.3 mm, to 2.5 cm wide, outside glabrous, base brown pilose, black-gray when dry; phyllaries 14–20, in 2 rows, oblong or lanceolate, 3–5 mm wide, apex acuminate; inner phyllaries with brown margin. Ray florets yellow; lamina lanceolate, 15–20 × 3–6 mm, apex acuminate; tube ca. 2 mm. Tubular florets numerous, yellow-brown, ca. 7 mm; tube to 1 mm; limb tubular, ca. 2 mm wide. Achenes cylindrical, ca. 4 mm. Pappus white, as long as corolla. Fl. Jul, fr. Aug.

• Grassy slopes, alpine meadows; 4000–4800 m. Xizang (Yadong).

**40. *Cremanthodium cordatum*** S. W. Liu, Acta Biol. Plateau Sin. 7: 28. 1988.

心叶垂头菊 xin ye chui tou ju

Plants grayish green. Stem solitary, erect, 15–25 cm tall, shortly white and black pilose. Basal leaves petiolate; petiole 1–2.5 cm, brown pilose; leaf blade cordate or ovate-cordate, rarely oblong-cordate, 2–8.5 × 1.6–7 cm, abaxially viscid-pilosulose, adaxially glabrous, pinnately veined, base cordate, margin entire or crenate and pilose, apex rounded. Stem leaves 3 or 4, bracteal, linear. Capitulum solitary, nodding. Involucre black when dry, hemispheric, 1–1.2 × 1.5–2 cm, outside glabrous, base black pilose; phyllaries in 2 rows, linear-oblong, apex acute. Ray florets yellow; lamina oblong, 1–1.2 cm × ca. 2 mm, apex 2- or 3-lobed; tube ca. 3 mm. Tubular florets numerous, dark yellow, ca. 6 mm; tube ca. 1 mm. Achenes yellowish brown, cylindrical, 4–5 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Aug.

• Grasslands in valleys; ca. 4200 m. S Xizang.

**41. *Cremanthodium petiolatum*** S. W. Liu, Acta Biol. Plateau Sin. 3: 64. 1984.

长柄垂头菊 chang bing chui tou ju

Stem solitary, erect, to 55 cm tall, 4.5–5 mm in diam. at base, proximally glabrous, distally black pilose. Basal leaves petiolate; petiole 15–30 cm, glabrous, base sheathed, proximally purplish red; leaf blade broadly elliptic, 12–15 × 6–9 cm, glabrous, both surfaces with conspicuous pinnate veins, base broadly cuneate, margin coarsely sharply dentate, apex rounded. Stem leaves smaller distally, proximal leaves petiolate or sessile; sheath to 5 cm, tubular; leaf blade obovate-oblong, to 10 × 4 cm, margin shallowly sharply dentate, apex rounded; upper leaves sessile, without sheath, oblong, base semiamplexicaul, margin sharply dentate. Capitula 3, in corymb-raceme; peduncles 4–10 cm, black pilose. Involucre hemispheric, 1–1.2 × ca. 1.5 cm, outside densely black pilose; phyllaries 12–14, in 1 row, base united and cupular, separate part linear, 2–3 mm wide, apex acuminate, white ciliate. Ray florets yellow; lamina narrowly lanceolate to linear-lanceolate, 1.5–2 cm × 3–5 mm, apex acuminate; tube ca. 1.5 mm. Tubular florets numerous, yellowish brown, ca. 7 mm; tube ca. 2 mm; limb narrowly cylindrical. Achenes white, oblong, ca. 4 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul.

• Stream banks on mountains; ca. 4500 m. SW Xizang.

**42. *Cremanthodium nanum*** (Decaisne) W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 14: 118. 1924.

小垂头菊 xiao chui tou ju

*Ligularia nana* Decaisne in Jacquemont, Voy. Inde 4(Bot.): 91. 1843; *Cremanthodium deasyi* Hemsley; *Senecio clarkeanus* Franchet (1892), not A. Gray (1868); *S. sessilifolius* Schultz Bipontinus; *Werneria nana* (Decaisne) Benth & J. D. Hooker.

Stem solitary, erect, 5–10 cm tall, proximally glabrous, purplish red, distally densely white puberulent; underground stem white, with scale leaf. Basal leaves petiolate; petiole 2–4 cm, glabrous, base sheathed; leaf blade ovate, obovate, or orbicular, 1–3.9 × 0.5–2.7 cm, densely white puberulent or abaxially glabrescent, adaxially glabrous, pinnately or subparallel veined to petiole, base cuneate, margin entire, apex rounded or acute. Stem leaves crowded distally, 2–4, sessile, ovate to oblong, both surfaces white puberulent or adaxially glabrescent, base semiamplexicaul. Capitulum solitary. Involucre hemispheric, 1–1.5 × 1.5–3 cm, outside densely black and white pilose; phyllaries 10–14, in 1 row, base united and cupular; separate part oblong, 2–3 mm wide, spreading at anthesis, apex obtuse or rounded. Ray florets yellow; lamina elliptic, 6–8 × 3–4 mm, shorter than phyllaries, apex obtuse, dentate; tube 3–5 mm. Tubular florets numerous, yellow, 5–8 mm; corolla narrowly funnelform. Achenes yellowish brown, linear-cylindrical, 3–6 mm, ribbed. Pappus white, numerous, in many rows, outer ones 5–12 mm, longer than tubular corolla, thick. Fl. and fr. Jul–Aug.

Gravelly areas on mountains; 4000–5400 m. SW Sichuan, S Xinjiang, Xizang, NW Yunnan [India (Sikkim), Kashmir, Nepal, Pakistan].

**43. *Cremanthodium microglossum*** S. W. Liu, Novon 6: 185. 1996.

小舌垂头菊 xiao she chui tou ju

Stem solitary, erect, dark purple, 4–15 cm tall, proximally glabrous, distally white and black puberulent. Basal leaves petiolate; petiole purplish brown, 4–14 cm, glabrous; leaf blade ovate or broadly ovate, 1–3 × 0.7–2.4 cm, with 3–5 pinnate veins, both surfaces white and black puberulent, base rounded or truncate, margin entire, apex rounded. Stem leaves 3, petiolate or sessile, ovate to oblong-ovate, 1.5–4 × 1–2 cm, both surfaces white puberulent or only abaxially, base semiamplexicaul, apex obtuse. Capitulum solitary, erect. Involucre hemispheric, 1.5–2 × 2.5–3 cm, outside densely white and black puberulent; phyllaries 9–12, in 1 row, oblong to narrowly lanceolate, 3–7 mm wide, rectangular-spreading from middle, apex obtuse to acute. Outer florets white; corolla narrowly tubular, 3–6 mm, slender; limb apically truncate or a small linear lamina; style 6.5–11 mm. Central florets numerous, orange, tubular; limb 5-lobed. Achenes yellowish brown, cylindrical, 4–6 mm, ribbed. Pappus white, 1–1.2 cm, as long as tubular corolla. Fl. and fr. Jul–Sep.  $2n = 58^*$ .

• Grassy slopes in gravelly areas on mountains, alpine meadows, swamp meadows; 4000–5400 m. SW Gansu, Qinghai, SW Sichuan, NW Yunnan.

**44. *Cremanthodium microphyllum*** S. W. Liu, Fl. Xizang. 4: 856. 1985.

小叶垂头菊 xiao ye chui tou ju

Stem solitary, erect, ca. 7 cm tall, ca. 1 mm in diam. at base, with rosette leaves, proximally glabrous, distally white and black pilose. Basal leaves 2, petiolate; petiole purplish brown, to 6 cm, glabrous, base sheathed; leaf blade ovate, 1.5–1.7 × ca. 1 cm, glabrous, pinnately veined, base cuneate, margin entire, slightly revolute, apex rounded. Stem leaves 3, proximal one a scale; middle one petiolate; petiole purplish red, glabrous, ca. 1 cm, base enlarged, sheath amplexicaul; leaf blade ovate; distal one linear, white puberulent. Capitulum solitary. Involucre hemispheric, 8–9 × ca. 15 mm, outside densely white and black pilose; phyllaries 10–12, in 1 row, base united and cupular; separate part narrowly lanceolate, 1.5–2.5 mm wide, apex acute. Ray florets yellow; lamina narrowly oblong, ca. 15 × 3–5 mm, extending from involucre. Tubular florets numerous, yellow, 6–7 mm; tube ca. 1.5 mm. Achenes (immature) 2–3 mm. Pappus white, as long as tubular corolla. Fl. Jul.

• Gravelly areas on mountains; 4800–5000 m. SE Xizang.

**45. *Cremanthodium humile*** Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 481. 1882.

矮垂头菊 ai chui tou ju

*Cremanthodium comptum* W. W. Smith; *Senecio kansuensis* Franchet.

Stem solitary, erect, 5–20 cm tall, 2–3 mm in diam. at base, proximally glabrous, distally long white and black pilose; underground stem stocklike, horizontal or ascending, with scale leaf and roots on nodes. Rosette of leaves absent. Stem leaves numerous. Proximal stem leaves petiolate; petiole 2–14 cm, glabrous, base ± sheathed; leaf blade ovate or ovate-oblong, sometimes orbicular, 0.7–6 × 1–4 cm, abaxially densely white puberulent, adaxially glabrous, pinnately veined, base cuneate or rounded, margin entire or shallowly dentate, apex obtuse or rounded. Middle to distal stem leaves sessile or shortly petiolate; leaf blade ovate to linear, smaller distally, abaxially densely white puberulent, margin entire or dentate. Capitulum solitary. Involucre hemispheric, 8–13 × 10–30 mm, outside densely white and black pilose; phyllaries 8–12, in 1 row, base united and cupular; separate part linear-lanceolate, 2–3 mm wide, apex acute or acuminate. Ray florets yellow; lamina extending from involucre, elliptic, 1–2 cm × 3–4 mm, apex acute; tube ca. 3 mm. Tubular florets numerous, yellow, 7–9 mm; tube ca. 3 mm. Achenes brown, oblong, 3–4 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Nov.  $2n = 60^*$ ,  $116^*$ .

Gravelly areas on mountains; 3500–5300 m. Gansu, Qinghai, SW and W Sichuan, E Xizang, NW Yunnan [Bhutan].

**46. *Cremanthodium laciniatum*** Y. Ling & Y. L. Chen ex S. W. Liu, Acta Biol. Plateau Sin. 3: 65. 1984.

条裂垂头菊 tiao lie chui tou ju

Stem solitary, erect, 12–21 cm tall, ca. 3 mm in diam. at base, proximally glabrous, distally long white and black pilose;

underground stem stocklike, horizontal or ascending, with scale leaf and roots on nodes. Rosette of leaves absent. Proximal stem leaves petiolate; petiole to 4 cm, abaxially white puberulent, base ± sheathed; leaf blade adaxially green, oblong, 1.5–6 × to 2 cm, abaxially densely white puberulent, adaxially glabrous, pinnately veined, margin lacinate; lobes oblong or linear-oblong, to 6 mm, apex acute. Middle to distal stem leaves sessile or shortly petiolate, oblong to linear, smaller distally, margin entire or denticulate, apex acute. Capitulum solitary. Involucre hemispheric, 1.2–1.7 × ca. 1.5 cm, outside densely long white and black pilose; phyllaries 8–12, in 1 row, base united and cupular; separate part linear-lanceolate, 1.5–2 mm wide, apex acuminate. Ray florets yellow; lamina extending from involucre, oblong, to 1.7 cm, apex acute; tube ca. 4 mm. Tubular florets numerous, yellow, ca. 7 mm; tube ca. 1 mm. Achenes (immature) cylindrical, 2–3 mm, apex truncate, ribbed. Pappus white, as long as or shorter than tubular corolla. Fl. Aug, fr. Aug–Sep.

• Gravelly areas on mountains; ca. 4100 m. E Xizang.

**47. *Cremanthodium discoideum*** Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 482. 1882.

盘花垂头菊 pan hua chui tou ju

*Cremanthodium cuculliferum* W. W. Smith; *Senecio discoideus* (Maximowicz) Franchet.

Stem solitary, erect, 15–30 cm tall, proximally glabrous, distally long white and purplish brown pilose. Basal leaves petiolate; petiole 1–6 cm, glabrous, base sheathed; leaf blade abaxially grayish green, adaxially green or greenish white, ovate-oblong or ovate-lanceolate, 1.5–4 × 0.7–1.5 cm, glabrous, with obscure pinnate veins, base rounded, margin entire or rarely denticulate, apex obtuse. Stem leaves few, proximal leaves sessile, lanceolate, base semiamplexicaul; distal leaves linear. Capitulum solitary, nodding. Involucre hemispheric, 8–10 × 15–25 mm, outside densely long dark brown pilose; phyllaries 8–10, in 2 rows, linear-lanceolate, 1–3 mm wide, apex acuminate or acute. Florets numerous, blackish purple, all tubular, 7–8 mm; tube 2–3 mm. Achenes brown, cylindrical, 4–6 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jun–Aug.  $2n = 58$ .

Grassy slopes, canopy gaps in forests, gravelly areas on mountains, swamp meadows; 3000–5000 m. Gansu, Qinghai, Sichuan, Xizang [Bhutan, ?India (Sikkim), Nepal].

**48. *Cremanthodium obovatum*** Y. Ling & S. W. Liu, Acta Biol. Plateau Sin. 3: 59. 1984.

硕首垂头菊 shuo shou chui tou ju

Stem solitary, erect, 20–30 cm tall, ca. 4 mm in diam. at base, distally branched in synflorescence, densely white puberulent. Basal leaves petiolate; petiole purplish red, 3.5–8.5 cm, to 1.6 cm wide, broadly winged, base sheathed; leaf blade obovate, oblong, or elliptic, 6–9 × 3–5 cm, both surfaces white pilose or adaxially glabrescent, pinnately veined, base broadly cuneate, attenuate into a winged petiole, margin entire or remotely denticulate, apex rounded or obtuse. Middle to distal

stem leaves smaller, lanceolate to linear, apex acuminate. Capitula 1–4, in corymbose raceme or solitary, nodding; peduncles 9–17 cm. Involucre hemispheric, 1.5–2 × 3–4 cm, outside densely white puberulent and black pilose; phyllaries 14–24, in 2 rows, 3–5 mm wide, apex acuminate, ciliate; outer phyllaries narrowly lanceolate; inner phyllaries lanceolate, margin brown membranous. Ray florets yellow; lamina narrowly lanceolate, 2–4 cm × 4–8 mm, apex acute, 3-dentate; tube ca. 5 mm. Tubular florets numerous, dark yellow, 6–8 mm; tube ca. 2 mm; limb cylindrical. Achenes brown, cylindrical, ca. 6 mm, ribbed. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Aug.

• Gravelly areas on mountains; 4800–5000 m. NW Sichuan (Sêrtar), SE Xizang.

**49. *Cremanthodium puberulum*** S. W. Liu, Acta Biol. Plateau Sin. 3: 61. 1984.

毛叶垂头菊 mao ye chui tou ju

Stem solitary, erect, 20–35 cm tall, 3–6 mm in diam. at base, shortly white pilose. Basal leaves petiolate; petiole 3–6 cm, shortly white pilose, base sheathed; leaf blade oblong or ovate-oblong, rarely suborbicular, 3.5–9 × 2–6 cm, both surfaces densely shortly white pilose, pinnately veined, base rounded or broadly cuneate, margin shallowly dentate, apex rounded or obtuse. Stem leaves 3–5, sessile, bracteal, oblong to linear, 3–5 cm, base semiamplexicaul. Capitulum solitary, nodding. Involucre black, hemispheric, 9–11 × 20–25 mm, outside densely white puberulent and dark brown pilose; phyllaries 12–16, in 2 rows, lanceolate, 3–5 mm wide, apex acute; inner phyllaries membranous at margin. Ray florets yellow; lamina linear-oblong, (2–)3–4 cm × 2–5 mm, apex acute, dentate; tube ca. 7 mm. Tubular florets numerous, dark yellow, 8–11 mm; tube 3–5 mm. Achenes cylindrical, ca. 5 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jun–Sep.

• Grassy slopes, alpine meadows, gravelly areas on mountains; 4800–5000 m. SW Qinghai, NE Xizang.

**50. *Cremanthodium prattii*** (Hemsley) R. D. Good, J. Linn. Soc., Bot. 48: 285. 1929.

长舌垂头菊 chang she chui tou ju

*Senecio prattii* Hemsley, Hooker's Icon. Pl. 25: t. 2491. 1896.

Stem solitary, erect, 25–40 cm, ca. 3 mm in diam. at base, proximally glabrous, distally white arachnoid-puberulent. Basal leaves petiolate; petiole 4–12 cm, glabrous, base ± sheathed; leaf blade abaxially greenish white, adaxially dark green, ovate or ovate-oblong, 2–7.5 × 1.5–4 cm, glabrous, pinnately veined, base cordate, margin entire or rarely denticulate, apex rounded. Stem leaves 1 or 2, sessile, oblong, base semiamplexicaul, margin entire, apex obtuse. Capitulum solitary, nodding. Involucre hemispheric, 1–1.5 × 2–3 cm, outside densely long brown and white pilose; phyllaries 12–16, in 2 rows, lanceolate, 1.5–4 mm wide, apex caudate-acuminate. Ray florets yellow; lamina linear-lanceolate, 4–6 cm × 2–5 mm, apex long acuminate, entire or lobed. Tubular florets numerous, yellow, 6–7 mm; tube 1.5–2 mm. Achenes oblong, 5–6 mm, tuberculate. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Aug.

• Wet grassy slopes, alpine meadows; 3200–4400 m. NW Sichuan.

**51. *Cremanthodium delavayi*** (Franchet) Diels ex H. Léveillé, Cat. Pl. Yun-Nan, 43. 1916.

大理垂头菊 da li chui tou ju

*Senecio delavayi* Franchet, Bull. Soc. Bot. France 39: 286. 1892.

Stem solitary, erect, 20–50 cm tall, 3–6 mm in diam. at base, proximally glabrous, distally white puberulent. Basal leaves petiolate; petiole ca. 20 cm × to 5 mm, base narrowly sheathed; leaf blade broadly triangular or ovate-triangular, 6–13 × 7–10 cm, glabrous or abaxially initially white puberulent, glabrescent, pinnate veins prominent abaxially, base truncate, margin sharply dentate or undulate-dentate, apex acute. Middle stem leaves shortly petiolate, base sheathed; leaf blade ovate-triangular, small, ca. 6 × to 7 cm. Distal stem leaves sessile, ovate-lanceolate, base semiamplexicaul. Capitulum solitary, nodding. Involucre hemispheric, 1–1.2 × 2–2.5 cm, outside glabrous, rarely puberulent at base; phyllaries 10–14, in 2 rows, ovate-lanceolate or elliptic, 6–8 mm wide, apex acute. Ray florets yellow; lamina linear-lanceolate, 2.5–4.5 cm, to 9 mm wide at base, apex caudate-acuminate, 3-lobed; tube ca. 2 mm. Tubular florets numerous, yellow, 6–7 mm; tube ca. 1 mm; limb campanulate, 3–3.5 mm. Achenes oblanceolate, ca. 4 mm, ribbed. Pappus brown, as long as tubular corolla. Fl. and fr. Jul–Sep.

Grassy slopes, wastelands; 3600–4200 m. NW and W Yunnan [Myanmar].

**52. *Cremanthodium sagittifolium*** Y. Ling & Y. L. Chen ex S. W. Liu, Acta Biol. Plateau Sin. 1: 54. 1982.

箭叶垂头菊 jian ye chui tou ju

Stem solitary, erect, purplish red, 10–20 cm tall, 1.5–2 mm in diam. at base, proximally glabrous, distally brown and white pilose. Leaves nitid, leathery. Basal leaves petiolate; petiole purplish red, 2–5 cm, base narrowly sheathed; leaf blade abaxially pale green, adaxially dark green, sagittate, 1.5–3 × 1.2–2 cm, pinnate veins prominent abaxially, base deeply cordate, margin sparsely denticulate or entire, apex acute; basal lobes slightly divergent. Stem leaves 1 or 2. Middle stem leaves smaller, sagittate, petiolate; petiole purplish red, base enlarged into a sheath. Distal stem leaves bracteal, linear. Capitulum solitary, nodding. Involucre hemispheric, 1.1–1.3 × 1.8–2.5 cm, outside glabrous, base brown pilose; phyllaries 12–14, in 2 rows, oblong or broadly elliptic, 3–8 mm wide, apex acute; inner phyllaries pale brown membranous at margin. Ray florets yellow; lamina lanceolate, 1.5–2.5 cm × 6–8 mm, apex acuminate, 2- or 3-lobed; tube 1.5–2 mm. Tubular florets numerous, yellow, 6–7 mm; tube 1.5–2 mm; limb narrowly tubular, anthers blackish purple. Achenes narrowly oblanceolate, ca. 5 mm, ribbed. Pappus pale brown, 4–5 mm, shorter than tubular corolla. Fl. and fr. Jul–Oct.

• Alpine meadows; 3400–4400 m. NE Yunnan.

**53. *Cremanthodium daochengense*** Y. Ling & S. W. Liu, Acta Biol. Plateau Sin. 1: 54. 1982.

稻城垂头菊 dao cheng chui tou ju

Stem solitary, erect, purplish red, to 50 cm tall, 3–4 mm in diam. at base, proximally glabrous, distally long white and purplish red pilose. Basal leaves petiolate; petiole 7–9 cm, slender, base sheathed, distally slightly broadened; leaf blade abaxially pale green, adaxially dark green, broadly lanceolate, 2.5–10 cm, middle to 2 cm wide, glabrous, conspicuously pinnately veined, base broadly cuneate to cuneate, margin undulately coarsely triangular-dentate, apex obtuse or acute. Stem leaves 3 or 4. Proximal stem leaves petiolate; petiole short, enlarged into a sheath; leaf blade lanceolate or reduced. Distal stem leaves subulate, ca. 5 mm. Capitulum solitary, nodding. Involucre hemispheric, 0.9–1.5 × 2–2.5 cm, outside densely long purplish red and white pilose; phyllaries 14–16, in 2 rows, linear, 1–2 mm wide, apex acuminate; inner phyllaries narrowly membranous at margin. Ray florets yellow; lamina linear-lanceolate, 3.5–3.7 cm × 3–4 mm, with 5–7 brown veins, apex long acuminate, lacinate-dentate. Tubular florets numerous, purple, 5–7 mm; tube 1–2 mm; limb narrowly tubular; anthers purple. Achenes dark brown, oblanceolate, ca. 4 mm. Pappus white, 7–9 mm, slightly longer than tubular corolla. Fl. Jul–Aug, fr. Aug–Sep.

• Stream banks, alpine swamp meadows, alpine meadows; 4700–5400 m. SW Sichuan.

**54. *Cremanthodium nobile*** (Franchet) Diels ex H. Léveillé, Cat. Pl. Yun-Nan, 43. 1916.

壮观垂头菊 zhuang guan chui tou ju

*Senecio nobilis* Franchet, Bull. Soc. Bot. France 39: 287. 1892.

Stems 1–4, erect, 15–40 cm tall, 2–4 mm in diam. at base, shortly black pilose, proximally glabrescent. Basal leaves sessile or shortly petiolate; petiole to 3 cm, broadly or narrowly winged; leaf blade obovate, broadly elliptic, or suborbicular, 1.2–10 × 1–5.5 cm, glabrous, pinnate veins prominent abaxially, base cuneate, narrowed into petiole, margin entire, apex obtuse or rounded. Stem leaves few, sessile, narrowly oblong to linear, base not amplexicaul. Capitulum solitary, nodding. Involucre hemispheric, 1.2–1.7 × 2–3 cm, outside shortly brown or dark brown pilose; phyllaries 10–14, in 2 rows; outer phyllaries lanceolate, 4–5 mm wide, apex acuminate; inner phyllaries broadly ovate, to 8 mm wide, margin shortly pilose and broadly membranous, apex acute. Ray florets yellow; lamina narrowly lanceolate or narrowly elliptic, 2.5–3.5 × 0.4–1 cm, apex acuminate or caudate-acuminate; tube ca. 3 mm. Tubular florets numerous, yellow, 5–6 mm; tube ca. 1 mm. Achenes obovoid, 2–4 mm, conspicuously ribbed, apex narrowed into a short rostrum, between ribs purplish red. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Sep.

• Scrub, alpine meadows; 3400–5000 m. SW Sichuan, SE Xizang, NW Yunnan.

**55. *Cremanthodium pilosum*** S. W. Liu, Acta Biol. Plateau Sin. 7: 29. 1988.

黄毛垂头菊 huang mao chui tou ju

Stem solitary, erect, 30–35 cm tall, 2–2.5 mm in diam. at base, shortly black pilose. Basal leaves petiolate; petiole 2–3.5 cm, densely shortly black pilose, base sheathed; leaf blade oblong, broadly elliptic, or obovate, 2.5–6 × 2–4 cm, both surfaces

densely yellow pilose, pinnately veined, base cuneate, margin denticulate or subentire, apex obtuse-rounded. Stem leaves sessile, narrowly oblong to linear, 1.5–3 × 0.4–1.2 cm, densely yellow pilose. Capitulum solitary, nodding. Involucre hemispheric, ca. 1 × 1.5–2 cm, outside brown pilose; phyllaries ca. 12, in 2 rows, oblong, ca. 2 mm wide, apex rounded. Ray florets yellow; lamina lanceolate, 1.5–2.5 cm × 4–7 mm, with 5–7 brown veins, apex acuminate; tube ca. 2 mm. Tubular florets numerous, 6–7 mm; tube 1–1.5 mm. Achenes yellowish brown, oblanceolate, ca. 4 mm. Pappus white, shorter than tubular corolla. Fl. and fr. Aug.

• Grasslands, forest understories; 3500–4000 m. SW Sichuan.

**56. *Cremanthodium arnicoides*** (Candolle ex Royle) R. D. Good, J. Linn. Soc., Bot. 48: 288. 1929.

宽舌垂头菊 kuan she chui tou ju

*Ligularia arnicoides* Candolle ex Royle, Ill. Bot. Himal. Mts. 251, t. 60, f. 2. 1835; *Senecio arnicoides* (Candolle ex Royle) Wallich ex C. B. Clarke.

Stem solitary, erect, 10–15(–45) cm tall, 3–6 mm in diam. at base, proximally glabrous, distally white and black pilose. Basal leaves petiolate; petiole to 5 cm, base sheathed; leaf blade ovate or ovate-oblong, 3–8 × 2.5–6 cm, thin, herbaceous, glabrous or abaxially hairy along veins, pinnate veins prominent abaxially, base cuneate or subrounded, margin coarsely dentate, apex acute. Middle stem leaves shortly petiolate, base sheathed, amplexicaul; leaf blade ovate, 3–7 × 2–6 cm, glabrous, base cuneate or rounded, margin coarsely dentate, apex obtuse. Distal stem leaves sessile, ovate, base cordate, amplexicaul. Distal-most stem leaves bracteal, lanceolate to oblong, both surfaces hairy. Capitula 1–4, in lax raceme, nodding; peduncles 2–3.5 cm, white pilose. Involucre hemispheric or broadly campanulate, 9–20 × 20–40 mm, outside black pilose; phyllaries ca. 14, in 2 rows, 3–10 mm wide, apex acute, white ciliate; outer phyllaries lanceolate; inner phyllaries broadly ovate, margin broadly membranous. Ray florets yellow; lamina broadly elliptic, 1.5–2.7 cm × 6–9 mm, apex obtuse, 3-dentate. Tubular florets numerous, 6–9 mm; tube 1–3 mm; limb narrowly campanulate. Achenes brown, cylindrical, 5–6 mm, ribbed. Pappus white, as long as tubular corolla. Fl. Aug.

Gravelly areas on mountains; 3600–4600 m. S and SW Xizang [Kashmir, Nepal, Pakistan].

**57. *Cremanthodium chungdienense*** Y. Ling & S. W. Liu, Acta Biol. Plateau Sin. 1: 52. 1982.

中甸垂头菊 zhong dian chui tou ju

Plants white arachnoid-puberulent. Stem solitary, erect, 32–76 cm tall, 8–10 mm in diam. at base. Basal leaves petiolate; petiole to 15 cm, winged; wings entire, wider distally; leaf blade ovate or ovate-oblong, 14–23 × 7–14 cm, herbaceous, both surfaces initially white arachnoid-puberulent, glabrescent in fruit, pinnately veined, with 8–13 pairs of lateral veins, base broadly cuneate, narrowed into a winged petiole, margin entire or denticulate, apex obtuse. Middle stem leaves shortly petiolate or sessile; leaf blade smaller, oblong or elliptic; sheath enlarged, cymbiform, to 10 × 1.5 cm, amplexicaul. Distal stem leaves ob-

long, 4–8.5 × 2–6 cm, parallel veined, apex obtuse, mucronate; sheath amplexicaul. Capitula 5–13, in lax raceme, to 26 cm, nodding; peduncles equal, to 10 cm. Involucre hemispheric, 8–11 × 20–25 mm, outside white puberulent; phyllaries 14–16, in 2 rows; outer phyllaries lanceolate, 2–3 mm wide, apex acute or acuminate; inner phyllaries oblong, 4–5 mm wide, margin membranous, apex triangular or obtuse. Ray florets yellow; lamina oblong or elliptic, 1–1.3 cm × 4–7 mm, apex rounded, 2- or 3-denticulate; tube ca. 2 mm. Tubular florets numerous, yellow, 5–6 mm; tube 1–1.5 mm; limb broadly campanulate, ca. 2.5 mm wide. Achenes (immature) oblanceolate, apex slightly narrowed. Pappus white, as long as tubular corolla. Fl. Jul–Aug.

- Grassy slopes, stream banks; 3600–4100 m. NW Yunnan.

**58. *Cremanthodium coriaceum*** S. W. Liu, Fl. Reipubl. Popul. Sin. 77(2): 165. 1989.

革叶垂头菊 *ge ye chui tou ju*

*Senecio scytophyllus* Diels, Notes Roy. Bot. Gard. Edinburgh 5: 193. 1912, not Kunth (1818); *S. dielsii* H. Léveillé (1916), not Muschler (1909).

Stem solitary, erect, 35–55 cm tall, 3–4 mm in diam. at base, proximally glabrous, distally white arachnoid-puberulent. Basal leaves petiolate; petiole 7–12 cm, subglabrous; leaf blade ovate or broadly ovate, (2.5–)6–10 × (2–)4–5 cm, leathery, nitid, glabrous, both surfaces with prominent pinnate reticulate veins, base cuneate, margin denticulate, apex obtuse. Middle to distal stem leaves sessile, smaller, bracteal, ovate-oblong, base semiamplexicaul, apex acute or acuminate. Capitula 2–5, in raceme, or rarely solitary, nodding; peduncles 2–6 cm, white arachnoid-puberulent. Involucre hemispheric, 8–11 × 20–30 mm, outside white arachnoid-puberulent or glabrous; phyllaries 10–14, in 2 rows, lanceolate or ovate-lanceolate, 3–5 mm wide, white ciliate, apex acute; inner phyllaries broadly membranous at margin. Ray florets yellow; lamina oblong, 1–1.5 cm × to 5 mm, apex 2- or 3-denticulate; tube ca. 2 mm. Tubular florets numerous, yellow, ca. 6 mm; tube ca. 1 mm. Achenes brown, oblanceolate, 4–5 mm. Pappus white, as long as tubular corolla. Fl. Jul–Aug.

- Grassy slopes, rocky slopes, grasslands, alpine meadows; 3000–4000 m. NW and W Yunnan.

**59. *Cremanthodium potaninii*** C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 14: 150. 1895.

戟叶垂头菊 *ji ye chui tou ju*

*Cremanthodium limprichtii* Diels; *Senecio kialensis* Franchet.

Stem solitary, erect, 5–30 cm tall, 1–2 mm in diam. at base, proximally glabrous, distally white arachnoid-puberulent, glabrescent. Basal leaves petiolate; petiole 1–7 cm, glabrous, base sheathed; leaf blade ovate-cordate, triangular-cordate, or ovate-lanceolate to lanceolate, 1.5–2.5 × 0.5–3 cm, glabrous, pinnately veined, base cordate, truncate, or cuneate, margin entire, regularly triangular-dentate, or distal margin entire, proximal margin dentate, apex acute. Middle to distal stem leaves sessile, linear-lanceolate to linear, margin entire. Capitulum solitary, nodding. Involucre broadly campanulate, 8–14 × 10–15 mm,

outside pale brown puberulent or glabrous; phyllaries 12–14, in 2 rows, lanceolate or linear-lanceolate, 2–3 mm wide, apex acuminate; inner phyllaries broadly membranous at margin. Ray florets yellow; lamina linear, 1.5–2(–3.5) cm × 2–3 mm, apex acuminate, entire or denticulate; tube ca. 5 mm. Tubular florets numerous, yellow, 6–8 mm; tube 1.5–2 mm. Achenes brown, cylindric, ca. 5 mm. Pappus brown, as long as tubular corolla. Fl. and fr. Jul–Sep.

- Wet grassy slopes, alpine scrub, alpine meadows; 3600–4500 m. SW Gansu, ?Shaanxi, NW Sichuan.

**60. *Cremanthodium cyclaminanthum*** Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 14. 1925.

香客来垂头菊 *xiang ke lai chui tou ju*

Stem solitary, erect, 15–33 cm tall, slender, proximally glabrous, distally brown pilose. Basal leaves petiolate; petiole 3–8 cm, glabrous; leaf blade ovate-cordate or orbicular-cordate, 1.5–2.5 × 1.5–2 cm, subleathery, nitid, glabrous, pinnately veined, with conspicuous reticulate veins, base cordate, margin entire, or shallowly crenate, apex rounded or obtuse. Stem leaves few, bracteal, linear. Capitulum solitary, nodding. Involucre hemispheric, ca. 1 × 1–2 cm, outside brown pilose or glabrate, glabrescent; phyllaries 10 or 11, in 2 rows, lanceolate, 2–4 mm wide, apex acute. Ray florets yellow; lamina oblong, 1.1–1.3 cm × to 5 mm, apex obtuse; tube ca. 2 mm. Tubular florets numerous, yellow, ca. 6 mm; tube ca. 1.5 mm; limb campanulate. Achenes straw-colored, ca. 4 mm, with 5 thick ribs, apex truncate. Pappus pale brown, as long as tubular corolla. Fl. and fr. Aug.

- Alpine meadows; 2900–4400 m. SW Sichuan, NW Yunnan.

**61. *Cremanthodium principis*** (Franchet) R. D. Good, J. Linn. Soc., Bot. 48: 283. 1929.

方叶垂头菊 *fang ye chui tou ju*

*Senecio principis* Franchet, J. Bot. (Morot) 10: 412. 1896; *Cremanthodium gypsophilum* R. D. Good.

Stem solitary, erect, 10–30 cm tall, 1.5–3 mm in diam. at base, proximally glabrous, distally brown puberulent. Basal leaves petiolate; petiole 2–6 cm, brown puberulent, base sheathed; leaf blade oblong, square, or suborbicular, 1.8–5 × 2–5 cm, herbaceous, glabrous or abaxially brown pilose along veins, pinnately veined, abaxially with conspicuous veins, base cordate, margin denticulate, apex rounded, truncate, or retuse. Middle to distal stem leaves few, smaller distally, sessile, bracteal, square to linear. Capitulum solitary, nodding. Involucre hemispheric, 8–13 × 10–20 mm, outside brown puberulent or glabrate, glabrescent; phyllaries ca. 12, in 2 rows, 3–5 mm wide, apex acute; outer phyllaries lanceolate; inner phyllaries oblong, margin brown membranous. Ray florets yellow; lamina oblong, 1.6–2.5 cm × to 8 mm, dentate or lobed, apex acute or truncate; tube 4–5 mm. Tubular florets numerous, yellow, ca. 8 mm; tube ca. 3 mm. Achenes dark brown, cylindric, ca. 5 mm. Pappus brown, as long as tubular corolla. Fl. and fr. Jun–Jul.

- Alpine scrub, alpine meadows, rocky places; 3600–4600 m. SW Sichuan, NW Yunnan.

**62. *Cremanthodium purpureifolium*** Kitamura, Acta Phytotax. Geobot. 15: 106. 1954.

紫叶垂头菊 *zi ye chui tou ju*

Stems 1 or 2, erect, 7–15 cm tall, 1.5–2 mm in diam. at base, proximally glabrous, distally purplish red, white arachnoid-puberulent. Basal leaves petiolate; petiole purple, 2–6.5 cm, glabrous or sparsely white arachnoid-puberulent; leaf blade abaxially purple, oblong, broadly oblong, or ovate-oblong, 3.7–7.5 × 1.5–5.5 cm, abaxially shortly pilose, adaxially glabrous, pinnate veins conspicuous abaxially, base broadly cuneate or rarely truncate, margin denticulate, apex rounded. Stem leaves bracteal, ovate or oblong to linear, 1–3 cm, base sheathed. Capitulum solitary, nodding. Involucre hemispheric, 1–1.4 × 1.5–2 cm, outside black pilose; phyllaries 10–12, in 2 rows, 2–4 mm wide, apex acuminate, white ciliate; outer phyllaries lanceolate; inner phyllaries oblong, margin broadly membranous. Ray florets yellow; lamina oblong, 1.5–2 cm × 3–5 mm, apex obtuse, denticulate. Tubular florets numerous, yellow, ca. 6 mm; tube ca. 2 mm. Pappus white, as long as tubular corolla. Fl. Jul.

Gravelly areas on mountains; 3600–4900 m. S Xizang [Nepal].

**63. *Cremanthodium nervosum*** S. W. Liu, Acta Biol. Plateau Sin. 3: 58. 1984.

显脉垂头菊 *xian mai chui tou ju*

Stem solitary, erect, 20–40 cm tall, slender, 2–3.5 mm in diam. at base, black pilose. Basal leaves petiolate; petiole purple, 4–5 cm, glabrous; leaf blade ovate or oblong-ovate, 4.5–9 × 2.5–6.5 cm, glabrous, pinnately veined, both surfaces with prominent reticulate veins, base cordate to subtruncate, margin regularly denticulate, apex rounded. Stem leaves smaller distally, proximal leaves petiolate, base sheathed, distal leaves linear-lanceolate. Capitula solitary or 3 in raceme, nodding; peduncles 1.5–3.5 cm, black pilose. Involucre hemispheric, 8–12 × 12–20 mm, outside glabrous or black pilose; phyllaries 10–16, in 2 rows, lanceolate, 3–4 mm wide, apex acuminate, white ciliate; inner phyllaries broader, margin membranous. Ray florets yellow; lamina broadly elliptic, 1–1.5 cm × 4–6 mm, apex rounded, 3-denticulate; tube ca. 2 mm. Tubular florets numerous, yellow, 6–7 mm; tube ca. 1 mm. Achenes (immature) ca. 3 mm. Pappus white, as long as tubular corolla. Fl. Aug, fr. Aug–Sep.

• Grassy slopes; 3500–4800 m. S Xizang.

**64. *Cremanthodium nepalense*** Kitamura, Acta Phytotax. Geobot. 15: 105. 1954.

尼泊尔垂头菊 *ni bo er chui tou ju*

Stem solitary, erect, 14–30 cm tall, slender, 1–2 mm in diam. at base, shortly black pilose and sparsely long white puberulent, or sometimes proximally glabrous. Basal leaves petiolate; petiole 1.5–8 cm, initially black pilose, glabrescent; leaf blade ovate to suborbicular, 2.5–4.5(–8.5) × 1.5–2.5(–7) cm, glabrous, pinnately veined, abaxially with prominent reticulate veins, base truncate, rounded, or shallowly cordate, margin dentate, apex obtuse or rounded. Stem leaves 2–4; proximal leaves petiolate, base sheathed; leaf blade ovate, to 10 × 7 mm; middle and distal leaves linear-lanceolate to linear, margin entire or

dentate. Capitulum solitary, nodding. Involucre hemispheric, 1–1.2 × 1.5–2 cm, outside black when dry, shortly black pilose; phyllaries 10–14, in 2 rows, 2–3.5 mm wide, apex acute or acuminate; outer phyllaries lanceolate; inner phyllaries oblong. Ray florets yellow; lamina oblong, 8–15 × 2–3 mm; tube 1–1.5 mm. Tubular florets numerous, yellow, blackish gray when dry, 4–5 mm; tube ca. 1 mm; limb tubular. Achenes white, oblong, ca. 3 mm. Pappus white, as long as tubular corolla. Fl. and fr. Aug–Sep.

Grassy slopes, stream banks, rocky places; 4300–4800 m. S Xizang [Nepal].

**65. *Cremanthodium variifolium*** R. D. Good, J. Linn. Soc., Bot. 48: 298. 1929.

变叶垂头菊 *bian ye chui tou ju*

Stem solitary, erect, 8–25 cm tall, 1.5–2.5 mm in diam. at base, densely white or proximally brown and distally white pilose. Basal leaves petiolate; petiole 2–5 cm, slender, densely pilose, base sheathed; leaf blade elliptic, ovate, or obovate, 1–4.5 × 0.6–3.5 cm, glabrous, pinnately veined, base cuneate or subrounded, margin entire and pilose, apex obtuse or rounded. Stem leaves numerous, dense, sessile, linear-oblong, longer than internodes, smaller than basal leaves, margin entire. Capitulum solitary, nodding. Involucre hemispheric, 8–10 × ca. 15 mm, outside glabrous, base pilose; phyllaries 12–14, in 2 rows, oblong or lanceolate, 3–5 mm wide, apex acute; inner phyllaries broader, margin membranous. Ray florets yellow; lamina oblong or narrowly oblanceolate, 1–1.5 cm × 2–4 mm, with brown veins, apex obtuse or truncate, 3-dentate. Tubular florets numerous, deep yellow, 6–7 mm; tube ca. 1 mm. Achenes brown or yellowish brown, obovoid, 2–3 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Oct.

• Grasslands beneath bamboo forests, margins of bamboo forests, grassy slopes, alpine meadows; 3200–4500 m. SW Sichuan, SE Xizang, NW Yunnan.

**66. *Cremanthodium pseudo-oblongatum*** R. D. Good, J. Linn. Soc., Bot. 48: 297. 1929.

无毛垂头菊 *wu mao chui tou ju*

Stems 1 or 2, erect, purplish red, 8–12 cm tall, 1–2 mm in diam. at base, glabrous. Basal leaves petiolate; petiole purplish red, 1.5–4 cm, winged, glabrous, base sheathed; leaf blade ovate or oblong, 2–5 × 1.5–3.5 cm, thick, glabrous, pinnately veined, base truncate, margin entire and sparsely coarsely dentate, apex acute or subrounded. Middle to distal stem leaves sessile, bracteal, ovate or elliptic to linear, base semiamplexicaul, margin dentate, apex acuminate. Capitulum solitary, nodding. Involucre hemispheric, 1–1.5 × 1–2 cm, outside glabrous; leaflike bracts 3–7, linear; phyllaries 12–14, in 2 rows, 2–4 mm, apex long acuminate, white ciliate; outer phyllaries narrowly lanceolate; inner phyllaries lanceolate, margin membranous. Ray florets yellow; lamina linear-lanceolate, 1.5–2.5 cm × 3–5 mm, apex long acuminate, 3-dentate; tube ca. 4 mm. Tubular florets numerous, dark yellow, 7–8 mm; tube 2–3 mm. Achenes (immature) ca. 3 mm. Pappus white, as long as tubular corolla. Fl. Jul.

Gravelly areas on mountains; 5100–5300 m. S Xizang [Bhutan, ?India (Sikkim)].

**67. *Cremanthodium oblongatum*** C. B. Clarke, Compos. Ind. 168. 1876.

矩叶垂头菊 ju ye chui tou ju

*Cremanthodium nakaoui* Kitamura; *Ligularia arnicoides* Candolle ex Royle var. *glabra* Candolle; *Senecio oblongatus* (C. B. Clarke) Franchet; *S. pyrolifolius* H. Léveillé.

Stems 1 or 2, erect, often purplish red, 8–20 cm tall, 2–3 mm in diam. at base, proximally glabrous, distally white puberulent. Basal leaves petiolate; petiole purplish red, winged, 1.5–5 cm, glabrous; leaf blade oblong, orbicular, or elliptic, 2–8 × 1.5–5 cm, thick, glabrous, pinnately veined, base subrounded to cuneate, margin entire and coarsely dentate, apex obtuse or rounded. Stem leaves 3 or 4, sessile, oblong to lanceolate, 1–4.5 × to 1.5 cm, base semiamplexicaul, margin remotely dentate, apex obtuse or acute. Capitulum solitary, nodding. Involucre hemispheric, 9–12 × to 25 mm, outside black when dry, white arachnoid-puberulent; phyllaries 10–14, in 2 rows, 2–3 mm wide; outer phyllaries lanceolate, apex acuminate; inner phyllaries ovate-lanceolate, 5–8 mm wide, margin yellowish brown membranous. Ray florets yellow; lamina oblong, 1–2.5 cm × 2–5 mm, apex acuminate or acute; tube to 5 mm. Tubular florets numerous, dark yellow, 7–8 mm; tube ca. 2 mm. Achenes brown, cuneate-cylindric, 4–5 mm. Pappus white, as long as tubular corolla. Fl. Jul–Aug, fr. Aug–Sep.

Gravelly areas on mountains, alpine meadows; 4500–5300 m. S Xizang [India, Nepal].

**68. *Cremanthodium ellisii*** (J. D. Hooker) Kitamura in H. Hara et al., Enum. Fl. Pl. Nepal 3: 22. 1982.

车前叶垂头菊 che qian ye chui tou ju

Stem solitary, erect, 6–60 cm tall, 2–3 mm in diam. at base, branched only in synflorescence, proximally glabrous, distally densely blackish gray pilose, purplish red. Basal leaves petiolate; petiole often purplish red, winged, 1–13 × to 1.5 cm, tubular-sheathed; leaf blade ovate or broadly elliptic to oblong, sometimes suborbicular, 1.5–19 × 1–8 cm, subsucculent, pinnately veined, glabrous or initially sparsely white puberulent, base cuneate to rounded, usually narrowed into a petiole, margin entire or minutely to coarsely dentate, rarely lobed, apex acute to rounded. Stem leaves sessile, ovate or ovate-oblong to linear, margin entire or denticulate, base with or without sheaths. Capitula 1–5, usually solitary or in corymb-raceme, nodding; peduncles 2–10 cm, blackish gray pilose. Involucre hemispheric, 8–17 × 10–25 mm, outside densely blackish gray pilose; phyllaries 8–14, in 2 rows, 2–9 mm, apex acute and white ciliate; outer phyllaries lanceolate; inner phyllaries ovate-lanceolate. Ray florets sometimes absent, yellow or purplish red; lamina oblong, 10–17 × 2–7 mm, apex obtuse or acute; tube 3–5 mm. Tubular florets numerous, dark yellow, 6–7 mm; tube 2–3 mm. Achenes brown, cylindric, 4–5 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Oct.  $2n = 58$ .

Gravelly areas on mountains, alpine scrub, grassy slopes, alpine meadows, swamp meadows, riverbanks; 3400–5600 m. SW and W

Gansu, Qinghai, Sichuan, Xizang, NW Yunnan [Bhutan, India (Sikkim), Kashmir, Nepal, Pakistan].

- 1a. Capitulum without ray florets ..... 68c. var. *ramosum*  
 1b. Capitulum with ray florets.  
     2a. Ray lamina yellow ..... 68a. var. *ellisii*  
     2b. Ray lamina purplish red ..... 68b. var. *roseum*

**68a. *Cremanthodium ellisii* var. *ellisii***

车前叶垂头菊(原变种) che qian ye chui tou ju (yuan bian zhong)

*Werneria ellisii* J. D. Hooker, Fl. Brit. India 3: 357. 1881; *Cremanthodium fletcheri* (Hemsley) Hemsley; *C. goringense* (Hemsley) Hemsley; *C. oblongatum* C. B. Clarke var. *villosius* C. B. Clarke; *C. plantagineum* Maximowicz; *C. plantagineum* f. *albidum* R. D. Good; *C. plantagineum* f. *ellisii* (J. D. Hooker) R. D. Good; *C. plantagineum* f. *goringense* (Hemsley) R. D. Good; *C. plantagineum* f. *maximowiczii* (Franchet) R. D. Good; *C. plantagineum* var. *maximowiczii* (Franchet) B. S. Aswal; *Senecio arnicoides* (Candolle ex Royle) Wallich ex C. B. Clarke var. *frigidus* J. D. Hooker; *S. fletcheri* Hemsley; *S. goringensis* Hemsley; *S. maximowiczii* Franchet; *S. paberensis* Franchet.

Capitulum with ray florets. Ray lamina yellow.

Gravelly areas on mountains, swamp meadows, riverbanks; 3400–5600 m. SW and W Gansu, Qinghai, Sichuan, Xizang, NW Yunnan [Kashmir, Nepal, Pakistan].

**68b. *Cremanthodium ellisii* var. *roseum*** (Handel-Mazzetti) S. W. Liu, Fl. Reipubl. Popularis Sin. 77(2): 162. 1989.

红舌垂头菊 hong she chui tou ju

*Cremanthodium plantagineum* f. *roseum* Handel-Mazzetti, Acta Horti Gothob. 12: 307. 1938.

Capitulum with ray florets. Ray lamina purplish red.

• Alpine scrub, grassy slopes, alpine meadows; 4000–4300 m. NW Sichuan.

**68c. *Cremanthodium ellisii* var. *ramosum*** (Y. Ling) Y. Ling & S. W. Liu, Acta Biol. Plateau Sin. 3: 65. 1984.

祁连垂头菊 qi lian chui tou ju

*Cremanthodium discoideum* Maximowicz subsp. *ramosum* Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 5: 1. 1937; *C. plantagineum* var. *ramosum* (Y. Ling) Y. Ling & S. W. Liu.

Capitulum without ray florets.

• Gravelly areas on mountains; 3000–4600 m. Qinghai, N Xizang.

**69. *Cremanthodium glandulipilosum*** Y. L. Chen ex S. W. Liu, Acta Biol. Plateau Sin. 3: 58. 1984.

腺毛垂头菊 xian mao chui tou ju

Stem solitary, erect, 8–20 cm tall, ca. 3 mm in diam. at base, proximally glabrous, distally densely blackish gray pilose and white puberulent, purplish red. Basal leaves petiolate;

petiole purple, 0.5–4 cm, glandular pilose or glabrous, base sheathed; leaf blade ovate-lanceolate, 3.5–7 × 1.5–3.5 cm, both surfaces densely glandular pilose or intermixed sparsely initially white puberulent, glabrescent, pinnately veined, base broadly cuneate to truncate, margin entire and triangular-dentate, apex acute to acuminate. Stem leaves 2–4, sessile, lanceolate to linear, base semiamplexicaul. Capitula 1–3, nodding. Involucre hemispheric, 8–12 × to 15 mm, outside densely blackish gray pilose and white puberulent; phyllaries 12–16, in 2 rows,

lanceolate or oblong-lanceolate, 2–4 mm, apex acuminate; inner phyllaries membranous at margin. Ray florets yellow; lamina oblong, 1.5–2 cm × 3–6 mm, apex obtuse; tube 4–5 mm. Tubular florets numerous, dark yellow, 6–8 mm; tube ca. 2 mm. Pappus white, or base sometimes reddish brown, as long as tubular corolla. Fl. Jul–Aug, fr. Aug–Sep.

- Wet grasslands in valleys, rocky slopes; 5200–5300 m. S Xinjiang (Pishan), C Xizang.

**96. SINACALIA** H. Robinson & Brettell, *Phytologia* 27: 274. 1973.

华蟹甲属 hua xie jia shu

Chen Yilin (陈艺林 Chen Yi-ling); Bertil Nordenstam, Charles Jeffrey

Herbs, perennial, erect, with thick subterranean tuberiform rhizomes and numerous fibrous roots. Leaves simple, petiole not winged, basal and lower stem leaves usually fallen by anthesis; blade ovate to suborbicular, palmately or pinnately veined, base cordate to subtruncate, sometimes expanded and subamplexicaul, but not vaginate. Capitula solitary or few to numerous, arranged in terminal lax corymb or compound paniculoid thyrses, radiate; peduncles bracteolate. Involucres not calyculate, narrowly cylindrical to obconic-campanulate, with minutely puberulent tips and scarious margins. Ray florets 2–8; lamina yellow, oblong or linear-oblong, 4–7-veined, with 2 or 3 small terminal teeth. Disk florets 2 to many; corolla yellow; limb funnellform; lobes 5, anthers shortly acutely to obtusely caudate, tails 1/4–3/4 as long as antheropodium; antheropodia broadly obconic to somewhat balusterform, broader than filament at base; endothelial cell wall thickenings strictly polar. Style branches incurved, obtuse with numerous rather long, prominent, obtuse terminal papillae. Achenes cylindrical, ribbed, glabrous. Pappus persistent, capillary-like.

- Four species: China.

*Ligularia* and *Parasenecio* are the closest relatives to *Sinacalia*. *Sinacalia* differs from the former by its non-vaginate leaf sheaths, from the latter by its radiate capitula, and from both by its tuberiform rhizomes.

- 1a. Capitula small, numerous, in broad, richly branched paniculoid thyrses; involucre cylindrical, ca. 2 mm in diam., phyllaries 5; ray florets 2 or 3.
  - 2a. Leaf blade deeply pinnatisect, with 3 or 4 lateral lobes on each side, pinnately veined ..... 4. *S. tangutica*
  - 2b. Leaf blade not lobed, pentagonal or triangular, sinuate, apiculate-dentate, basally palmately 3–5-veined ..... 3. *S. davidii*
- 1b. Capitula large, 20 or fewer, corymbose or solitary; involucre obconic-campanulate, 5–8 mm in diam., phyllaries 8; ray florets 5–8.
  - 3a. Leaf blade deeply cordate, thickly papery; ray lamina 15–18 mm ..... 1. *S. macrocephala*
  - 3b. Leaf blade shallowly cordate, truncate, or broadly cuneate, leathery or subleathery; ray lamina 8–11 mm ..... 2. *S. caroli*

**1. *Sinacalia macrocephala*** (H. Robinson & Brettell) C. Jeffrey & Y. L. Chen, *Kew Bull.* 39: 217. 1984.

大头华蟹甲 da tou hua xie jia

*Koyamacalia macrocephala* H. Robinson & Brettell, *Phytologia* 27: 272. 1973, based on *Cacalia macrocephala* Handel-Mazzetti, *Notizbl. Bot. Gart. Berlin-Dahlem* 13: 633. 1937, not (Lessing) Kuntze (1891).

Stems erect, conspicuously striate, robust, 8–10 mm in diam. at base, fistulose, 80–100 cm tall, simple, sparsely puberulent, glabrescent. Leaves subradical, thickly papery, long petiolate; petiole 8–15 cm, stout, expanded and somewhat amplexicaul at base, sparsely puberulent or subglabrous; blade adaxially dark green, broadly ovate-orbicular, 14–16 × 20–30 cm, thickly papery, abaxially arachnoid, soon glabrescent, adaxially glabrous, veins prominent on both surfaces, base cordate, margin irregularly repand-denticulate, apex rounded, mucronate. Stem leaves bractlike, ovate-lanceolate, 2–3 cm × 4–6 mm, many veined, sparsely arachnoid, glabrescent, apex acuminate. Capitula large, 5–22, arranged in a terminal or compound

corymb; peduncles 1–3.5 cm, stout, fulvous arachnoid; bracteoles 2 or 3, linear-lanceolate, 6–10 × 1–1.5 mm. Involucres obconic-campanulate, 13–15 × 6–10 mm; phyllaries 8, green, linear-oblong or linear-lanceolate, ca. 15 × 2–3.5 mm, herbaceous, glabrous or subglabrous, with puberulent tips and broadly scarious margins, obscurely 3–5-veined, apically acuminate. Ray florets 5 or 6, yellow, with 8–8.5 mm tube; lamina linear-oblong, 15–18 × 3–3.5 mm, 6- or 7-veined, apically minutely 2- or 3-dentate. Disk florets numerous; corolla yellow, 1.2–1.3 cm, with 5–5.5 mm tube and funnellform limb; lobes oblong-lanceolate, ca. 2 mm, apically acuminate; anthers oblong, 4–4.5 mm, shortly obtusely caudate, appendages ovate-oblong; style branches ca. 1.5 mm. Achenes cylindrical, 5–6 mm, glabrous, ribbed. Pappus white, 1.3–1.5 cm, scabrid. Fl. Sep–Nov.

- W Hubei (near Yichang).

**2. *Sinacalia caroli*** (C. Winkler) C. Jeffrey & Y. L. Chen, *Kew Bull.* 39: 218. 1984.

革叶华蟹甲 ge ye hua xie jia

*Senecio caroli* C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 13: 7. 1893; *Cacalia caroli* (C. Winkler) C. C. Chang.

Rhizomes fusiform, 5–6 mm in diam., subglabrous, with numerous fibrous roots. Stem solitary, erect or ascending, often flexuous, 2–3 mm in diam. at base, leafless in lower part, 15–40 cm tall, sparsely puberulent or subglabrous. Radical and lower leaves fallen by anthesis. Stem leaf petiole 2.5–6 cm, sparsely puberulent, expanded and somewhat amplexicaul at base; blade abaxially pale green or purplish, adaxially dark green, suborbicular or subflabelliform, 2–4 × 3–6 cm, leathery or subleathery, abaxially fulvous puberulent or glabrescent, adaxially glabrous, basally palmately 7–9-veined, veins distinctly prominent abaxially, base truncate or weakly cordate, rarely broadly cuneate, margin coarsely palmately dentate-lobulate with apically cartilaginous-mucronate teeth, ± revolute. Upper stem leaves progressively smaller with shorter petioles. Uppermost leaves bractlike, lanceolate or linear-lanceolate, apically cartilaginous mucronate. Capitula solitary or 3–5 arranged in lax corymbs, medium-sized, 2.5–6 cm in diam.; peduncles 3–5 cm, slender, usually 5–7-bracteolate. Involucres obconic-campanulate, 12–13 × 5–7 mm; phyllaries 8, oblong-linear or linear, ca. 12 × 2–3 mm, ± glabrous, with white puberulent tips and scarious margins, apex acute or subobtuse. Ray florets 6–8, yellow, corolla tube ca. 6 mm; lamina oblong-lanceolate, 8–11 × 2.5–3 mm, 4–6-veined, apically minutely 3-dentate. Disk florets numerous; corolla yellow, 9–9.5 mm, with 4–4.5 mm tube and funnellform limb; lobes oblong-ovate, ca. 2 mm, apically acute. Anthers dark brown, oblong, ca. 3.5 mm, shortly obtusely caudate; appendages ovate-oblong; style branches ca. 1.5 mm, apically obtuse, papillose. Achenes cylindric, ca. 4 mm, glabrous, ribbed. Pappus 9–9.5 mm. Fl. Jul–Aug.

• Roadsides, forest understories, valleys; 1000–2900 m. Gansu (Têwo), Sichuan.

**3. *Sinacalia davidii*** (Franchet) H. Koyama, Acta Phytotax. Geobot. 30: 82. 1979.

双花华蟹甲 shuang hua hua xie jia

*Senecio davidii* Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 10: 40. 1887 [“*Davidii*”]; *Cacalia davidii* (Franchet) Handel-Mazzetti; *C. didymantha* (Dunn) Handel-Mazzetti; *S. didymanthus* Dunn; *S. tuberivagus* W. W. Smith.

Stems robust, 8–10 mm in diam. at base, fistulose, to 150 cm tall, distinctly sulcate when dry, glabrous. Radical and lower stem leaves fallen by anthesis, petiolate; middle stem leaves with petiole 3–5 cm, sparsely puberulent or glabrous, basally expanded and subamplexicaul; blade of middle stem leaves abaxially pale green or purplish, adaxially dark green, triangular or pentagonal, 8–15 × 9–20 cm, leathery, abaxially fulvous puberulent on veins or glabrescent, adaxially sparsely hispidulous or subglabrous, basally palmately 3–5-veined, base truncate or weakly cordate, apex acute, mucronate-dentate. Upper stem leaves smaller; uppermost leaves shortly petiolate, ovate-triangular. Capitula small, numerous, arranged in terminal compound paniculoid thyrses; axes and peduncles fulvous puber-

ulent; peduncles short, 2–5 mm, usually with 2 or 3 linear or linear-lanceolate bracteoles. Involucres cylindric, 8–10 × 1.5–2 mm; phyllaries 4 or 5, linear-oblong, 0.5–1.5 mm wide, with obtuse minutely puberulent tips and narrow scarious margins, glabrous, inconspicuously 3–5-veined. Ray florets 2; corolla yellow, ca. 8 mm with ca. 5.5 mm tube; lamina oblong-linear, 10–12 × 0.5–1.5 mm, 4-veined, apically minutely 2-dentate. Disk florets 2, rarely 4; corolla yellow, ca. 8 mm, with ca. 2 mm tube and funnellform limb; lobes 5, lanceolate, ca. 1.5 mm, apically acute. Anthers linear-oblong, ca. 3.5 mm, shortly caudate; appendages ovate-oblong. Style branches ca. 1.5 mm, papillose, obtuse. Achenes cylindric, ca. 3 mm, glabrous, ribbed. Pappus white, sometimes rubescent, 5–6 mm. Fl. Jul–Aug, fr. Oct.

• Grassy slopes, cliffs, roadsides, forest margins; 900–3200 m. Shaanxi, Sichuan, Xizang, Yunnan.

**4. *Sinacalia tangutica*** (Maximowicz) B. Nordenstam, Opera Bot. 44: 15. 1978.

华蟹甲 hua xie jia

*Senecio tanguticus* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 486. 1882; *Ligularia tangutica* (Maximowicz) Mattfeld; *Senecillis tangutica* (Maximowicz) Kitamura; *Senecio henryi* Hemsley.

Rhizomes tuberiform, 1–1.5 cm in diam., with numerous fibrous roots. Stems robust, fistulose, 50–100 cm tall, 5–6 mm in diam., simple, sparsely arachnoid when young, or glabrous at base, puberulent with brown hairs in upper parts. Lower stem leaves fallen by anthesis, petiolate. Petiole of median stem leaves 3–6 cm, expanded and subamplexicaul at base, sparsely puberulent or subglabrous; blade of median stem leaves adaxially dark green, ovate or ovate-cordate, 10–16 × 10–15 cm, thickly papery, abaxially puberulent and sparsely arachnoid, adaxially sparsely adpressed hispidulous at least on veins, distinctly pinnately veined, base subtruncate or weakly cordate, margin deeply pinnatisect with 3 or 4 lateral lobes on each side, apex mucronate; lateral lobes subopposite, narrowly to broadly oblong, with a few acute marginal teeth or lobules. Upper stem leaves smaller, shortly petiolate. Capitula small, numerous, arranged in terminal often broad and much branched, compound paniculoid thyrses; axes and peduncles fulvous glandular puberulent; peduncles 2–3 mm, slender, with 2 or 3 small linear-acuminate bracteoles. Involucres cylindric, 8–10 × 1.5–2 mm; phyllaries 4 or 5, linear-oblong, 0.5–1.5 mm wide, with obtuse minutely puberulent tips and narrow scarious margins. Ray florets 2 or 3, yellow, with ca. 4.5 mm tube; lamina oblong-lanceolate, 13–14 × ca. 2 mm, 4-veined, apically minutely 2-dentate. Disk florets 4, rarely 7; corollas yellow, 8–9 mm, with 2–2.5 mm tube and funnellform limb; lobes oblong-ovate, ca. 1.5 mm, apically acuminate; anthers oblong, 3.5–3.7 mm, shortly caudate; appendages oblong, apically acuminate; style branches ca. 1.5 mm, papillose, obtuse. Achenes cylindric, ca. 3 mm, glabrous, ribbed. Pappus white, 7–8 mm. Fl. Jul–Aug, fr. Oct.

• Grassy slopes, cliffs, streamsides, meadows, roadsides, forest margins; 1200–3500 m. Gansu, Hebei, Henan, Hubei, Hunan, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan.

**97. DICERCOCLADOS** C. Jeffrey & Y. L. Chen, *Kew Bull.* 39: 213. 1984.

歧笔菊属 *qi bi ju shu*

Chen Yilin (陈艺林 *Chen Yi-ling*); Bertil Nordenstam, Charles Jeffrey

Herbs, perennial, rhizomatous. Rhizomes woody, with fibrous, tomentose roots. Stems erect, leafy. Leaves alternate, stem leaves petiolate, strongly 3-veined from above base. Capitula homogamous, discoid, axillary to upper leaves, solitary or paired; pedunculate; peduncles slender, divaricate, minutely multibracteolate in upper part. Involucres cylindric, minutely calyculate. Receptacle subconvex, areolate; phyllaries 10 or 11, linear or linear-lanceolate, subleathery, with scarious margins. Florets 15 or 16, all discoid, bisexual, fertile; corollas yellow, actinomorphic; tubular with funnellform limb, 5-lobed, lobes oblong-lanceolate. Anthers linear, exerted from corolla, basally long caudate, appendages lanceolate; endothelial cell wall thickenings strictly polar. Antheropodia long, narrow, without enlarged basal cells, as broad as filaments, shorter than anther tails. Ovary cylindric, glabrous. Style branches with confluent stigmatic areas, abaxially and apically long papillose; papillae divided at apex into 2 brushlike lobes. Pappus of numerous capillary-like hairs, many seriate, barbellate.

- One species: China.

In habit and the shape of the capitula, the single species of *Dicercocladus* is very similar to some species of *Synotis*, such as *S. sinica*; however, the strongly 3-veined leaves, cylindric antheropodia, and completely polarized endothelial tissue cell wall thickenings place it in the subtribe Tus-silagininiae and ally it firmly to *Parasenecio*. The apically bipenicillate style branches and its habit readily distinguish it from the latter.

**1. Dicercocladus triplinervis** C. Jeffrey & Y. L. Chen, *Kew Bull.* 39: 214. 1984.

歧笔菊 *qi bi ju*

Roots densely tomentose. Stems to 100 cm tall, ascending at base, leafless in lower part, leafy above, simple or branching in upper part, sparsely fulvous puberulent when young, glabrescent. Leaves shortly petiolate, lower leaves withered and fallen by anthesis; median leaves rather numerous; petiole 3–5 mm, sparsely pubescent, not winged, not auriculate; blade abaxially paler, adaxially deep green, oblong-lanceolate or lanceolate, 5–9 × 0.8–1.8 cm, leathery, abaxially glabrous, adaxially glabrous except for sparsely puberulent main veins and margins, prominently 3-veined from above base, main veins conspicuously impressed, base cuneate, margin remotely mucronulate-dentate and when dry somewhat revolute, apex acuminate or acuminate-caudate. Upper leaves similar but gradually

smaller upward. Capitula solitary or paired in upper leaf axils; peduncles 1–2.5 cm, slender, divaricate, densely ferruginous puberulent, when paired bracteate at base, minutely and rather closely 7–9-bracteolate in upper part, sparsely puberulent; bracteoles linear-subulate, 2–3 mm, apically incurved. Involucres cylindric, 7–9 × 3–5 mm, calyculate; bracteoles of calyculus 5 or 6, linear-subulate, minute; phyllaries 10 or 11, linear or linear-lanceolate, 1–2 mm wide, subleathery, glabrous, margin broadly scarious, apically acute and sparsely puberulent. Florets 15 or 16; corolla yellow, ca. 7 mm, with 2–2.5 mm tube and narrowly funnellform limb; lobes oblong-lanceolate, ca. 1.5 mm, apically papillose, acute. Anthers linear, ca. 5 mm, prominently caudate, tails 2–3 × as long as antheropodia. Ovary cylindric, ca. 0.5 mm, glabrous. Style branches ca. 1.5 mm, truncate, with papillae divided at apex into 2 brushlike lobes. Pappus white, ca. 6.5 mm. Fl. Sep.

- Probably extinct. Guizhou (*Guiding*).

**98. PARASENECIO** W. W. Smith & J. Small, *Trans. & Proc. Bot. Soc. Edinburgh* 28: 93. 1922.

蟹甲草属 *xie jia cao shu*

Chen Yilin (陈艺林 *Chen Yi-ling*); Bertil Nordenstam, Hiroshige Koyama

Herbs, perennial. Rhizomes robust, erect or horizontal, with numerous fibrous roots. Stem solitary, erect, usually striate or sulcate, glabrous, arachnoid, or glandular puberulent. Leaves alternate, petiolate, simple or palmately or pinnately lobed, serrate. Capitula small or medium-sized, discoid, homogamous, all bisexual, fertile, few to numerous flowered, terminal or axillary, racemose or paniculate, pedunculate or sessile, often calyculate. Involucres cylindric or narrowly campanulate, rarely campanulate. Phyllaries uniseriate, free. Receptacle flat, paleaceous or not. Florets few to numerous; corolla yellow, white, or orange, tubular, with slender tube and narrowly campanulate or broadly tubular limb; lobes 5, lanceolate or ovate-lanceolate; anthers sagittate or caudate at base; antheropodium cylindric, filaments slender; style branches apically truncate or rather dilated with unequal papillae. Achenes cylindric, glabrous, ribbed. Pappus of capillary-like bristles, white, sordid white, or sordid fulvous-brown.

About 60 species: mainly in E Asia and the Sino-Himalayan region, also across Russia and one species in the Aleutian Islands; 52 species (43 endemic) in China.

- 1a. Leaves large, orbicular or orbicular-cordate, palmately divided, petioles basally amplexicaul, shortly vaginate (1. *P.* sect. *Taimingasa*) ..... 1. *P. firmus*
- 1b. Leaves large or medium-sized, not orbicular or orbicular-cordate, simple or divided, petioles basally not vaginate.
  - 2a. Radical leaves persistent, stem leaves 1, rarely 2, or bracteal-leaflike; capitula 3 or 4, or more; involucres campanulate or narrowly campanulate, phyllaries 8–10; florets 10–28 (2. *P.* sect. *Parasenecio*).

- 3a. Plants densely glandular pubescent; radical leaves broadly cordate, obtuse, or suborbicular; stem leaves 1, rarely 2, sessile or subsessile; capitula pendulous; phyllaries 8 or 9; florets 10–16, corolla white or pink-white ..... 2. *P. forrestii*
- 3b. Plants densely brown pubescent; radical leaves ovate or ovate-orbicular, stem leaves few, bracteal-leaflike, shortly petiolate; capitula erect; phyllaries 9 or 10; florets 28, corolla yellow ..... 3. *P. begoniifolius*
- 2b. Radical leaves withered by anthesis, or if persistent then florets 5; stem leaves few to numerous; capitula few to numerous, paniculate or racemose-paniculate; involucre cylindrical or narrowly campanulate; phyllaries 3–10, rarely more; florets (2 or)3–5(–8) or more.
- 4a. Involucre cylindrical, 2–5 mm; phyllaries 4–6; florets 2–6; leaves ovate or broadly ovate-cordate, irregularly coarsely toothed or shallowly 3–10-lobed; petioles not winged, basally not expanded (3. *P.* sect. *Koyamacalia*) .... 4. *P. chola*
- 4b. Involucre cylindrical or campanulate, more than 4 mm; phyllaries 3–8, rarely more; florets 3–15, rarely more; leaves polymorphic, irregularly coarsely toothed, shallowly lobed to divided; petioles winged or not, basally auriculate or not auriculate.
- 5a. Stem leaves numerous; leaf blade palmately divided; phyllaries 3–5, rarely 7 or 8; florets 3–5, rarely 10–14 (5. *P.* sect. *Delphiniifolii*).
- 6a. Leaf blade palmately 5–7-lobed, lobes obovate, oblong, or ovate-oblong.
- 7a. Leaf blade basally hastate, lobes broad, apically caudate or long acuminate; peduncles ca. 1 mm, glandular puberulent; phyllaries and florets 5 ..... 47. *P. delphiniifolius*
- 7b. Leaf blade basally subcordate, lobes narrow, apically acute; capitula sessile, brown puberulent; phyllaries and florets 3 ..... 48. *P. pilgerianus*
- 6b. Leaf blade palmately deeply 5–7-sect, lobes lanceolate or oblong-lanceolate to linear, rarely obovate or spatulate.
- 8a. Leaf blade broadly ovate, palmately deeply sect, lobes obovate or spatulate, lateral lobes 2-fid to deeply sect, both surfaces glabrous; phyllaries and florets 3; pappus white ..... 52. *P. tripteris*
- 8b. Leaf blade ovate-oblong, pentagonal-cordate, or orbicular-ovate, lobes lanceolate or oblong-lanceolate to linear.
- 9a. Leaves pinnate-palmately divided, lobes pinnately lobulate or 2–4-denticulate; phyllaries 4; (plants of Sichuan, Xizang, Yunnan) ..... 51. *P. palmatisectus*
- 9b. Leaves palmately lobed, lateral lobes often 1-lobulate or finely toothed; phyllaries 5, 7, or 8; (plants of Henan, Hubei, Shaanxi).
- 10a. Leaf blade 10–20 × 12–24 cm, 5–7-lobed; phyllaries 7 or 8; florets 10–14; achenes 5–6 mm; pappus red-brown ..... 49. *P. sinicus*
- 10b. Leaf blade 16–27 × 15–35 cm, (5 or)6–9-lobed; phyllaries 5; florets 5; achenes ca. 3 mm; pappus white ..... 50. *P. dissectus*
- 5b. Stem leaves few to numerous, triangular, triangular-ovate, reniform, polyangular, or ovate-cordate, coarsely toothed or shallowly lobed, adaxially glabrous, pubescent, or densely tomentose.
- 11a. Leaves adaxially glabrous or pubescent; capitula few to numerous, pedunculate or not; pappus white or red-brown (3. *P.* sect. *Koyamacalia*).
- 12a. Capitula few, or solitary at apex and axillary in upper leaves, pendulous; involucre campanulate, 5–10 mm in diam.; phyllaries 8–10; florets numerous, ca. 38; leaves triangular; petioles not winged ..... 5. *P. deltophyllus*
- 12b. Capitula numerous or more in terminal racemes or panicles; involucre cylindrical or narrowly campanulate, (1–)3–5 mm in diam.; phyllaries 3–8; florets few; leaves not triangular; petioles winged or not.
- 13a. Capitula numerous, small; involucre cylindrical, 1–2 mm in diam.; phyllaries and florets 3–5; leaf blade polyangular or reniform, 5–7-lobed or coarsely toothed; corolla white or yellow.
- 14a. Capitula sessile; involucre ca. 5 × 1 mm; phyllaries and florets 3 or 5; corolla white; pappus sordid white or pale yellow-brown ..... 18. *P. ambiguus*
- 14b. Capitula pedunculate; involucre 6–8 × 1.5–2 mm; phyllaries and florets 5; corolla white or yellow; pappus white or yellow-brown.
- 15a. Capitula racemose or compound racemose; peduncles short or very short; involucre cylindrical; phyllaries obtuse or rounded; pappus white ..... 19. *P. ainsliaeiflorus*
- 15b. Capitula laxly racemose or compound racemose; peduncles 1–2 mm; involucre narrowly campanulate; phyllaries acute; corolla yellow; pappus pale yellow-brown ..... 20. *P. kangxianensis*
- 13b. Capitula more numerous, larger; involucre 3–5 or 10–20 mm in diam.; pappus white, sordid white, or red-brown.
- 16a. Involucre campanulate, 10–15 × 10–20 mm; phyllaries 7–12; florets 8–38; pappus red-brown.
- 17a. Leaves broadly triangular, 3–5-lobed, lobes triangular, basal lobes sometimes rudimentary; capitula smaller; involucre narrowly campanulate, 10–12 × 5–10 mm; phyllaries 7 or 8; florets 8–10 ..... 21. *P. rubescens*

- 17b. Leaves pentagonal-hastate, lateral lobes small, narrowly triangular or obscure; capitula large; involucre campanulate, 13–15 × 17–20 mm; phyllaries 12; florets numerous (ca. 38) .... 22. *P. matsudae*
- 16b. Involucre 5–8(–10) mm; phyllaries and florets 4–8, rarely more; pappus white or sordid white.
- 18a. Petioles not winged, basally not expanded into auricles.
- 19a. Leaf axils with buds.
- 20a. Leaf blade hastate-triangular, apex acuminate or long acuminate, base cordate, both surfaces scaly puberulent; phyllaries 7 or 8; florets 10–13; pappus white ..... 14. *P. nokoensis*
- 20b. Leaf blade broadly triangular-hastate or ovate-triangular, apex long acuminate or caudate, base hastate or broadly cordate, adaxially densely glandular pubescent; phyllaries and florets 5; pappus brown or purple-brown ..... 15. *P. hastiformis*
- 19b. Leaf axils without buds.
- 21a. Leaf blade triangular-hastate, apex acute or acuminate, base broadly cordate, both surfaces glabrous or subglabrous; phyllaries 5; florets 5 or 6 ..... 16. *P. albus*
- 21b. Leaf blade pentagonal-reniform, apex acute or rounded-obtuse, base deeply cordate, abaxially hispidulous, adaxially on veins puberulent; phyllaries 8(or 9); florets 16–19 ..... 17. *P. vespertilio*
- 18b. Petioles winged.
- 22a. Petioles narrowly or indistinctly winged, basally not expanded into auricles.
- 23a. Capitula pendulous, arranged in pyramidal panicles; phyllaries 7 or 8, glandular pubescent; florets 8–15(–20); blade triangular-hastate, adaxially densely or laxly pubescent; petioles narrowly winged ..... 6. *P. hastatus*
- 23b. Capitula erect, arranged in broadly pyramidal panicles with long divaricate branches; phyllaries 5 or 6; florets 5–8; blade triangular-lanceolate, apex acuminate or caudate, adaxially laxly pilose on veins or subglabrous; petioles indistinctly winged ..... 7. *P. lancifolius*
- 22b. Petioles broadly winged, base often expanded and auriculate.
- 24a. Plants to 2–3 m tall, stems robust; leaves broadly triangular or triangular-hastate, petioles with 1.5–2 cm wide wings, base expanded and amplexicaul-auriculate; capitula numerous, 250–350, in broad pyramidal panicles; phyllaries 4 or 5; florets 5–7 ..... 8. *P. komarovianus*
- 24b. Plants 30–100 cm tall; stems slender; leaves reniform or triangular-reniform, petioles large or small auriculate; capitula more numerous, racemose or paniculate; phyllaries 4 or 5; florets 4–7.
- 25a. Leaf blade oblate-reniform, thinly papery, retuse or subtruncate, triangular-rostrate at center, margin irregularly coarsely toothed stipitate glandular hairy; petioles basally entire or dentate auriculate; phyllaries 4; florets 5 ..... 9. *P. maowenensis*
- 25b. Leaf blade not oblate-reniform, papery, apically constricted long apiculate, with regular teeth or with concave teeth at subbasal margins glandular puberulent; phyllaries 5; florets 4–7(or 8).
- 26a. Leaves reniform or triangular-reniform, both surfaces glabrous.
- 27a. Phyllaries 4–8 mm, 1/3–1/2 as long as corolla and pappus by anthesis; capitula racemose, rarely paniculate; petioles basally expanded and small auriculate ..... 10. *P. auriculatus*
- 27b. Phyllaries 8–12 mm, subequal to or rather shorter than corolla by anthesis; capitula laxly or densely paniculate; petioles basally with 1.5–2 cm wide auricle ..... 11. *P. praetermissus*
- 26b. Leaves triangular-hastate or ovate to broadly ovate, adaxially hairy.
- 28a. Median stem leaves triangular-hastate, lateral lobes triangular, irregularly repand-dentate, adaxially puberulent on veins; petioles toward base gradually expanded into ovate-orbicular or orbicular, 1.5–2.5 cm wide auricle; auricles entire or remotely toothed; phyllaries 5; florets 5 or 6 ..... 12. *P. gansuensis*
- 28b. Stem leaves broadly ovate or broadly cordate, adaxially sparsely arachnoid or subglabrous; petioles with 5–10 mm wide wings, basally expanded into a large amplexicaul auricle; phyllaries (3 or)5; florets 3 or 4(or 5) ..... 13. *P. otopteryx*
- 11b. Leaves adaxially arachnoid, densely lanate, or hairy initially, gradually glabrescent (4. *P. sect. Monanthi*).
- 29a. Plants glabrous or sparsely arachnoid in upper part; leaves triangular, ovate-triangular, or hastate-triangular, distinctly prominently 3-veined; anthers basally long caudate.
- 30a. Leaves divided.
- 31a. Leaf blade obovate-spatulate, lyrate-pinnate; lobes ovate, oblong, or obovate-triangular, coarsely toothed, adaxially arachnoid-tomentose; petioles broadly winged, basally expanded into auricle; phyllaries and florets 5 or 6 ..... 32. *P. cyclotus*

- 31b. Leaf blade 3–5-lobed to medially sect.
- 32a. Leaves reniform-pentangular or broadly ovate-pentangular; petioles not winged, often with many globose bulblets in upper branches of synflorescence; phyllaries and florets 4 or 5 ..... 29. *P. quinquelobus*
- 32b. Leaves reniform-triangular or broadly ovate; petioles winged, but without bulblets.
- 33a. Leaf blade broadly triangular, 3-lobed, central lobe 3-fid, lateral lobes 2-fid, abaxially white arachnoid-tomentose; petioles narrowly winged, basally without auricle; phyllaries and florets 4 or 5 ..... 30. *P. rockianus*
- 33b. Leaf blade reniform-triangular or broadly ovate, medially 3–5-sect, lobes lobulate or coarsely toothed, abaxially white arachnoid-tomentose, adaxially densely brown hispidulous; petioles broadly winged, basally auriculate; phyllaries 5; florets 8(–10) ..... 31. *P. souliei*
- 30b. Leaves not divided.
- 34a. Petioles winged, often expanded into subamplexicaul auricle; capitula pendulous.
- 35a. Leaf blade ovate-triangular to broadly triangular, stiffly papery; petioles broadly winged, basally expanded into broad or narrow auricle; phyllaries 3; florets 5 or 6 ..... 23. *P. latipes*
- 35b. Leaf blade triangular or triangular-hastate, thick, abaxially arachnoid-tomentose; petioles with 4–15 mm in diam. orbicular auricles; phyllaries 6–8; florets 9–12(–14) ..... 24. *P. lidjiangensis*
- 34b. Petioles not winged, base not or ± expanded, but without auricles; capitula ascending or pendulous.
- 36a. Stem leaves numerous, crowded at middle part of stem; leaves ovate or reniform-triangular, margin with cartilaginous coarse teeth; capitula laxly racemose, but not secund; phyllaries 3; florets 2 or 3 ..... 27. *P. tenianus*
- 36b. Stem leaves 3 or 4, often crowded at middle to lower part of stem; capitula secund.
- 37a. Radical leaves withered and fallen by anthesis; leaf blade membranous or submembranous, broadly ovate or ovate-oblate, abaxially densely white tomentose; florets (6–)8 or 9 ..... 25. *P. taliensis*
- 37b. Radical leaves persistent at anthesis; leaf blade papery, ovate-triangular, broadly ovate, or rhombic, abaxially not white tomentose; florets 5.
- 38a. Stems yellow-brown multicellular pubescent; leaves often crowded in lower middle part of stem, ovate-triangular or broadly ovate, rarely rhombic or cordate, abaxially yellow-brown villous; capitula narrowly paniculate ..... 28. *P. koualapensis*
- 38b. Stems slender, glabrous; leaves crowded near base of stem, ovate-orbicular or cordate, abaxially becoming purple when dry, glabrous; capitula spicate ..... 26. *P. jiulongensis*
- 29b. Plants all or at least upper part arachnoid or villous; leaf blade ovate-triangular, ovate-cordate, or cordate, basally 3-veined or palmately 5–7-veined, abaxially arachnoid, glandular hairy, or ± glabrescent.
- 39a. Leaf blade ovate-triangular, ovate, or cordate, usually basally 3-veined; phyllaries (2 or)3–5; florets 1–5, rarely more.
- 40a. Capitula numerous, spreading or pendulous, racemose or paniculate; phyllaries (2 or)3; florets 1–3, rarely 4.
- 41a. Phyllaries 2; floret 1; leaves 4, lax on stem, subtriangular-reniform, abaxially densely lanate, adaxially crisped-volute hairy; petioles not winged ..... 35. *P. morrisonensis*
- 41b. Phyllaries 2 or 3(or 4); florets 3(or 4); leaf blade ovate-triangular or broadly cordate; petioles winged or not.
- 42a. Capitula laxly pyramidal-paniculate, pendulous, secund; leaves ovate-triangular, abaxially white or gray-white arachnoid; petioles not winged ..... 33. *P. roborowskii*
- 42b. Capitula narrowly racemose-paniculate, spreading; leaves broadly cordate, abaxially sparsely arachnoid, adaxially sparsely hairy; petioles narrowly winged ..... 34. *P. xinjiashanensis*
- 40b. Capitula laxly paniculate or narrowly racemose-paniculate; phyllaries 5; florets 5 or 6, rarely 10–13.
- 43a. Stem leaves 4 or 5; petioles winged.
- 44a. Leaves membranous, broadly ovate to ovate-rhombic, acute, angular coarsely toothed; petioles distinctly winged ..... 36. *P. profundorum*
- 44b. Leaves thinly papery, broadly ovate or ovate-triangular, caudate-acuminate, serrulate; petioles indistinctly winged or not winged; uppermost leaves bractlike ..... 37. *P. phyllolepis*
- 43b. Stem leaves 2–4(or 5); petioles not winged.
- 45a. Stems slender, glabrous; stem leaves 2 or 3, broadly cordate-orbicular or ovate-cordate-orbicular or ovate-cordate, abaxially violet or purplish, sparsely arachnoid; capitula broadly paniculate; involucre 12–14 × 1.5–2 mm, glabrous; florets 5 or 6 ..... 38. *P. ianthophyllus*

- 45b. Stems robust, white arachnoid; stem leaves 4 or 5, ovate-triangular or triangular-hastate, abaxially white arachnoid; capitula narrowly paniculate; involucre 8–10 × 4–5 mm, outside white lanate; florets 10–13 ..... 39. *P. leucocephalus*
- 39b. Leaf blade broadly ovate-cordate or cordate, palmately 5–7-veined, abaxially arachnoid-tomentose or glandular hairy; phyllaries 3–5(or 6); florets (2–)5–8(–10).
- 46a. Phyllaries 3 or 4; florets 2–4; plants adpressed gray-white arachnoid-lanate, intermixed glandular puberulent ..... 40. *P. longispicus*
- 46b. Phyllaries 5; florets 5–8(–10); plants arachnoid or red-brown glandular pubescent.
- 47a. Axillary scale buds ovoid-globose, brown tomentose; capitula racemose, upper part laxly bracteate, often with bulblets; phyllaries 5 or 6; florets 8–10 ..... 41. *P. bulbiferoides*
- 47b. Bulblets absent from leaf axils and bracts; capitula spicate-racemose or paniculate.
- 48a. Stems, petioles, and involucre arachnoid or later ± glabrescent.
- 49a. Capitula spicate-racemose; involucre 12–14 mm; florets 5–8; petioles 5–14 cm, not winged, basally not expanded ..... 42. *P. petasitoides*
- 49b. Capitula laxly narrowly paniculate; involucre ca. 10 mm; florets 7 or 8; petioles indistinctly narrowly winged, basally expanded and subamplexicaul ..... 43. *P. hwangshanicus*
- 48b. Stems, petioles, and involucre red-brown or brown villous or knotted glandular pubescent.
- 50a. Lower stems glandular pubescent, upper part white arachnoid or hispidulous; peduncles 3–4 mm; corolla orange ..... 46. *P. dasythyrsus*
- 50b. Stems, petioles, and phyllaries red-brown or brown pubescent; peduncles very short or capitula subsessile; corolla yellow.
- 51a. Leaf blade broadly ovate-cordate or reniform, triangularly 5-lobed or deeply serrate, red-brown hyaline glandular hairy; petioles 5–10 cm, basally not expanded ..... 44. *P. rufipilis*
- 51b. Leaf blade reniform or ovate, undulate-lobed, lobes broadly triangular, abaxially arachnoid or puberulent, adaxially brown puberulent; petioles 10–15 cm, basally expanded, subamplexicaul ..... 45. *P. tsinlingensis*

**1. Parasenecio sect. Taimingasa** (Kitamura) H. Koyama in Iwatsuki et al., Fl. Japan 3b: 47. 1995.

鞘叶组 qiao ye zu

*Cacalia* sect. *Taimingasa* Kitamura, Acta Phytotax. Geobot. 20: 172. 1962.

Leaves large, few, usually 2 or 3; blade orbicular, palmately medially sect; petioles amplexicaul, shortly sheathed at base. Involucres narrowly campanulate; phyllaries 3–5. Florets 5–10. Pappus sordid white.

Five species: China, Japan, Korea; one species in China.

**1. Parasenecio firmus** (Komarov) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 26. 1999.

大叶蟹甲草 da ye xie jia cao

*Cacalia firma* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 18: 420. 1901; *Koyamacalia firma* (Komarov) H. Robinson & Brettell; *Miricacalia firma* (Komarov) Nakai.

Stems erect, striate, to 2 m tall, robust, 1.5–2 cm in diam. at base, terete, glabrous. Radical leaves long petiolate, large; petiole 22–28 cm, stout, crisped-pubescent; blade abaxially pale green, adaxially green, orbicular or orbicular-cordate, ca. 30 × 35–100 cm, palmately medially cleft, base cordate, apex acute; lobes 11–15, triangular-ovate, adaxially glabrous, retic-

ulate veined, abaxially puberulent on veins, margin irregularly mucronulate-serrate, apically acute. Stem leaves small; petiole short, 3–8 mm, stout; leaf blade ovate-triangular or ovate-oblong. Peduncles 10–12 × 2–3 mm, with linear bracteoles. Phyllaries 5, linear-lanceolate, 10–12 × 1.5–2 mm, sparsely puberulent or subglabrous, with membranous margins, apex obtuse or slightly acute. Florets 5–10; corolla yellow, 8–10 mm, tube slender, ca. 3.5 mm, limb narrowly tubular; lobes 5, linear-lanceolate, ca. 2 mm. Anthers basally caudate; style branches excurved, apex truncate, penicillate-papillose. Achenes yellow-brown, cylindric, 5–6 mm, glabrous, ribbed. Pappus white or sordid white, ca. 7 mm. Fl. Aug–Sep, fr. Oct.

Forest understories, forest margins, open spaces; 800–1100 m. Jilin [N Korea].

**2. Parasenecio sect. Parasenecio**

蟹甲草组 xie jia cao zu

Radical leaf 1, stem leaves 1, rarely 2 or few, bracteal-leaflike. Capitula 3 or 4 to numerous, erect or pendulous, narrowly paniculate. Involucres campanulate or narrowly campanulate; phyllaries uniseriate or nearly biseriate, 8–10. Florets 10–28. Pappus white.

- Two species: China.

**2. *Parasenecio forrestii*** W. W. Smith & J. Small, Trans. & Proc. Bot. Soc. Edinburgh 28: 93. 1922.

蟹甲草 xie jia cao

*Cacalia forrestii* (W. W. Smith & J. Small) Handel-Mazzetti.

Rhizomes slender, woody, scabrous. Stem solitary, 60–80 cm tall, striate, densely glandular pubescent at base, with laxly paniculate synflorescence branches in upper part, densely glandular pubescent. Leaves petiolate, often crowded in lower part, usually 3. Radical leaf 1, large; petiole 3–5 cm, not winged, densely pubescent; leaf blade cordate, 10–12 × 14–17 cm, abaxially densely villous on veins, adaxially villous, ± reticulate, apex obtuse. Stem leaves usually 1, rarely 2, similar to radical leaves but smaller, sessile or subsessile, elliptic-triangular. Capitula numerous, pendulous, narrowly paniculate; peduncles 0.5–5 cm, puberulent; bracteoles 1–4. Involucres campanulate, 1.3–1.4 cm; phyllaries 8 or 9, subbiseriate; outer phyllaries 3 or 4, larger, puberulent. Florets 10–16; corolla pale pink-white. Anthers caudate at base. Style branches excurved, truncate, penicillate-papillose. Achenes cylindrical, 5–6 mm, glabrous, 5-ribbed. Pappus white, ca. 8 mm. Fl. Aug. fr. Sep–Oct.

- Forest understories; 2300–3700 m. SW Sichuan, Yunnan.

*Parasenecio forrestii* is quite similar to *P. begoniifolius* in aspect, but the form of the leaves and indumentum are different.

**3. *Parasenecio begoniifolius*** (Franchet) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 28. 1999.

秋海棠叶蟹甲草 qiu hai tang ye xie jia cao

*Senecio begoniifolius* Franchet, J. Bot. (Morot) 8: 358. 1894; *Cacalia begoniifolia* (Franchet) Handel-Mazzetti.

Plants densely brown multicellular pubescent throughout, with numerous, stout, fibrous roots. Stem solitary, ca. 50 cm tall, erect or curved from base, striate, with 1 radical leaf and few scaly leaflets. Radical leaves long petiolate; petiole 7–15 cm, stout, not winged, densely fulvous-brown tomentulose, base ± expanded, slightly amplexicaul; blade abaxially pale green, adaxially deep green, broadly ovate or ovate-orbicular, 15–20 × 12–13 cm, papery, both surfaces red-brown puberulent, basally 7–9-veined, lateral veins branched, base deeply cordate, margin irregularly mucronulate-serrate, apex acute. Stem leaves few, shortly petiolate, bracteal-leaflike, lanceolate, ca. 2 cm. Capitula usually 3 or 4, terminal or on synflorescence branches arranged in narrow panicle; peduncles erect, 5–15 mm, densely pubescent; bracteoles 3–5, linear. Involucres narrowly campanulate, 7–9 × 1–1.5 mm, puberulent, margin narrowly scarious, apically acute or acuminate; phyllaries 9 or 10. Florets 28, longer than involucres; corolla yellow, 9–10 mm, tube 3–4 mm, slender, limb broadly tubular; lobes lanceolate, ca. 2 mm. Anthers caudate at base. Style branches excurved, truncate, papillose. Achenes cylindrical, glabrous, ribbed. Pappus white, ca. 1 cm. Fl. Nov–Dec.

- Forest understories on slopes, forest margins, roadsides; 700–2200 m. Chongqing (Chengkou), W Hubei (Badong), E Sichuan (Daba Shan).

**3. *Parasenecio* sect. *Koyamacalia*** (H. Robinson & Brettell) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 28. 1999.

小山蟹甲草组 xiao shan xie jia cao zu

*Koyamacalia* H. Robinson & Brettell, Phytologia 27: 270. 1973.

Stem leaves numerous, triangular or ovate-hastate to reniform, abaxially not arachnoid. Capitula numerous. Involucres cylindrical to campanulate; phyllaries 3–12. Florets 3–38; corolla white or yellow. Pappus white, rarely yellow-brown or red-brown.

About 26 species: Eurasia from Russia to E Asia; 19 species (14 endemic) in China.

**1. *Parasenecio* ser. *Trilobi*** (H. Koyama) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 29. 1999 [*“Trilobae”*].

三裂叶蟹甲草系 san lie ye xie jia cao xi

*Cacalia* ser. *Trilobae* H. Koyama, Mem. Fac. Sci. Kyoto Univ., Ser. Biol. 2(2): 170. 1969.

Petiole basally expanded into an amplexicaul auricle or not; leaf blade ovate or broadly ovate-cordate, 3-lobed or coarsely toothed. Involucres cylindrical, 2–4 mm; phyllaries 4 or 5. Florets 2–5.

One species: China, India (Sikkim), Kashmir, Nepal.

**4. *Parasenecio chola*** (W. W. Smith) R. C. Srivastava & C. Jeffrey, J. Bombay Nat. Hist. Soc. 93(2): 318. 1996.

藏南蟹甲草 zang nan xie jia cao

*Senecio chola* W. W. Smith, J. Proc. Asiat. Soc. Bengal 7: 72. 1911.

Rhizomes woody, densely yellow-brown tomentose on collar, with few fibrous roots. Stem solitary, erect, 50–100 cm tall, sulcate, simple or inflorescence-branched in upper part,

sparsely puberulent in lower part, densely yellow-brown pubescent in upper part. Leaves long petiolate; petiole not winged, 7–11 cm, sparsely pubescent, not expanded at base; blade abaxially pale green, adaxially green, ovate or ovate-cordate, 10–18 × 9–17 cm, abaxially yellow-brown puberulent on veins, adaxially sparsely adpressed hairy, basally 3–5-veined, lateral veins branched from midvein, base cordate or subtruncate, margin irregularly coarsely, triangularly mucronulate-toothed, rarely 3–10-lobed, apex acute or acuminate. Capitula numerous, small,

terminal and in upper leaf axils, crowded in paniculate racemes, sessile or subsessile, densely yellow-brown pubescent. Involucres cylindric, 2–5 mm; phyllaries 4–6, linear, 5–6 mm, densely puberulent, margin scarios, apically obtuse. Florets 2–

6; corolla yellow, shorter than involucre. Achenes cylindric, ca. 2 mm, glabrous, ribbed. Pappus pale brown. Fl. Jul–Aug.

Forest understories; 3300–3800 m. S Xizang (Gyirong) [India (Sikkim), Kashmir, Nepal].

**2. Parasenecio ser. Candidi** (Kitamura) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 30. 1999 [“*Candidae*”].

戟叶蟹甲草系 *ji ye xie jia cao xi*

*Cacalia* ser. *Candidae* Kitamura, Compos. Jap. 3: 203. 1942.

Leaves reniform or triangular-ovate to hastate, margin toothed or shallowly lobed. Involucres cylindric or narrowly campanulate; phyllaries 3–8, rarely 10. Florets 3–5, rarely more. Pappus white, rarely yellow-brown.

About 20 species: China, N Japan, Korea, Mongolia, Russia; 13 species (nine endemic) in China.

**5. Parasenecio deltophyllus** (Maximowicz) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 30. 1999.

三角叶蟹甲草 *san jiao ye xie jia cao*

*Senecio deltophyllus* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 487. 1882; *Cacalia deltophylla* (Maximowicz) Mattfeld ex Rehder & Kobuski; *Koyamacalia deltophylla* (Maximowicz) H. Robinson & Brettell.

Rhizomes robust, elongate with numerous fibrous roots. Stem solitary, erect, 50–80 cm tall, distinctly sulcate, sparsely pubescent or subglabrous. Leaves petiolate; lower leaves withered and fallen; petiole 3–6 cm, not winged, white crisped and glandular hairy. Median leaves triangular, 4–10 × 5–7 cm, abaxially sparsely puberulent, adaxially glabrous, basally 3–5-veined, lateral veins upward divaricate, base truncate or cuneate, margin irregularly undulate-toothed, teeth obtuse and mucronulate, apex acute. Upper leaves shortly petiolate, lanceolate. Capitula few to 10, pendulous, terminal or in upper leaf axils, corymbose; peduncles 1–3 cm, sparsely crisped- and glandular hairy; bracteoles 3–8, linear. Involucres campanulate, 6–8 × 5–10 mm; phyllaries 8–10, oblong, ca. 8 × 2–3 mm, outside sparsely white pubescent and glandular hairy, barbate, with broad scabrous margins, apex acuminate. Florets numerous (ca. 38); corolla yellow or yellow-brown, 5–7 mm, with ca. 3 mm tube and campanulate limb; lobes lanceolate, apex puberulent. Anthers caudate at base. Style branches finely long excurved, apex truncate, long papillose. Achenes cylindric, 3–4 mm, glabrous, ribbed. Pappus white, 6–7 mm. Fl. Jul–Aug, fr. Sep.

• Forest understories, slopes, thickets in valleys, shaded places; 3100–4000 m. Gansu, Qinghai, N Sichuan.

**6. Parasenecio hastatus** (Linnaeus) H. Koyama in Iwatsuki et al., Fl. Japan 3b: 52. 1995.

山尖子 *shan jian zi*

Rhizomes procumbent, with numerous fibrous roots. Stem stiff, erect, 40–150 cm tall, simple, sulcate, glabrous or subglabrous in lower part, densely glandular puberulent in upper part. Lower leaves withered and fallen at anthesis. Median leaf petiole 4–5 cm, narrowly winged, not expanded at base; blade abaxially pale green, adaxially green, triangular-hastate, 7–10 × 13–19 cm, basal lateral lobes sometimes incised-lobulate, abaxially densely pubescent, adaxially glabrous or sparsely pu-

berulent, base hastate or subcordate, margin irregularly finely toothed, apex acute or acuminate. Upper leaves smaller; basal lobes rudimentary, triangular or subrhombic, base truncate or broadly cuneate, apex acuminate. Uppermost bracteal leaves lanceolate to linear. Capitula numerous, pendulous, apically and in upper leaf axils narrowly pyramidal-paniculate; peduncles 4–20 mm, densely glandular puberulent. Involucres cylindric, 9–11 × 5–8 mm; phyllaries 7 or 8, linear or lanceolate, ca. 2 mm wide, apex acute, with 2 subulate bractlets. Florets 8–15(–20); corolla whitish, 9–11 mm, with ca. 4 mm tube narrowly campanulate, limb lobes lanceolate, apically acuminate. Anthers caudate at base. Style branches slender, excurved, apically truncate, papillose. Achenes pale brownish, cylindric, 6–8 mm, glabrous, ribbed. Pappus white, equal to achenes or shorter. Fl. Jul–Aug, fr. Sep–Oct.  $2n = 40, 60$ .

Forest understories, slopes, grasslands, forest margins, roadsides. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shanxi [N Japan, Korea, Mongolia, Russia (Far East)].

- 1a. Leaves abaxially and phyllaries outside densely glandular puberulent ..... 6a. var. *hastatus*
- 1b. Leaves glabrous or veins sparsely puberulent; phyllaries outside glabrous or puberulent only at base ..... 6b. var. *glaber*

**6a. Parasenecio hastatus var. hastatus**

山尖子(原变种) *shan jian zi (yuan bian zhong)*

*Cacalia hastata* Linnaeus, Sp. Pl. 2: 835. 1753; ?*C. hastata* subsp. *orientalis* Kitamura; *C. hastata* var. *pubescens* Ledebour; *Hasteola hastata* (Linnaeus) Pojarkova; *Koyamacalia hastata* (Linnaeus) H. Robinson & Brettell; *Senecio sagittatus* Schultz Bipontinus; *S. sagittatus* var. *pubescens* (Ledebour) Maximowicz.

Leaves abaxially and phyllaries outside densely glandular puberulent.

Forest understories, grasslands along forest margins; 1700–2300 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shanxi [N Japan, Korea, Mongolia, Russia (Far East)].

**6b. Parasenecio hastatus var. glaber** (Ledebour) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 33. 1999.

无毛山尖子 *wu mao shan jian zi*

*Cacalia hastata* var. *glabra* Ledebour, Fl. Altaic. 4: 52. 1833.

Leaves glabrous or veins sparsely puberulent. Phyllaries outside glabrous or only puberulent at base.

• Forest understories on slopes, forest margins, roadsides. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shanxi.

**7. *Parasenecio lancifolius*** (Franchet) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 33. 1999.

披针叶蟹甲草 pi zhen ye xie jia cao

*Senecio sagittatus* Schultz Bipontinus var. *lancifolius* Franchet, J. Bot. (Morot) 10: 421. 1896 [*“lancifolia”*]; *Cacalia hastata* Linnaeus subsp. *lancifolia* (Franchet) H. Koyama; *C. hastata* var. *lancifolia* (Franchet) H. Koyama.

Rhizomes robust, 1.5–2 cm in diam., with numerous fibrous roots. Stem solitary, erect, green or purple in lower part, striate, 90–200 cm tall, glabrous, long naked in lower part. Leaves long petiolate, lower leaves withered at anthesis; petiole 3–5 cm, not or inconspicuously winged; blade abaxially pale green, adaxially deep green, triangular-lanceolate to lanceolate, 18–20 × 4–8 cm, abaxially sparsely puberulent or subglabrous on veins, adaxially glabrous, base 3–5-veined, lateral veins numerous, upward divaricate, reticulately connected, base truncate or rarely subcordate, apex long acuminate or caudate, lateral lobes excurved or spreading, narrowly triangular-lanceolate, small, sometimes indistinct, margin equally denticulate or triangularly coarsely toothed, teeth long mucronulate. Upper leaves smaller, lanceolate or narrowly lanceolate, lateral lobes very small or inconspicuous, shortly acute. Capitula numerous, terminal and in upper leaf axils in a large divaricately branched panicle; branches spreading or ascending, rachis and peduncles yellow-brown glandular puberulent; peduncles (3–)5–8 mm, slender, with 2 or 3 linear or subulate bractlets. Involucres cylindrical, 10–13 × 2–3 mm; phyllaries 5 or 6, green or purple, linear-lanceolate, 10–12 × 1–1.5 mm, outside glabrous or laxly puberulent at base, margin narrowly scarious, apex obtuse or rather acute. Florets 5–8, shorter than involucres or subequal to involucres; corolla yellow, 8–9 mm, with 3–3.5 mm tube and broadly tubular limb; lobes lanceolate. Anthers caudate at base. Style branches not curved, apex truncate, papillose. Achenes yellow-brown, cylindrical, 5–6 mm, glabrous, ribbed. Pappus white, 7–8 mm. Fl. Jul–Aug, fr. Sep.

• Forest understories on slopes, thickets, wet places in grasslands; 1300–2100 m. Chongqing, W Hubei, E Sichuan.

*Parasenecio lancifolius* is similar to *P. hastatus* in leaf form but differs in having upper stem leaves triangular-lanceolate or narrowly lanceolate, capitula arranged in large divaricately branched panicles, and different numbers of phyllaries and florets.

**8. *Parasenecio komarovianus*** (Pojarkova) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 34. 1999.

星叶蟹甲草 xing ye xie jia cao

*Hasteola komaroviana* Pojarkova, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 20: 381. 1960; *Cacalia hastata* Linnaeus subsp. *komaroviana* (Pojarkova) Kitagawa; *C. komaroviana* (Pojarkova) Pojarkova.

Rhizomes procumbent, with numerous stout fibrous roots.

Stems robust, erect, (70–)100–200(–300) cm tall, 8–12 mm in diam. in lower part, striate, glabrous or laxly pubescent. Lower leaves withered by anthesis; petiole 1/3–1/2 as long as blade, with 1.5–2 cm wide wings, basally expanded into an amplexicaul auricle. Median leaf petiole decurrent into a broad wing; median leaves abaxially pale green, adaxially dark green, triangular-hastate, rarely broadly triangular-hastate, 20–30 × 20–50 cm, abaxially glandular puberulent on veins, adaxially sparsely puberulent, 3-veined from base, lateral veins upward divaricate, base truncate or subcordate, margin irregularly triangularly or lanceolate toothed, thin, apex caudate-acute; lateral lobes usually 2-lobed, lobules narrowly lanceolate, apex acute, slightly retuse. Upper leaves smaller, shortly petiolate. Lower leaves 1 or 2, similar to median stem leaves, but rather narrow, triangular-hastate, 2- or 3-fid or lateral lobes with smaller teeth on margins. Capitula quite numerous, 250–350, crowded at apices of stems in 20–50 cm large pyramidal panicles; lower synflorescence branches to 22 cm, ascending; upper branches erect or spreading; peduncles 4–12 mm, slender; rachis and peduncles often densely glandular puberulent. Involucres narrowly cylindrical, 9–12 × 2–3 mm; phyllaries 4 or 5, green, linear-lanceolate, 9–12 mm, outside sparsely glandular puberulent or subglabrous, margin scarious, apically acute. Florets 5–7; corolla yellow, 7–8 mm, with 1.5–2 mm tube and campanulate-tubular limb; lobes lanceolate. Anthers ca. 3 mm, basally caudate. Style branches long excurved, apically truncate, papillose. Achenes cylindrical, 7–8 mm, glabrous, ribbed. Pappus white, ca. 7 mm. Fl. Jul–Aug, fr. Sep.

Forest understories, forest margins; 800–2000 m. Jilin, Liaoning [Korea, Russia (Far East)].

**9. *Parasenecio maowenensis*** Y. L. Chen, Acta Phytotax. Sin. 34: 645. 1996.

茂汶蟹甲草 mao wen xie jia cao

Rhizomes short, stout, ca. 1 cm in diam., with numerous fibrous roots. Stem solitary, erect or curved in lower part, 60–65 cm tall, slender, striate, long naked in lower part, sparsely or densely yellow-brown capitate stipitate glandular hairy. Lower leaves withered by anthesis; petiole 4–8.5 cm, not winged, expanded into an amplexicaul auricle; auricle entire or laxly toothed, with capitate stipitate glandular hairs. Stem leaves 2, long petiolate; blade abaxially pale green, adaxially deep green, broadly reniform, 6–9 × 12–14 cm, thinly papery, both surfaces glabrous, capitate stipitate glandular hairy, basally 3–5-veined, lateral veins upward divaricate, base deeply cordate, margin irregularly undulate coarsely toothed, large teeth angular, stiffly mucronulate, apex retuse or subtruncate, triangular-rostrate-acute at center. Uppermost leaves reduced to bracteal leaf; bracteal leaves linear, 6–8 mm. Capitula very numerous, apically in a branched panicle; rachis and peduncles densely yellow-brown capitate stipitate glandular hairy; peduncles 6–13 mm, slender, with 1 or 2 linear bractlets. Involucres cylindrical, 10–11 × 2–3 mm; phyllaries 4, green, linear or linear-lanceolate, 0.5–1 mm wide, outside sparsely capitate stipitate glandular hairy, margin narrowly scarious, apically acute. Florets 5, exerted from involucres; corolla yellow, 8–9 mm, with ca. 3 mm tube and narrowly campanulate limb; lobes lanceolate, ca. 2 mm. An-

thers caudate at base. Style branches excurved, apex truncate, papillose. Achenes yellow-brown, cylindric, ca. 6 mm, glabrous, ribbed. Pappus white, ca. 7 mm. Fl. and fr. Aug.

- Open places on slopes; ca. 2800 m. Sichuan (Wenchuan).

*Parasenecio maowenensis* is similar to *P. auriculatus* but differs in the shape of leaves, the indumentum, and the number of phyllaries and florets.

**10. *Parasenecio auriculatus*** (Candolle) J. R. Grant, Novon 3: 154. 1993.

耳叶蟹甲草 er ye xie jia cao

*Cacalia auriculata* Candolle, Prodr. 6: 329. 1838; *C. auriculata* var. *ochotensis* (Maximowicz) Komarov; *Hasteola auriculata* (Candolle) Pojarkova; *Koyamacalia auriculata* (Candolle) H. Robinson & Brettell; *Senecio dahuricus* Schultz Bipontinus; *S. dahuricus* var. *ochotensis* Maximowicz.

Rhizomes procumbent, with numerous fibrous roots. Stem solitary, erect or often curved, 30–100 cm or taller, sulcate, glabrous. Radical leaves withered often by anthesis; stem leaves 4–6, thinly papery; lower leaf petiole 1.5–2(–3) × as long as blade, slender, expanded at base only, but without auricle. Lower stem leaves 1 or 2; blade reniform, 2–4 × 4–7 cm, margin with unequally sized large teeth, apex contracted and long acute or sometimes slightly retuse. Median stem leaf petiole equal to blade or 1/4–1/2 as long, basally usually expanded into a small auricle; blade reniform to triangular-reniform, 5–16 × 7–14 cm, margin with equal large teeth or teeth retuse or indistinctly toothed near base, rarely entire, apex deeply retuse or retuse, often angulate, sometimes long acuminate. Upper leaves same shape as median leaves but smaller, triangular or oblong-ovate, shortly petiolate; uppermost leaves lanceolate. Capitula very numerous, terminal, arranged in 4.5–15 cm, narrow racemes, rarely shortly branched in lower part, or few racemose; peduncles pendulous, 1.5–5 mm or 7–9 mm in lower part, slender, glandular hairy and puberulent, with setiform or lanceolate bractlets; bractlets ca. 2 mm. Involucres purple or purple-green to green, cylindric; phyllaries 5, rarely 4, oblong, 4–8 mm, outside subglabrous, apically slightly acute. Florets 4–7; corolla yellow, 6–8 mm; tube as long as limb. Anthers exerted from corollas, basally sagittate. Style branches apically truncate, papillose. Achenes yellowish, cylindric, 3.5–5 mm, glabrous, ribbed. Pappus white, ca. 7 mm. Fl. Jun–Jul, fr. Sep.

Forest understories, forest margins; 1400–1600 m. Heilongjiang, Jilin, Nei Mongol [N Japan, N Korea, Russia (Far East)].

**11. *Parasenecio praetermissus*** (Pojarkova) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 38. 1999.

长白蟹甲草 chang bai xie jia cao

*Hasteola praetermissa* Pojarkova, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 20: 386. 1960; *Cacalia praetermissa* (Pojarkova) Pojarkova.

Rhizomes ascending or procumbent, 5–15 mm in diam., with numerous fibrous roots. Stem solitary, erect, green or purple tinged, 50–150 cm tall, sulcate, glabrous or sparsely puberulent. Leaves densely crowded; lower leaves 1 or 2, long

petiolate, reniform, smaller, withered by anthesis. Median stem leaves 3 or 4; petiole 1/4–1/2 as long as blade, ± winged, basally expanded into a 1.5–2 cm wide auricle, subamplexicaul; leaf blade abaxially gray-green, adaxially dark green, narrowly reniform, rarely triangular-reniform, 7–15 × 12–24 cm, both surfaces glabrous, basally 3-veined, divaricately branched near base, veins prominent abaxially, base cordate or subhastate, margin unequally undulate-toothed, teeth mucronulate, apex contracted into acute large teeth, with 2 rarely similar acute teeth. Upper leaves 1 or 2, triangular or triangular-reniform, very small, base truncate or cuneate, margin usually 3-toothed or nearly so, or nearly 3-lobed. Capitula numerous, laxly or densely narrowly paniculate at apices of stems, branched in upper or middle part; branches racemose, (1.5–)2–7 cm; lower branches ascending, to 10 cm, distinctly shorter than rachis; bracteal leaves lanceolate-linear, 8–20 mm; uppermost leaves setose, lower leaves same as upper stem leaves; capitula pendulous at anthesis; peduncles 3–8 mm, slender, puberulent, with 2–4 setose bractlets. Involucres cylindric; phyllaries 5, green or reddish, narrowly linear, (6–)8–12 × 1–1.5 mm, slightly shorter than corolla, apex rather acute or obtuse. Florets 5–8; corolla 8–9 mm, with 3–5 mm tube and campanulate-tubular limb; lobes lanceolate. Anthers exerted from corolla, basally caudate. Style branches truncate, papillose. Achenes brownish, cylindric, ca. 6 mm, glabrous, ribbed. Pappus white, 7–8 mm. Fl. Aug, fr. Sep–Oct.

Forest understories, riversides; 900–1400 m. Heilongjiang, Jilin (Changbai Shan) [Korea, Russia (Far East)].

**12. *Parasenecio gansuensis*** Y. L. Chen, Acta Phytotax. Sin. 34: 643. 1996.

甘肃蟹甲草 gan su xie jia cao

Rhizomes short and stout, 10–15 mm in diam., with numerous fibrous roots. Stem solitary, erect, 60–80(–100) cm, striate, sparsely puberulent or subglabrous, long naked in lower part. Leaves long petiolate, lower leaves fallen by anthesis, median stem leaves papery; petiole 5–8 cm, basally expanded into an ovate or rounded amplexicaul auricle; auricle 1.5–2.5 cm wide, entire or laxly toothed, sparsely puberulent; blade abaxially gray-green, adaxially green, triangular-hastate, 9–13 × 9–14 cm, abaxially puberulent on veins, adaxially sparsely adpressed puberulent, basally 5- or 6-veined, lateral veins upward divaricate, branched, veins convex abaxially, concave adaxially, base hastate-cordate, apex acute or acuminate; central lobes large, lateral lobes triangular, upper ones long, lower ones smaller, margin irregularly undulate-toothed, teeth mucronulate. Upper leaves similar, like median stem leaves but smaller, shortly petiolate; uppermost leaves triangular-hastate to lanceolate, with broad amplexicaul auricle or sessile. Capitula numerous, apically or in upper axils racemose-paniculate; rachis and peduncles with capitate stipitate glandular hairs; peduncles 1–2 mm, with 1 or 2 linear bractlets. Involucres cylindric, 6–7 × ca. 2 mm; phyllaries 5, purple-red, linear or linear-lanceolate, 0.5–1 mm wide, outside sparsely glandular or subglabrous, margin narrowly scarios, apically rather acute or obtuse. Florets 5 or 6; corolla yellow, 6–7 mm, with ca. 3 mm tube and broadly tubular limb; lobes lanceolate. Anthers exerted from corolla,

3–4 mm, basally caudate. Style branches excurved, truncate, papillose. Achenes cylindrical, 3–4 mm, glabrous, ribbed. Pappus white, 6–7 mm. Fl. Jul–Aug, fr. Sep–Oct.

• Forest understories on slopes, thickets, shaded places by canals; 1300–2500 m. Gansu, Shaanxi.

**13. *Parasenecio otopteryx*** (Handel-Mazzetti) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 40. 1999.

耳翼蟹甲草 er yi xie jia cao

*Cacalia otopteryx* Handel-Mazzetti, Symb. Sin. 7: 1132. 1936; *Koyamacalia otopteryx* (Handel-Mazzetti) H. Robinson & Brettell.

Rhizomes not dilated, with numerous fibrous roots. Stem solitary, erect, striate, often purple in lower part, 70–100 cm tall, glabrous. Lower leaves withered by anthesis; stem leaves 4–6, long petiolate; petiole with 5–10 mm wide wings, expanded into an amplexicaul large auricle; blade abaxially gray-green, adaxially green, broadly ovate-cordate or broadly cordate, 10–16 × 11–19 cm, papery, abaxially sparsely arachnoid or subglabrous, adaxially sparsely brown glandular, basally 3-veined, lateral veins 3 or 4 pairs, upward divaricate, base cordate, margin irregularly undulate-serrate, teeth mucronulate, apex acute or shortly acute. Capitula numerous, terminal, compound racemose; rachis and peduncles glandular puberulent, with 1 or 2 lanceolate-subulate bractlets at base of peduncles; bractlets 1–8 mm, spreading or pendulous. Involucres cylindrical or narrowly campanulate, 5–7 × 2–2.5 mm; phyllaries (3–)5, oblong-lanceolate, 6–7 × 1–1.5 mm, outside with paleaceous short hairs, margin scabrous, apically obtuse. Florets 3(–5); corolla yellow-white, 7–8 mm, with ca. 3 mm tube and narrowly campanulate limb; lobes lanceolate, ca. 1.5 mm. Anthers exerted from corolla, basally long caudate. Style branches excurved, truncate, papillose. Achenes brown, cylindrical, 4–5 mm, glabrous, ribbed. Pappus white, 6–7 mm. Fl. and fr. Jul–Sep.

• Forest understories on slopes, forest margins, shaded places in thickets; 1400–2800 m. Henan, Hubei, Shaanxi, Sichuan.

*Parasenecio otopteryx* is similar to *P. profundorum* but differs by the shape of leaves and in having petioles broadly winged and expanded at the base into an amplexicaul auricle.

**14. *Parasenecio nokoensis*** (Masamune & Suzuki) C. I. Peng & S. W. Chung, Fl. Taiwan, ed. 2, 4: 1026. 1998.

高能蟹甲草 gao neng xie jia cao

*Cacalia nokoensis* Masamune & Suzuki, J. Soc. Trop. Agric. 2: 51. 1930; *Koyamacalia nokoensis* (Masamune & Suzuki) H. Robinson & Brettell.

Rhizomes obliquely ascending. Stem solitary, 45–80 cm tall, erect, 2–3.5 mm in diam., glabrous below, densely shortly crisped-pubescent above; branchlets spreading. Basal and lower leaves fallen at anthesis. Stem leaves numerous, petiolate in median leaves; petioles 2.5–5 cm, not winged, usually with axillary buds at base, sparsely shortly crisped-pubescent; blade abaxially pale green, adaxially green, hastate-triangular, 4–13 × 4.5–10 cm, both surfaces scaly and shortly hairy, base ± cordate, margin denticulate, apex acuminate or long acuminate; lat-

eral lobes acuminate. Upper leaves smaller; uppermost leaves linear. Capitula more numerous, terminal, arranged in panicles, 8–10 mm wide; peduncles 4–10 mm, with 1 or 2 linear bractlets, crisped-hairy. Involucres cylindrical, not calyculate, 7–10 × 4–7 mm; phyllaries 7 or 8, linear-oblong, outside densely shortly crisped-hairy, margin narrowly scabrous, apically obtuse. Florets 10–13; corolla yellow, 8–9 mm, with 2.5–3 mm tube and broadly tubular limb; lobes lanceolate, ca. 1.5 mm, apex angularly thickened. Anthers exerted from corolla, basally sagittate-caudate. Style branches excurved, apex obtuse, papillose. Achenes cylindrical, ca. 5 mm, glabrous, ribbed. Pappus white, ca. 8 mm, fragile. Fl. Aug–Oct.

• Forest margins on slopes; ca. 2900 m. Taiwan.

*Parasenecio nokoensis* is similar to *P. hastatus* in aspect but differs by its leaves unwinged, petioles with axillary buds at the base, phyllaries 7 or 8, and florets 10–13.

**15. *Parasenecio hastiformis*** Y. L. Chen, Acta Phytotax. Sin. 34: 641. 1996.

戟状蟹甲草 ji zhuang xie jia cao

Rhizomes 10–15 mm in diam., with numerous fibrous roots. Stem solitary, erect, 80–100 cm tall, striate, long naked below, sparsely glandular shortly pubescent, densely so in upper part. Leaves crowded, long petiolate; lower leaves fallen at anthesis; median leaf petioles not winged, 6–10 cm, expanded at base but not amplexicaul, sparsely or densely glandular shortly pubescent, sometimes with axillary ovoid scale buds; blade abaxially pale green or gray-green, adaxially dark green, broadly triangular-hastate or ovate-triangular, 10–15 × 12–15 cm, thinly papery, abaxially densely glandular shortly pubescent on veins, adaxially adpressed hispidulous, basally 3–5-veined, lateral veins upward divaricate and reticulate, base broadly cordate or hastate, apex long acuminate or caudate; lateral lobes broadly triangular, margin with long mucronulate teeth. Upper leaves smaller, similar to median leaves, or ovate-triangular, shortly petiolate; uppermost narrowly triangular to lanceolate, small. Capitula numerous apically and in upper leaf axils in lateral racemes or panicles; rachis and peduncles 1–2 mm or capitula subsessile, densely capitate stipitate glandular hairy; peduncles with 1 or 2 linear bractlets. Involucres cylindrical or narrowly campanulate, 10–11 × 3–4 mm; phyllaries 5, oblong-lanceolate, ca. 1.5 mm wide, outside sparsely or densely glandular puberulent, margin ciliate, narrowly scarious, apically rather acute or obtuse. Florets 5, often longer than involucres; corolla yellow, 8–9 mm, with ca. 4 mm tube and campanulate limb; lobes lanceolate. Anthers exerted from corolla, basally caudate. Style branches excurved, truncate, papillose. Achenes brown, cylindrical, 3–4 mm, glabrous, ribbed. Pappus brown, ca. 8 mm. Fl. Sep.

• Riversides in valleys; ca. 2400 m. Yunnan (Lijiang).

**16. *Parasenecio albus*** Y. S. Chen, Ann. Bot. Fenn. 48: 34. 2011.

无毛蟹甲草 wu mao xie jia cao

Rhizomes procumbent, with fascicled fibrous roots. Stem solitary, erect, ca. 50 cm tall, 4–6 mm in diam. at base, angulate,

subglabrous except on synflorescence branches, paniculate synflorescences branched above, upward subcurved. Basal leaves withered and fallen at anthesis. Lower stem leaf petioles 4–6.5 cm, not winged, hispidulous, rather expanded at base but without auricle; leaf blade triangular-hastate, 7.5–15 × 10–18 cm, base broadly cordate or subcordate, shortly decurrent, margin with fine or stout teeth, teeth triangular and mucronulate, apex long acute or acuminate; lateral lobes furcate, acute or 2-lobulate; basal lobes longer, narrowly triangular. Upper stem leaves similar, gradually smaller. Uppermost leaves shortly petiolate, sometimes ovate or narrowly ovate, basally 3-veined, palmately divaricate, connected before margins, lateral and reticulate veins slightly prominent on both surfaces, base rounded. Capitula numerous, terminal and in upper leaf axils, pyramidal paniculate; synflorescence branches spreading, sparsely or densely yellow pubescent; peduncles 1.5–2 mm, hispidulous, basally with linear-lanceolate bractlets; bractlets 3–7 mm, rarely to 15 mm or shorter than 3 mm. Involucres cylindrical, 9–11 × 2–3 mm; phyllaries 5, linear-lanceolate, 1.5–2 mm wide, outside pubescent, margin narrowly scarious, apically acute. Florets 5 or 6; corolla yellow, often exceeding involucre, with 3.5–4.5 mm tube and narrowly campanulate limb; lobes lanceolate, ca. 2 mm, apically sparsely puberulent. Anthers exserted from corolla, basally caudate. Style branches excurved, truncate, papillose. Achenes cylindrical, ca. 4 mm, glabrous, ribbed. Pappus white, equaling corolla lobes. Fl. Jul, fr. Sep.

• Forests, thickets on slopes, meadows, riversides; 800–2300 m. Chongqing (Nanchuan), Fujian, Guangxi, Guizhou, Hubei, Hunan, Jiangxi.

This species was originally described as *Cacalia subglabra* C. C. Chang (*Parasenecio subglaber* (C. C. Chang) Y. L. Chen), but Y. S. Chen (loc. cit.) demonstrated that the holotype of *C. subglabra*, Z. S. Chung 83429 (IBSC), as designated in the protologue, presumably in error, is in fact a specimen of the species currently known as *Ligularia stenocephala*, into the synonymy of which the names *C. subglabra* and *P. subglaber* must therefore be placed. Y. S. Chen published the new name *P. albus* for the species originally described as *C. subglabra*, designating as the holotype Z. S. Chung 83438 (IBSC), which was

annotated as "*Cacalia subglabra* Chang" by C. C. Chang and, as it agrees perfectly with the description and illustration in his protologue, was evidently his intended holotype.

**17. *Parasenecio vespertilio*** (Franchet) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 44. 1999 [*"vespertilio"*].

川鄂蟹甲草 chuan e xie jia cao

*Senecio vespertilio* Franchet, J. Bot. (Morot) 8: 359. 1894; *Cacalia vespertilio* (Franchet) Handel-Mazzetti.

Plants 90–120 cm tall. Stem erect, robust, distinctly sulcate, simple, glabrous in lower part, sparsely hispidulous and brown glandular hairy. Leaves few, long petiolate; petiole 15–20 cm, stout, not winged, shortly hairy and brown glandular hairy above; blade abaxially pale green, adaxially dark green, pentagonal-reniform, 20–22 × ca. 30 cm, abaxially hispidulous on veins, adaxially sparsely hispidulous, basally 7–9-veined, lateral veins upward furcate and laxly reticulate, base broadly deeply cordate, margin undulate-toothed, teeth mucronulate, apex shortly acute or rounded. Upper leaf petioles short, ca. 10 cm; leaf blades cordate or pentagonal-cordate, smaller, margin undulate-dentate, teeth mucronulate, apex hornlike acuminate. Capitula numerous, terminal, arranged in panicle ca. 50 × 20 cm, spreading at anthesis; peduncles 2.5–3.5 cm, slender, with 2 or 3 linear bractlets, sparsely puberulent and brown glandular hairy. Involucres cylindrical or narrowly campanulate, 1.3–1.5 cm × 5–7 mm; phyllaries 8(or 9), olivaceous, oblong-lanceolate, outside sparsely puberulent and glandular hairy, margin narrowly scarious, apically acuminate or acute. Florets 16–19; corolla yellow, 8–10 mm, with 3–3.5 mm tube and broadly tubular limb; lobes ovate-lanceolate, apically puberulent. Anthers exserted from corolla, basally long caudate. Style branches excurved, truncate, penicillate-papillose. Achenes cylindrical, 5–6 mm, glabrous, ribbed. Pappus white, ca. 9 mm. Fl. Jul–Aug, fr. Sep.

• Forest margins, canal sides, shaded places on mountains; 1200–2400 m. Chongqing (Chengkou), W Hubei (Shennongjia).

**3. *Parasenecio* ser. *Ainsliaeflori*** Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 329. 1999 [*"Ainsliaeflorae"*].

兔儿风花系 tu er feng hua xi

Leaves polygonal or reniform, 5–7-lobed or coarsely toothed. Capitula many, small, sessile or with very short peduncles. Involucres cylindrical; phyllaries 2–5. Florets 3–5. Pappus white or yellowish brown.

• Three species: China.

**18. *Parasenecio ambiguus*** (Y. Ling) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 45. 1999.

两似蟹甲草 liang si xie jia cao

Rhizomes robust, with numerous fibrous roots. Stem solitary, erect, striate, 80–150 cm tall, sparsely hairy or glabrous below, adpressed shortly pubescent in upper part. Leaves long petiolate; petiole not winged, 10–18 cm, glabrous; blade abaxially pale green, adaxially green, polygonal or reniform-triangular, abaxially sparsely shortly hairy, glabrescent, adaxially gla-

brous, 5–7-veined, lateral veins divaricately branched, base cordate or truncate, margin undulate-toothed, apex acute. Upper leaves smaller, shortly petiolate. Uppermost leaves narrowly ovate, bractlike, entire or laxly denticulate. Capitula small, very many, terminal and in upper leaf axils, arranged in ca. 10 cm, branched, broad panicles, sessile or subsessile, often with 1 subulate bractlet; rachis puberulent or subglabrous below. Involucres cylindrical, ca. 5 × 1 mm; phyllaries 3 or 5, rarely 4, distinctly striate, linear, subleathery, glabrous, barbate, margin scarious, apically obtuse. Florets 3 or 5, rarely 4; corolla white, 4–5 mm with slender tube and broadly tubular limb; lobes lan-

ceolate. Anthers exerted from corolla, basally long caudate. Style branches excurved, truncate, papillose. Achenes brownish, cylindric, 3–4 mm, glabrous. Pappus sordid white or yellow-brown, 4–5 mm. Fl. Jul–Aug, fr. Sep–Oct.

• Forest understories, forest margins, thickets, grasslands on slopes, valleys; 1200–2400 m. Hebei, Henan, Shaanxi, Shanxi.

- 1a. Leaves papery; phyllaries and florets 3, rarely 4 ..... 18a. var. *ambiguus*  
 1b. Leaves thickly papery, petioles stout; phyllaries and florets 5, rarely 4 ..... 18b. var. *wangianus*

**18a. *Parasenecio ambiguus* var. *ambiguus***

两似蟹甲草(原变种) liang si xie jia cao (yuan bian zhong)

*Cacalia ambigua* Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 2: 528. 1934; *Koyamacalia ambigua* (Y. Ling) H. Robinson & Brettell.

Leaves papery. Phyllaries and florets 3, rarely 4.

• Forest understories, forest margins, thickets, grasslands on slopes; 1200–2400 m. Hebei, Henan, Shaanxi, Shanxi.

**18b. *Parasenecio ambiguus* var. *wangianus*** (Y. Ling) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 47. 1999.

王氏两似蟹甲草 wang shi liang si xie jia cao

*Cacalia ambigua* var. *wangiana* Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 5: 14. 1937.

Leaves thickly papery; petioles stout. Phyllaries and florets 5, rarely 4.

• Valleys; ca. 1700 m. Shanxi (Huoxian).

**19. *Parasenecio ainsliaeiflorus*** (Franchet) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 47. 1999.

兔儿风蟹甲草 tu er feng xie jia cao

*Senecio ainsliaeiflorus* Franchet, J. Bot. (Morot) 8: 361. 1894; *Cacalia ainsliaeiflora* (Franchet) Handel-Mazzetti; *C. leucanthema* (Dunn) Y. Ling; *Koyamacalia leucanthema* (Dunn) H. Robinson & Brettell; *S. leucanthemus* Dunn.

Rhizomes robust, with numerous fibrous roots. Stem solitary, erect, 60–100 cm tall, striate, glabrous below, yellow-brown puberulent in upper part and on branches of synflorescences. Lower leaves fallen by anthesis. Median leaves 5–8, long petiolate; petiole 5–10 cm, not winged; blade cordate-reniform or orbicular-reniform, 8–12(–20) × 8–12(–20) cm, abaxially shortly pubescent on veins, adaxially laxly adpressed

shortly hairy or subglabrous, veins abaxially prominent, basally 5-veined, lateral upward furcately branched, base broadly cordate or subtruncate, margin often triangularly 5–7-lobed, irregularly serrate, apex acute. Upper leaves homomorphic to lower leaves but smaller, broadly ovate, 3–5-lobed, shortly petiolate. Capitula small, numerous, terminal or in upper leaf axils, racemose or compound racemose; synflorescence branches spreading; peduncles short or very short. Involucre cylindrical, 6–8 × 1.5–2 mm; phyllaries 5, linear or linear-lanceolate, outside glabrous, margin scarious, apically obtuse or rounded, puberulent. Florets 5; corolla white, ca. 8 mm, with slender tube, and broadly tubular limb; lobes triangular-lanceolate. Anthers exerted from corolla, basally long caudate. Style branches excurved, apically truncate, papillose. Achenes cylindric, 3–4 mm, glabrous, ribbed. Pappus white or sordid white, 5–6 mm. Fl. Jul–Aug, fr. Sep–Oct.

• Forest margins, forest understories, thickets, grasslands on slopes; 1500–2600 m. Guizhou, W Hubei, Hunan, Sichuan.

*Parasenecio ainsliaeiflorus* differs from *P. ambiguus* by its peduncles, phyllaries, and florets 5 and its pappus white.

**20. *Parasenecio kangxianensis*** (Z. Ying Zhang & Y. H. Gou) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 49. 1999.

康县蟹甲草 kang xian xie jia cao

*Cacalia kangxianensis* Z. Ying Zhang & Y. H. Gou, Bull. Bot. Res., Harbin 3(1): 130. 1983.

Rhizomes unknown. Stem solitary, erect, ca. 70 cm tall, striate, glandular hairy, naked below, with 1 or 2 large leaves at middle. Leaves long petiolate; petiole not winged, 9–10 cm; blade suborbicular, ca. 15 × 17 cm, papery, both surfaces glabrous or subglabrous, basally 7-veined, lateral veins upward furcately branched, base cordate, triangularly 7-lobed, margin mucronulate-denticulate, apex acute. Upper leaves shortly petiolate, very small. Capitula few, usually at apex of stem in lax racemes or compound racemes, to 10 cm; peduncles 1–2 mm, sparsely arachnoid, with 1 or 2 bractlets. Involucre narrowly campanulate, 6–7 mm; phyllaries 5, linear-lanceolate, outside subglabrous, with veinlets, margin scarious, apically acute. Florets 5; corolla yellow, 5–6 mm, with slender tube and tubular-campanulate limb; lobes lanceolate. Anthers exerted from corolla, ca. 4 mm, basally caudate. Style branches truncate, papillose. Achenes yellow-brown, cylindric, 1–1.5 mm (immature), glabrous, ribbed. Pappus pale yellow-brown, 5–6 mm. Fl. and fr. Jul–Sep.

• Forest understories on slopes; ca. 1400 m. Gansu (Kangxian).

**4. *Parasenecio* ser. *Rubescentes*** Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 329. 1999.

红缨蟹甲草系 hong ying xie jia cao xi

Petiole not winged, not expanded at base; leaf blade broadly triangular or hastate. Involucre campanulate or narrowly campanulate; phyllaries 7–12. Florets 8–38. Pappus red-brown or white.

• Two species: China.

**21. *Parasenecio rubescens*** (S. Moore) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 49. 1999.

矢瓣叶蟹甲草 shi zu ye xie jia cao

*Senecio rubescens* S. Moore, J. Bot. 13: 228. 1875; *Cacalia rubescens* (S. Moore) Matsuda.

Plants 50–80(–100) cm tall. Stems erect, green or sometimes purple tinged, distinctly striate, glabrous, simple. Basal leaves fallen at anthesis. Lower and median leaves long petiolate; petiole not winged, 3–4.5 cm, glabrous; blade abaxially pale green, adaxially green, broadly triangular, 10–18 × 5–16 cm, 3–5-lobed; lobes triangular, basal lobes sometimes rudimentary, both surfaces glabrous or puberulent on veins, base cuneate or truncate, margin stiffly mucronulate-denticulate, apex acute. Upper leaves shortly petiolate, gradually smaller upward. Uppermost leaf blades ovate-lanceolate, 5–10 × 3–6 cm, apex acuminate. Capitula numerous, terminal or in upper leaf axils in furcate broad panicle; peduncles ascending, 5–15 mm, stout, sparsely pubescent or subglabrous, with 1 or 2 linear bractlets. Involucres narrowly campanulate, 10–12 × 5–10 mm; phyllaries 7 or 8(–10), oblong or oblong-lanceolate, outside glabrous, margin scarios, apically obtuse or rather acute. Florets 8–10; corolla yellow, 7–8 mm, with ca. 3 mm tubular tube and limb; lobes lanceolate. Anthers exerted from corolla, basally caudate. Style branches excurved, obtuse or truncate, papillose. Achenes yellowish brown, cylindric, ca. 6 mm, glabrous, ribbed. Pappus white or reddish brown, ca. 7 mm. Fl. Jul–Aug, fr. Sep.

• Forest understories, forest margins, thickets in valleys; 800–1400 m. Anhui, Fujian, Hunan, Jiangxi.

**22. *Parasenecio matsudae*** (Kitamura) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 50. 1999 [“*matsudai*”].

天目山蟹甲草 tian mu shan xie jia cao

*Cacalia matsudae* Kitamura, J. Jap. Bot. 20: 196. 1944; *Koyamacalia matsudae* (Kitamura) H. Robinson & Brettell.

Stems robust, erect, distinctly striate, green or purple above, to 120 cm tall, ca. 1.2 cm in diam. at base, branched above; branches ascending or spreading, often divaricate. Leaves long petiolate; petiole ca. 10 cm, not winged, glabrous; lower leaves fallen by anthesis; median stem leaves large; blade abaxially gray-green, adaxially green, broadly pentagonal or hastate, 15–20(–30) × 8–25 cm; terminal lobes large, apically acute; lateral lobes narrowly triangular, small, obscurely angled, both surfaces glabrous, basally 3-veined, veins upward furcately branched, base broadly cuneate or truncate, margin mucronulate-denticulate. Capitula many, 2–2.5 cm when dry, terminal or in upper leaf axils, arranged in broad panicles; peduncles 2.5–5 cm, stout, apex often dilated; bractlets 1 or 2, linear or linear-lanceolate, glabrous. Involucres campanulate, 1.3–1.5 × 1.7–2 cm, not calyculate at base; phyllaries 12, oblong or oblong-lanceolate, subequal, sometimes ± connate, outside puberulent, margin scarios, apically obtuse. Florets ca. 38; corolla yellow, with slender, ca. 3 mm tube and limb; lobes lanceolate, ca. 2 mm. Anthers exerted from corolla, basally sagittate. Style branches excurved, obtuse, slightly dilated, papillose. Achenes yellow-brown, cylindric, ca. 6 mm, glabrous, ribbed. Pappus sordid red-brown, ca. 9 mm. Fl. Jul–Aug, fr. Sep.

• Roadsides, by canals on slopes; ca. 1000 m. Anhui, Zhejiang (Tianmu Shan).

**4. *Parasenecio* sect. *Monanthi*** (Kitamura) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 52. 1999 [“*Monantheae*”].

单花蟹甲草组 dan hua xie jia cao zu

*Cacalia* ser. *Monantheae* Kitamura, Acta Phytotax. Geobot. 7: 237. 1938.

Leaves ovate-triangular, ovate-cordate, or cordate, densely arachnoid, basally 3-veined or palmately 5–7-veined. Phyllaries 2–5. Florets 1–13. Pappus white.

About 25 species: China, Himalayan region, Japan; 24 species (23 endemic) in China.

**23. *Parasenecio latipes*** (Franchet) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 52. 1999.

阔柄蟹甲草 kuo bing xie jia cao

*Senecio latipes* Franchet, J. Bot. (Morot) 8: 356. 1894; *Cacalia latipes* (Franchet) Handel-Mazzetti; *Koyamacalia latipes* (Franchet) H. Robinson & Brettell.

Rhizomes robust, ca. 2 cm in diam., with numerous fibrous roots. Stem solitary, erect or curved below, green or purple-tinged below, striate, 50–100 cm tall, sparsely shortly pubescent or subglabrous, simple or synflorescence branched. Leaves few; petiole 3–5 cm, basally expanded into an amplexicaul auricle; blade abaxially pale green, adaxially green, ovate-triangular or broadly triangular, 8–10 × 10–14 cm, stiffly papery, abaxially densely or sparsely arachnoid, or ± glabrescent, rarely shortly pubescent on veins, adaxially adpressed hirsutulous, base truncate or cuneate-decurrent into a broad or narrow

wing, margin irregularly serrate, teeth mucronulate, apex acute or acuminate. Upper leaves shortly petiolate, gradually smaller upward, triangular or triangular-lanceolate. Uppermost leaves lanceolate or linear-lanceolate, margin subentire or finely 1- or 2-toothed. Capitula numerous, terminal or upper leaf axils in racemes or compound racemes, lateral, at first spreading, pendulous at anthesis; peduncles 2–3 mm, with 1–3 linear bractlets, arachnoid or subglabrous. Involucres cylindric, 6–8(–10) mm; phyllaries 3, oblong-lanceolate, outside glabrous, margin ciliate, narrowly scarios, apically obtuse or slightly acute. Florets 5 or 6; corolla yellow, 6–7 mm, with ca. 3 mm tube, and campanulate limb; lobes ovate-lanceolate. Anthers exerted from corolla, basally long caudate. Style branches excurved, truncate, papillose. Achenes cylindric, ca. 4 mm, glabrous, ribbed. Pappus white, ca. 6 mm. Fl. Jul–Aug, fr. Sep.

• Understories of *Abies* forests, forest margins, thickets; 3200–4100 m. SW and W Sichuan, NW Yunnan.

**24. *Parasenecio lidjiangensis*** (Handel-Mazzetti) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 53. 1999.

丽江蟹甲草 li jiang xie jia cao

*Cacalia lidjiangensis* Handel-Mazzetti, Symb. Sin. 7: 1130. 1936.

Rhizomes shortly robust, 1.5–2 cm in diam., with many fibrous roots. Stem solitary, erect, usually red-purple below, distinctly striate, (30–)45–65 cm tall, often long naked except for few brown ovate scales, sparsely arachnoid at middle part. Leaves usually at middle to upper part; petiole as long as or shorter than blade, slender or expanded to 4–15 mm in diam. rounded auricle; blade adaxially green, thin, triangular or hastate-triangular, (5–)6–10 × 5–11 cm, abaxially densely white arachnoid-tomentose except on veins, adaxially densely hispidulous, veins furcate at base, lateral veins connected reticulately, abaxially prominent, base truncate or subcordate, cuneate-decurrent into narrow or broad petiole, subamplexicaul, margin equally deeply undulate-toothed, teeth mucronate, apex acute or acuminate, mucronulate. Upper leaves smaller, lanceolate or linear-lanceolate, shortly petiolate. Capitula 12–18, terminal or in upper leaf axils, arranged in racemes or compound racemes; bracts linear-lanceolate, ca. 1 cm; peduncles 2–5(–10) mm, pendulous, white arachnoid. Involucres cylindrical or narrowly campanulate, 8–10 × 2–5 mm; phyllaries 6–8, linear-lanceolate, ca. 10 × 1.5–2 mm, glabrous, few veined, margin narrowly scarious, apically obtuse, barbate; bractlets ca. 1/3 as long as phyllaries. Florets 9–12(–14); corolla yellow, or rarely orange-yellow, 8–9 mm, with slender 3–4 mm tube and narrowly campanulate limb; lobes lanceolate, ca. 2 mm, apically obtuse. Anthers exerted from corolla, basally long caudate. Style branches excurved, truncate, papillose. Achenes cylindrical, 3–4 mm, glabrous, ribbed. Pappus white, 6–7 mm. Fl. Jul–Aug, fr. Sep–Oct.

• Understories of *Pinus* or *Picea* forests on slopes; 3400–3500 m. Yunnan (Lijiang).

**25. *Parasenecio taliensis*** (Franchet) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 55. 1999.

大理蟹甲草 da li xie jia cao

*Senecio taliensis* Franchet, J. Bot. (Morot) 8: 357. 1894; *Cacalia taliensis* (Franchet) Handel-Mazzetti.

Rhizomes subglobose, short, with many tomentose, fibrous roots. Stem solitary, erect, striate, 25–40 cm tall, slender, simple or sometimes laxly branched above, sparsely arachnoid or subglabrous, often naked in lower part. Leaves lax at middle to upper part, long petiolate; petiole not winged, 3–5(–8) cm, sparsely arachnoid or later glabrescent, not expanded at base; blade adaxially dark green, broadly ovate or ovate-oblate, 3–5 × 3.5–6(–7) cm, membranous or submembranous, abaxially densely white or gray-white tomentose, adaxially densely or sparsely hispidulous, veins abaxially prominent, basally 5-veined, lateral veins upward branched, base truncate or subcordate, margin inconspicuously undulate or irregularly triangular coarsely toothed, rarely subentire, teeth mucronulate, apex acute or obtuse. Upper leaves smaller, ovate or ovate-triangular, shortly petiolate. Capitula 5–7, terminal or in upper leaf axils, arranged in racemes or compound racemes; peduncles

spreading or pendulous by anthesis, short, (3–)5–7 mm, slender, arachnoid, with 1 or 2 linear or linear-lanceolate bractlets. Involucres cylindrical, 8–10 × 2–2.5 mm; phyllaries 5, linear-lanceolate, 1.3–2 mm wide, sparsely puberulent or subglabrous, margin narrowly scarious, apically obtuse, ciliate. Florets (6–)8 or 9; corolla yellow, 7–8 mm, with 2.5–3 mm tube and broadly tubular limb; lobes linear-lanceolate, 1.5–2 mm. Anthers exerted from corolla, basally long caudate. Style branches truncate, papillose. Achenes yellow-brown, cylindrical, 4–4.5 mm, glabrous, ribbed. Pappus white, 6–7 mm. Fl. Jul–Aug, fr. Sep.

• Open slopes, understories of *Abies* forests; 3000–3400 m. Yunnan (Dali, Zhongdian).

*Parasenecio taliensis* is similar to *P. lidjiangensis* but differs in having leaves 3 or 4, crowded at the middle; blade orbicular or broadly ovate, abaxially densely white arachnoid-tomentose; and petiole not winged, not expanded at the base.

**26. *Parasenecio jiulongensis*** Y. L. Chen, Acta Phytotax. Sin. 34: 645. 1996.

九龙蟹甲草 jiu long xie jia cao

Rhizomes procumbent or ascending, slender, with many fibrous roots. Stem solitary, erect, striate, scapiform, 30–35 cm tall, slender. Leaves 3 or 4, crowded near base, long petiolate, persistent at anthesis; petiole not winged, (3–)4–6 cm, glabrous, base slightly expanded, subamplexicaul; blade abaxially becoming purple-red when dry, adaxially green, broadly ovate-cordate or cordate, papery, abaxially laxly hispidulous or subglabrous, ciliate, adaxially glabrous, basally 3–5-veined, lateral veins upward furcately branched, base cordate or subtruncate, margin undulate-toothed, teeth mucronulate, apex obtuse or slightly acute, mucronulate. Capitula 8–10, in upper part of stem, arranged in spicate racemes; peduncles 2–4(–5) mm, with 1 or 2 linear or linear-lanceolate bractlets, excurved or pendulous, sparsely arachnoid or ± glabrescent. Capitula inserted on one side. Involucres cylindrical, ca. 10 × 2–3 mm; phyllaries 5, linear or linear-lanceolate, ca. 10 × 0.5–1 mm, outside glabrous, margin narrowly scarious, apically acute or obtuse. Florets 5; corolla yellow, 5–6 mm, with slender 1.5–2 mm tube and narrowly campanulate limb; lobes lanceolate. Anthers exerted from corolla, basally caudate. Style branches excurved, truncate, papillose. Achenes yellow-brown, cylindrical, ca. 3 mm, glabrous, ribbed. Pappus white, 5–6 mm. Fl. and fr. Sep–Oct.

• Understories of *Picea* forests; ca. 2700 m. Sichuan (Jiulong).

**27. *Parasenecio tenianus*** (Handel-Mazzetti) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 57. 1999.

盐丰蟹甲草 yan feng xie jia cao

*Cacalia teniana* Handel-Mazzetti, Symb. Sin. 7: 1129. 1936.

Plants with fascicled tomentose roots. Stem solitary, striate, erect, 55–65 cm tall, glabrous, long naked, with few scales. Leaves often crowded at middle of stems. Lower leaf petiole as long as blade or shorter, slender, not winged; blade broadly ovate-triangular or reniform-triangular, ca. 9 × 12–15 cm, with prominent angles on nearly basal margins, base truncate or slightly cordate, broadly cuneate-attenuate into petiole, apex

acute or shortly acute. Upper leaves shortly petiolate, gradually smaller upward, abaxially pale or becoming red-brown when dry, adaxially dark green, triangular or subpentagonal, narrow, papery when dry, basally 3-veined, rarely 5-veined, lateral veins extended-branched, both surfaces glabrous, veins prominent abaxially, margin cartilaginous mucronulate-denticulate, apex shortly acuminate. Capitula many, terminal or in upper leaf axils, arranged in lax racemes, pendulous; bracts linear-lanceolate, ca. 5 mm, submembranous; peduncles 3–5 mm, with 1 or 2 linear bractlets. Involucres cylindric, ca. 10 × 1.5–2 mm; phyllaries 3, linear-lanceolate, ca. 10 × 1.5 mm, glabrous, with many fine veins, margin narrowly scarious, apically acute or obtuse. Florets 2 or 3; corolla yellow, 8–10 mm, with ca. 4 mm tube and narrowly campanulate limb; lobes excurved, lanceolate, ca. 2 mm. Anthers exerted from corolla, basally long caudate. Style branches excurved, apically obtuse or slightly acute, papillose. Achenes cylindric, 3–4 mm, glabrous, ribbed. Pappus white, 7 or 8 mm. Fl. Aug–Sep.

- Understories of mixed forests; 2700–3200 m. Yunnan.

**28. *Parasenecio koualapensis*** (Franchet) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 59. 1999.

瓜拉坡蟹甲草 *gua la po xie jia cao*

*Senecio koualapensis* Franchet, J. Bot. (Morot) 8: 356. 1894; *Cacalia koualapensis* (Franchet) Handel-Mazzetti; *S. leclerei* H. Léveillé.

Rhizomes short, stout, with tomentose fibrous roots. Stem solitary, erect, striate, 30–80 cm tall, simple, brown multicellular villous in lower part. Median and lower stem leaves 3 or 4; petiole not winged, 3–5 cm, densely brown villous; blade abaxially pale green, sometimes turning purple, adaxially green, broadly ovate-triangular or broadly ovate, rarely rhombic or cordate, 5–15(–18) × 6–15 cm, papery, abaxially yellow-brown villous especially on veins, adaxially adpressed hispidulous, base truncate or subrounded, rarely cordate, margin usually triangularly toothed, teeth mucronulate, sometimes inconspicuous, apex obtuse or shortly acute. Upper leaves shortly petiolate or sessile, gradually smaller or very small, bracteal-leaflike, lanceolate or linear-lanceolate, entire. Capitula numerous, terminal or in upper leaf axils, arranged in simple or rarely branched narrow panicles; peduncles ca. 2 mm, on one side, spreading, pendulous later, with 1 or 2 linear bractlets. Involucres cylindric, 6–8 × 1.5–2 mm; phyllaries 5, linear-oblong, 1–1.5 mm wide, glabrous, margin narrowly scarious, apically obtuse or slightly acute. Florets 5; corolla yellow, ca. 8 mm, with slender, ca. 3 mm tube and tubular limb; lobes lanceolate. Anthers exerted from corolla, basally caudate. Style branches excurved, truncate, papillose. Achenes cylindric, 4–5 mm, glabrous, ribbed. Pappus white, 6–7 mm. Fl. Aug–Sep, fr. Oct.

- Understories of mixed forests on slopes; 2800–3200 m. Yunnan.

**29. *Parasenecio quinquelobus*** (Wallich ex Candolle) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 59. 1999.

五裂蟹甲草 *wu lie xie jia cao*

Rhizomes ascending or procumbent, with numerous yellow-brown tomentose fibrous roots. Stem solitary, erect or ±

curved, 40–90 cm tall, sulcate, simple, synflorescence branched above, glabrous. Lower leaves fallen by anthesis; stem leaves many, 5–8. Median leaves large; petiole not winged, 2–8(–10) cm; blade abaxially gray-green, adaxially green, reniform-pentagonal to triangular or lanceolate, (4–)6–10 × 5–14 cm, abaxially arachnoid, later glabrescent, adaxially adpressed hispidulous, basally 3–5-veined, base broadly cordate or truncate, margin shallowly to deeply lobed, irregularly coarsely toothed, teeth mucronulate, apex acute, acuminate, or caudate-acute. Upper leaves smaller, shortly petiolate, triangular or narrowly triangular. Uppermost leaves narrowly lanceolate or linear, bracteal-leaflike, usually with many globose buds in upper leaf axils and on synflorescence branches. Capitula numerous, arranged in terminal narrow or broad panicles, spreading by anthesis, pendulous after anthesis; peduncles 1–2 mm, with 1 or 2 linear bractlets. Involucres cylindric, 7–8 mm; phyllaries 4 or 5, oblong, outside glabrous, apically obtuse or acute. Florets 4 or 5; corolla yellow, 6–7 mm, with 2.5–3 mm tube and broadly tubular limb; lobes lanceolate. Anthers exerted from corolla, shortly caudate. Style branches excurved, obtuse or truncate, papillose. Achenes cylindric, 4–5 mm, glabrous, ribbed. Pappus white, 5–6 mm. Fl. Aug, fr. Sep–Oct.

Understories of *Quercus* or *Abies* forests, alpine meadows; 2800–4100 m. SW Sichuan, Xizang, NW Yunnan [Bhutan, N India, Myanmar, Nepal].

- 1a. Leaf blade margin lobed in distal 1/3; capitula arranged in narrow panicles ..... 29a. var. *quinquelobus*
- 1b. Leaf blade margin 3-lobed in distal 3/4, lobes 2- or 3-lobed in distal 1/3; capitula arranged in broad panicles ..... 29b. var. *sinuatus*

**29a. *Parasenecio quinquelobus* var. *quinquelobus***

五裂蟹甲草(原变种) *wu lie xie jia cao* (yuan bian zhong)

*Prenanthes quinqueloba* Wallich ex Candolle, Prodr. 7: 195. 1838; *Cacalia pentaloba* Handel-Mazzetti; *C. quinqueloba* (Wallich ex Candolle) Kitamura; *Koyamacalia quinqueloba* (Wallich ex Candolle) H. Robinson & Brettell; *Senecio quinquelobus* (Wallich ex Candolle) J. D. Hooker & Thomson ex C. B. Clarke (1876), not (Thunberg) Candolle (1838).

Leaf blade margin lobed in distal 1/3. Capitula arranged in narrow panicles.

Understories of *Quercus* or *Abies* forests, alpine meadows; 2800–4100 m. SW Sichuan, Xizang, NW Yunnan [Bhutan, N India, Myanmar, Nepal].

**29b. *Parasenecio quinquelobus* var. *sinuatus*** (H. Koyama) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 62–63. 1999.

深裂五裂蟹甲草 *shen lie wu lie xie jia cao*

*Cacalia pentaloba* var. *sinuata* H. Koyama, Acta Phytotax. Geobot. 30: 65. 1979.

Leaf blade margin 3-lobed in distal 3/4, lobes 2- or 3-lobed in distal 1/3. Capitula arranged in broad panicles.

Understories of *Abies* forests; 3000–3600 m. Xizang [Bhutan].

**30. *Parasenecio rockianus*** (Handel-Mazzetti) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 63. 1999.

玉龙蟹甲草 *yu long xie jia cao*

*Cacalia rockiana* Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 634. 1937; *C. lidjiangensis* Handel-Mazzetti var. *acerina* H. Koyama; *Koyamacalia rockiana* (Handel-Mazzetti) H. Robinson & Brettell.

Rhizomes procumbent, with numerous fibrous roots. Stem solitary, erect or slightly curved below, often purple, striate, 35–50 cm tall, shortly pubescent or arachnoid in upper part. Leaves usually 5, crowded at middle of stem, paniculate synflorescence branched above. Petiole narrowly winged, 1.5–2 cm; leaf blade adaxially green, broadly triangular, 6–9 × 4–6 cm, base truncate or cuneate, middle 3-lobed, central lobe shallowly 3-lobed, lateral lobes shallowly 2-lobed; lobes to 2.5 cm wide, abaxially densely gray-white arachnoid-lanate, adaxially sparsely or densely furfuraceous-hispidulous, palmately veined, margin deeply undulate-toothed, teeth mucronulate, apex acuminate. Uppermost leaves narrowly lanceolate, 3-fid upward into bracts; bracts purple tinged, linear, 1–1.2 cm, acute or acuminate. Capitula mostly at apex of stem, arranged in lax racemes; peduncles 2–3 mm, densely arachnoid, pendulous. Involucres cylindrical, 8–11 × 2–3 mm; phyllaries 4 or 5, pale green, linear or linear-lanceolate, 1.5–2 mm wide, margin ciliate, narrowly scarious, ± purple, apex obtuse or slightly acute. Florets 4 or 5; corolla yellow, 1–1.1 cm; tube ca. 1/2 as long as limb, slender; limb cylindrical-campanulate; lobes excurved, linear-lanceolate. Anthers exerted from corolla, basally caudate. Style branches truncate. Achenes cylindrical, ca. 3 mm, glabrous, ribbed. Pappus white, shorter than corolla. Fl. Aug, fr. Oct.

- Forest margins on slopes; ca. 2400 m. Yunnan (Lijiang, Weixi).

**31. *Parasenecio souliei*** (Franchet) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 63. 1999.

川西蟹甲草 *chuan xi xie jia cao*

*Senecio souliei* Franchet, Bull. Annuel Soc. Philom. Paris, sér. 8, 3: 165. 1891; *Cacalia souliei* (Franchet) Handel-Mazzetti; *Koyamacalia souliei* (Franchet) H. Robinson & Brettell.

Rhizomes 1.3–1.4 cm in diam., with numerous tomentose fibrous roots. Stem solitary, erect, often purple-red, striate, (20–)30–60 cm tall, long naked in lower part, glabrous. Leaves usually at middle and lower part of stem; petiole expanded at base, with incised or divided auricle, subamplexicaul; blade reniform-triangular or broadly ovate, 5–6 × 4–5 cm, 3–5-lobed; lobes spreading, lobulate or irregularly toothed, abaxially white arachnoid-tomentose, adaxially densely brown hispidulous, 3-veined, veins abaxially prominent, base truncate or slightly cordate, decurrent into broadly winged petiole, apex acute or slightly acute. Upper leaves smaller, ovate or ovate-lanceolate, incised or lobulate at base. Capitula numerous, terminal or in upper leaf axils, arranged in lax racemose panicles, spreading, pendulous later; peduncles 2–5 mm, densely shortly pubescent, with 1–3 linear bractlets. Involucres cylindrical or narrowly campanulate, ca. 7 × 3–4 mm; phyllaries 5, oblong-lanceolate, 1.5–2 mm, glabrous, margin narrowly scarious, apically obtuse or

slightly acute, puberulent. Florets 8, rarely 10; corolla yellow, 6–7 mm, with slender, ca. 2 mm tube and narrowly campanulate limb; lobes lanceolate, ca. 1.5 mm. Anthers exerted from corolla, basally caudate. Style branches truncate, papillose. Achenes cylindrical, ca. 3 mm, glabrous, ribbed. Pappus white, 5–6 mm. Fl. and fr. Aug–Sep.

- Understories of forests or thickets, grasslands, shaded and wet slopes; 3100–3700 m. SW and W Sichuan.

**32. *Parasenecio cyclotus*** (Bureau & Franchet) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 64. 1999.

轮叶蟹甲草 *lun ye xie jia cao*

*Senecio cyclotus* Bureau & Franchet, J. Bot. (Morot) 5: 74. 1891; *Cacalia cyclota* (Bureau & Franchet) Handel-Mazzetti; *Koyamacalia cyclota* (Bureau & Franchet) H. Robinson & Brettell.

Rhizomes robust, ca. 1.5 cm in diam. Stem solitary, erect, 80–100 cm tall, long naked, or with few ovate scales in lower part, sparsely arachnoid above, subglabrous below, sulcate. Lower leaves fallen by anthesis; petiole expanded into ca. 2.5 cm wide, entire or laxly toothed auricle; blade adaxially green, obovate-spatulate, 5–10(–16) × 3–8(–10) cm, papery, lyrate-pinnate; lobes ovate-oblong or obovate, abaxially sparsely or densely arachnoid-tomentose, or ± glabrescent, adaxially sparsely adpressed shortly hairy, base decurrent into broadly winged petiole, apex acute or shortly acute, unequally triangularly toothed, teeth mucronulate. Upper leaves smaller; uppermost leaves often rudimentary as linear or linear-lanceolate bracts. Capitula numerous, arranged in racemes, or sometimes 1- or 2-branched, lateral, pendulous; peduncles very short, 2–4 mm, with linear-lanceolate bractlets at base. Involucres cylindrical, 8–10 × 2–3 mm; phyllaries 5 or 6, lanceolate, 8–10 × ca. 1.5 mm, puberulent, margin scarious, apically obtuse. Florets 5 or 6(or 7); corolla yellow, ca. 8 mm, with slender tube and ca. 3 mm, narrowly campanulate limb; lobes lanceolate. Anthers exerted from corolla, basally caudate. Style branches excurved, truncate, papillose. Achenes yellow-brown, cylindrical, ca. 4 mm, ribbed. Pappus white, 6–7 mm. Fl. and fr. Aug–Sep.

- Understories of forests on slopes, forest margins, grasslands, roadsides; 2200–3600 m. W Sichuan.

*Parasenecio cyclotus* is similar to *P. souliei* but differs in having leaves lyrate-pinnate, petiole with entire or toothed auricle ca. 2.5 cm wide, and florets 5 or 6.

**33. *Parasenecio roborowskii*** (Maximowicz) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 65. 1999.

蛛毛蟹甲草 *zhu mao xie jia cao*

*Senecio roborowskii* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 487. 1882; *Cacalia adenocauloides* Handel-Mazzetti; *C. monantha* (Diels) Hayata; *C. roborowskii* (Maximowicz) Y. Ling; *C. tatsienensis* (Bureau & Franchet) Handel-Mazzetti; *Koyamacalia roborowskii* (Maximowicz) H. Robinson & Brettell; *Parasenecio monanthus* (Diels) C. I. Peng & S. W. Chung; *S. monanthus* Diels; *S. tatsienensis* Bureau & Franchet.

Rhizomes robust, procumbent, with many fibrous roots. Stem solitary, erect, striate, 60–100 cm tall, simple, usually white arachnoid or later glabrescent. Petiole not winged, 6–10 cm, sparsely arachnoid; leaf blade adaxially green, narrowly triangular, 8–13 × 8–10 cm, rachis sparsely shortly hairy or subglabrous, abaxially white or gray-white arachnoid, basally 5-veined, lateral veins furcately branched, prominent on both surfaces, margin irregularly serrate, teeth mucronulate, apex acute or acuminate. Upper leaves smaller, similar to median leaves or narrowly ovate or narrowly triangular, but with short petioles. Capitula numerous, usually terminal or in upper leaf axils, arranged in pyramidal lax panicles on one side, spreading pendulous; peduncles ca. 3 mm, same as rachis arachnoid and shortly pubescent, with 2 or 3 linear or linear-lanceolate bractlets. Involucres cylindrical, 8–13 × 1–1.5 mm; phyllaries 3 (or 4), rarely 2, yellow-green, linear-oblong, glabrous, few finely veined, margin narrowly scarious, apically obtuse, puberulent. Florets usually 3 or 4, rarely 1 or 2; corolla white, 8–10 mm, with slender tube and ca. 3 mm broadly tubular limb; lobes lanceolate. Anthers exerted from corolla, basally caudate. Style branches excurved, truncate, papillose. Achenes cylindrical, 3–4 mm, glabrous, ribbed. Pappus white, 7–8 mm. Fl. Jul–Aug, fr. Sep–Oct.

• Understories of forests on slopes, forest margins, thickets, grasslands; 1700–3400 m. Gansu, Qinghai, Shaanxi, Sichuan, E Yunnan.

**34. *Parasenecio xinjiashanensis*** (Z. Ying Zhang & Y. H. Gou) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 66. 1999.

辛家山蟹甲草 xin jia shan xie jia cao

*Cacalia xinjiashanensis* Z. Ying Zhang & Y. H. Gou, Bull. Bot. Res., Harbin 3(1): 132. 1983.

Rhizomes slender, with many fibrous roots. Stem solitary, erect, striate, 40–75 cm tall, arachnoid or gradually glabrescent. Leaves usually crowded at middle part; petiole 6.5–8 cm, broadly or narrowly winged; blade thinly papery; median leaves broadly cordate, 8–10 × 10–12.5 cm, abaxially sparsely arachnoid on veins, later ± glabrescent, adaxially sparsely pubescent, base 3-veined, lateral veins furcate, veins prominent on both surfaces, base cordate, margin irregularly sharply serrate, teeth mucronulate, apex shortly acute or caudate-acuminate. Upper leaves smaller; petiole 3.5–5 cm, narrowly winged, not expanded at base. Capitula numerous, usually arranged in terminal racemes or branched in lower part, to 17 cm; peduncles 3–7 mm, slender, arachnoid and densely shortly glandular hairy, with 2 linear or linear-lanceolate bractlets. Involucres cylindrical or narrowly campanulate, 9–11 × ca. 1.5 mm; phyllaries 3, linear-lanceolate, arachnoid or subglabrous, margin scarious, apically obtuse. Florets 3; corolla yellow, 6–7 mm; limb broadly tubular; lobes lanceolate. Anthers exerted from corolla, ca. 4 mm, basally caudate. Style branches excurved, truncate, papillose. Achenes brown, cylindrical, 3–4 mm, glabrous, ribbed. Pappus white, 6–7 mm. Fl. Jun–Jul, fr. Aug.

• Understories of dense forests on slopes; 2300–2600 m. Shaanxi.

**35. *Parasenecio morrisonensis*** Ying Liu, C. I. Peng & Q. E. Yang, Taxon 56: 583. 2007.

玉山蟹甲草 yu shan xie jia cao

Stem solitary, erect or curved, 47–70 cm tall, paniculate-branched above, glabrous below, upper part and branches crisped-pubescent. Leaves papery, sparsely distributed. Lower leaves long petiolate; petiole ca. 12 cm, not winged; blade abaxially pale green, adaxially green, subtriangular-reniform, ca. 13 × 19 cm, abaxially densely lanate, adaxially crisped-pubescent, base cordate, marginal teeth mucronulate, apex acute. Upper leaves smaller, shortly petiolate. Capitula numerous, arranged in terminal panicles; peduncles 1–3.5 mm, slender, with 1 or 2 subulate bractlets. Involucres cylindrical, 8.5–11 mm, calyculate; phyllaries 2, narrowly oblong, 1.5–2 mm wide, glabrous, apex obtuse. Floret 1; corolla yellow, 8.5–10.5 mm; lobes lanceolate, ca. 1.5 mm. Achenes cylindrical, ca. 5 mm, glabrous. Pappus white, 6–7 mm. Fl. Aug.

• Mountain summits; ca. 3000 m. Taiwan (Jiayi, Yilan).

**36. *Parasenecio profundorum*** (Dunn) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 68. 1999.

深山蟹甲草 shen shan xie jia cao

*Senecio profundorum* Dunn, J. Linn. Soc., Bot. 35: 507. 1903; *Cacalia profundorum* (Dunn) Handel-Mazzetti; *Koyamacalia profundorum* (Dunn) H. Robinson & Brettell.

Rhizomes procumbent, robust. Stem solitary, erect, 50–120 cm tall, often naked below, striate, sparsely arachnoid, later glabrescent, ferruginous-brown glandular, shortly pubescent. Leaves long petiolate; petiole 5–8 cm, basally subamplexicaul; blade broadly ovate or ovate-rhombic, membranous, abaxially sparsely arachnoid, later glabrescent, adaxially hispidulous, base truncate or slightly cordate, cuneately narrowed into winged petiole, apex acute or shortly acute, teeth densely mucronulate. Middle stem leaves 10–13 × 10–12 cm, basally 3-veined, lateral veins furcately branched, veins abaxially prominent. Upper leaves shortly petiolate, smaller. Capitula numerous, arranged in terminal lax panicles; peduncles slender, sparsely glandular shortly pubescent, with 1–3 linear bractlets. Involucres cylindrical, 8–10 × ca. 3 mm; phyllaries 5, linear-lanceolate, 8–9 × 1.5–2 mm, glabrous or subglabrous, margin scarious, apex obtuse, puberulent. Florets 5; corolla yellow, ca. 8 mm, with slender ca. 3 mm tube, broadly tubular; limb lobes lanceolate, 1.5–2 mm. Anthers exerted from corolla, basally caudate. Style branches excurved, truncate, papillose. Achenes cylindrical, ca. 6 mm, glabrous, ribbed. Pappus white, shorter than corolla. Fl. and fr. Aug–Sep.

• Dense forests, forest margins on slopes, wet places in valleys, ravines, cliffs; 1000–2100 m. Chongqing, W Hubei, E Sichuan.

**37. *Parasenecio phyllolepis*** (Franchet) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 69. 1999.

苞鳞蟹甲草 bao lin xie jia cao

*Senecio phyllolepis* Franchet, J. Bot. (Morot) 8: 360. 1894; *Cacalia hupehensis* Handel-Mazzetti; *C. phyllolepis* (Franchet) Handel-Mazzetti; *Koyamacalia hupehensis* (Handel-Mazzetti) H. Robinson & Brettell; *K. phyllolepis* (Franchet) H. Robinson & Brettell.

Rhizomes robust, with fascicled fibrous roots. Stem solitary, erect, 60–90 cm tall, simple, striate or sulcate, arachnoid,

long naked below, often purple tinged. Leaves ca. 5, usually crowded at middle part, long petiolate; petiole 8–12 cm, obscurely narrowly winged or nearly not winged; blade abaxially pale green, adaxially dark green, broadly ovate, ovate-triangular, or ovate-cordate, 10–16 × 8–10 cm, thinly papery, abaxially sparsely arachnoid, later glabrescent, adaxially sparsely brown hispidulous, veins prominent on both surfaces, basally 3-veined, lateral veins furcately branched, base cordate or cuneate, rarely truncate, margin unequally serrulate, teeth mucronulate, apex caudate-acuminate. Upper leaves smaller, ovate, shortly petiolate. Uppermost leaves bracteal, lanceolate or linear-lanceolate. Capitula numerous, terminal or in upper leaf axils, arranged in racemes or narrow racemose panicles; peduncles 6–10 mm, erect or pendulous, shortly hairy, with 2 or 3 unequal bractlets. Involucres cylindric or narrowly campanulate, 8–10 × 3–4 mm; phyllaries 5(or 6), green, oblong-lanceolate, 8–10 × 1.5–2 mm, herbaceous, sparsely shortly hairy or subglabrous, margin scarious, apically obtuse or slightly acute, puberulent. Florets 5 or 6; corolla yellow, 8–9 mm, with slender 3–4 mm tube and narrowly campanulate limb; lobes lanceolate. Anthers exerted from corolla, basally caudate. Style branches excurved or involute, truncate, papillose. Achenes yellow-brown, cylindric, 5–6 mm, glabrous, ribbed. Pappus white, 7–8 mm. Fl. and fr. Sep–Oct.

• Understories of forests on slopes, by canals; 1000–2500 m. Chongqing, W Hubei, E Sichuan.

**38. *Parasenecio ianthophyllus*** (Franchet) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 71. 1999.

紫背蟹甲草 *zi bei xie jia cao*

*Senecio ianthophyllus* Franchet, J. Bot. (Morot) 8: 361. 1894; *Cacalia ianthophylla* (Franchet) Handel-Mazzetti.

Rhizomes short, slender, with few tomentose fibrous roots. Stem solitary, erect or oblique, 20–40 cm tall, slender, glabrous, striate, naked below. Stem leaves usually 2 or 3, crowded at middle part of stem; lower leaves fallen by anthesis, long petiolate; petiole not winged, 5–7 cm, sparsely arachnoid or glabrous; blade abaxially purple-blue or purple, adaxially green, thinly papery, broadly cordate-ovate or ovate-cordate, 5–14 × 8–11 cm, abaxially sparsely arachnoid, later glabrescent, adaxially sparsely hispidulous, basally 5–7-veined, lateral veins upward furcately branched, veins prominent on both surfaces, base deeply cordate, margin unequally serrate, teeth mucronulate, apex acuminate or caudate. Capitula numerous, usually on one side, arranged in terminal large panicles, synflorescence branches spreading, glabrous or uppermost hispidulous; peduncles 2–4 mm, spreading or pendulous, densely shortly hairy. Involucres pink-purple, cylindric, 12–14 × 1.5–2 mm, glabrous, margin narrowly scarious, apically slightly acute. Florets 5 or 6; corolla yellow, ca. 8 mm; tube shorter than limb; lobes lanceolate. Anthers exerted from corolla, basally caudate. Style branches excurved, truncate, papillose. Achenes cylindric, glabrous. Pappus white, ca. 8 mm. Fl. Jul–Aug.

• Mixed or coniferous forests; 1400–1600 m. Chongqing (Chengkou), W Hubei.

*Parasenecio ianthophyllus* is easily distinguished by its stem leaves 2 or 3, often crowded at the middle, and blade broadly cordate-

orbicular, abaxially blue-purple, with veins conspicuously prominent on both surfaces.

**39. *Parasenecio leucocephalus*** (Franchet) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 71. 1999.

白头蟹甲草 *bai tou xie jia cao*

*Senecio leucocephalus* Franchet, J. Bot. (Morot) 8: 360. 1894; *Cacalia leucocephala* (Franchet) Handel-Mazzetti.

Rhizomes procumbent, with numerous tomentose fibrous roots. Stem solitary, erect, often purple tinged, conspicuously striate, 40–80 cm tall, naked below, glabrous, white arachnoid or later glabrescent above. Leaves long petiolate; lower leaves fallen by anthesis; petioles 4–9 cm, not winged, glabrous or subglabrous. Median leaves adaxially green, ovate-triangular or hastate-triangular, rarely cordate, 8–12 × 18–14 cm, abaxially white or gray-white arachnoid, adaxially hispidulous, palmately 3–5-veined, lateral veins upward furcate, veins prominent on both surfaces, base cordate or truncate, margin irregularly serrate, teeth mucronulate, apex shortly acute or caudate. Upper leaves smaller, petioles shorter. Capitula many, terminal and in upper leaf axils, arranged in narrow panicles; peduncles 2–17 mm, with 2 or 3 linear bractlets, densely tomentose. Involucres cylindric or cylindric-campanulate, 8–10 × 4–5 mm; phyllaries 5, oblong or oblong-lanceolate, 8–10 × 2–4 mm, white lanate, margin scarious, apically obtuse. Florets 10–13; corolla yellow, 8–11 mm, with slender ca. 3 mm tube and tubular limb; lobes lanceolate. Anthers exerted from corolla, basally long caudate. Style branches excurved, truncate, papillose. Achenes cylindric, 5–6 mm, glabrous, ribbed. Pappus white, 6–8 mm. Fl. Aug–Sep, fr. Oct.

• Forest understories, forest margins, grasslands; 1200–3000 m. Chongqing (Chengkou, Wushan), W Hubei.

*Parasenecio leucocephalus* is easily distinguished by its stems and leaves abaxially densely arachnoid; phyllaries rather broad, densely white lanate; and florets 10–13.

**40. *Parasenecio longispicus*** (Handel-Mazzetti) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 72. 1999.

长穗蟹甲草 *chang sui xie jia cao*

*Cacalia longispica* Handel-Mazzetti, Acta Horti Gothob. 12: 301. 1938.

Rhizomes robust, with many fibrous roots. Stem solitary, erect, striate, to 100 cm tall, slender, stiff, strict, branched above, adpressed arachnoid and shortly glandular pubescent. Leaves long petiolate; petiole not winged, 3–5 cm. Median leaves papery, broadly cordate, 10–15 × 17–20 cm, abaxially gray-white tomentose, adaxially articulately shortly hairy, palmately 5-veined, lateral veins furcately branched, veins prominent on both surfaces, base cordate, margin deeply undulate-denticulate, teeth sometimes long mucronulate, apex shortly acute or obtuse. Uppermost leaves shortly petiolate, reniform, sometimes with buds in leaf axils. Capitula numerous, terminal and in upper leaf axils, arranged in raceme-panicles, or lateral synflorescences rudimentary, spreading or pendulous; rachis arachnoid, tomentose; bracts linear-lanceolate; uppermost bracts to 1 cm; peduncles 1–3 mm, usually with 1 bractlet. Involucres cylindric, 8–10 × 1.5–2 mm; phyllaries 3 or 4, green, linear, 10–

11 × ca. 1.5 mm, glabrous or sparsely pubescent. Florets 2–4; corolla yellow, ca. 8 mm, with slender, 2–3 mm tube and cylindrical-campanulate limb; lobes lanceolate, ca. 1 mm. Anthers slightly exerted from corolla, ca. 5 mm, basally caudate. Style branches truncate, papillose. Achenes brown, cylindrical, ca. 5 mm, rugulose. Pappus white. Fl. Jul–Aug, fr. Sep–Oct.

- Thickets, grasslands on slopes; 2000–3100 m. Sichuan.

**41. *Parasenecio bulbiferoides*** (Handel-Mazzetti) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 73. 1999.

珠芽蟹甲草 zhu ya xie jia cao

*Cacalia bulbiferoides* Handel-Mazzetti, Symb. Sin. 7: 1131. 1936; *Koyamacalia bulbiferoides* (Handel-Mazzetti) H. Robinson & Brettell.

Plants ca. 85 cm tall, with fascicled fibrous roots. Stem solitary, erect, often becoming purple, stiff, finely sulcate, naked at base, sparsely arachnoid. Leaves lax; petioles 3–5 cm, not winged; leaf blade adaxially green, broadly triangular-ovate or broadly ovate, 6–12 × ca. 15 cm, herbaceous, abaxially sparsely arachnoid, glabrescent, adaxially sparsely shortly brown hairy on veins, palmately 5–7-veined and 1 or 2 lateral veins, base angular-cordate, margin undulate, stoutly toothed, or 9–11-lobulate, apex obtuse or shortly acute. Upper leaves shortly petiolate, all leaf axils with ovoid, ca. 7 mm scaly buds; buds brown, tomentulose. Capitula numerous, spreading, arranged in terminal racemes or compound racemes, to 40 cm; lower bracts with sparse buds; uppermost bracts to 8 mm; bracts lanceolate, ca. 6 mm, submembranous; peduncles 1–2 mm, tomentose, with 1 bractlet. Involucres cylindrical-campanulate; phyllaries 5 or 6, lanceolate, 11–13 mm, glabrous, margin scarious, apically obtuse. Florets 8–10; corolla yellow, ca. 1 cm, with ca. 4 mm tube and cylindrical, broader, ca. 6 mm limb; lobes linear, ca. 1 mm, involute. Anthers exerted from corolla, purple when dry, basally caudate. Style branches truncate, papillose, ovary glabrous, cylindrical. Pappus white, shorter than corolla. Fl. Sep.

- Wet places in valleys; 1000–2200 m. W Hubei, Hunan (Hengshan), Shaanxi (Hanzhong).

**42. *Parasenecio petasitoides*** (H. Léveillé) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 75. 1999.

蜂斗菜状蟹甲草 feng dou cai zhuang xie jia cao

*Senecio petasitoides* H. Léveillé, Repert. Spec. Nov. Regni Veg. 8: 360. 1910; *Cacalia farfarifolia* Siebold & Zuccarini subsp. *petasitoides* (H. Léveillé) H. Koyama.

Rhizomes robust, with many fibrous roots. Stem solitary, erect, 100–150 cm tall, striate, sparsely arachnoid. Leaves long petiolate, papery; petiole 5–14 cm, not winged, shortly pubescent or subglabrous; median leaves adaxially green, broadly ovate-cordate, 9–16 × 12–20 cm, abaxially densely white arachnoid or later glabrescent, adaxially sparsely adpressed shortly hairy or subglabrous, palmately 5–7-veined, veins abaxially prominent, adaxially impressed, base deeply cordate, margin stoutly undulate-toothed, teeth mucronulate, apex acute or shortly acuminate. Upper leaves shortly petiolate, gradually smaller upward. Capitula numerous, usually arranged in crowded spicate racemes; peduncles ca. 9 mm, with 3 linear-

lanceolate bractlets, arachnoid. Involucres cylindrical, 1.2–1.4 cm; phyllaries 5, oblong-lanceolate, glabrous, margin scarious, apically rounded-obtuse. Florets 5–8; corolla yellow or white, ca. 8 mm, tube slender, ca. 3 mm, limb broadly tubular; lobes triangular. Anthers exerted from corolla, basally caudate. Style branches excurved, apically truncate, papillose. Achenes cylindrical, 5–7 mm, glabrous, ribbed. Pappus white, 7–9 mm. Fl. Aug–Sep, fr. Oct.

- Wet places of forest understories on slopes, grasslands; 1700–2200 m. Guizhou, Sichuan.

**43. *Parasenecio hwangshanicus*** (Y. Ling) C. I. Peng & S. W. Chung, Fl. Taiwan, ed. 2, 4: 1024. 1998.

黄山蟹甲草 huang shan xie jia cao

*Cacalia hwangshanica* Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 5: 11. 1937; *C. bulbifera* (Maximowicz) Matsumura var. *piligera* Y. Ling; *Koyamacalia hwangshanica* (Y. Ling) H. Robinson & Brettell.

Plants erect, 25–50 cm tall. Rhizomes robust, ca. 2.5 cm in diam., with many fascicled tomentose fibrous roots. Stem solitary, simple, striate or sulcate, sparsely arachnoid, gradually glabrescent, naked in lower part, with 2 withered ovate scales. Leaves usually 3 or 4, crowded at middle part; petiole often shorter than leaf blade, petioles in lower part to 9 cm, obscurely narrowly winged, sparsely arachnoid or subglabrous, base expanded and subamplexicaul; leaf blade adaxially dark green, broadly reniform or ovate-orbicular, 6–12(–15) × 8–15 cm, membranous when dry, abaxially thinly white arachnoid, adaxially sparsely or on veins more densely brown strigillose, basally 3-veined, lateral veins furcate in 3–5 pairs, veins prominent on both surfaces, base cordate, shortly cuneate, decurrent into petiole, margin deeply undulate or equally finely toothed, teeth mucronulate, apex acute or rounded-obtuse. Upper leaves shortly petiolate, ovate-cordate, smaller, apex acute or slightly acute. Uppermost leaves bractlike, ovate or ovate-lanceolate. Capitula many, arranged in 8–18 cm lax panicles; rachis slender, arachnoid and brown shortly pubescent; peduncles 3–5 mm or subsessile, with 1 or 2 subulate bractlets. Involucres narrowly campanulate-cylindrical, ca. 10 × 1.5–2 mm, margin broadly scarious, apically obtuse, puberulent. Florets 7 or 8; corolla yellow, ca. 8 mm; tube slender, ca. 3 mm; limb narrowly campanulate, 4–5 mm; lobes ovate-lanceolate, apex puberulent. Anthers exerted from corolla, basally shortly caudate. Style branches excurved, apically truncate, penicillate, papillose. Achenes brown, cylindrical, 4–5 mm, glabrous, ribbed. Pappus white, ca. 7 mm. Fl. Jun–Aug, fr. Sep.

- Grasslands at mountain summits, shaded wet places on slopes; 1500–1800 m. Anhui, Jiangxi, Taiwan, Zhejiang.

*Parasenecio hwangshanicus* is quite similar to *P. rufipilis* in aspect, but the latter differs in having petioles and stems red-brown villos; capitula arranged in dense narrow panicles, rachis densely arachnoid; and florets 5.

**44. *Parasenecio rufipilis*** (Franchet) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 76. 1999.

红毛蟹甲草 hong mao xie jia cao

*Senecio rufipilis* Franchet, J. Bot. (Morot) 8: 359. 1894; *Cacalia rufipilis* (Franchet) Y. Ling; *Koyamacalia rufipilis* (Franchet) H. Robinson & Brettell.

Plants erect, 60–80 cm tall. Rhizomes robust, with many tomentose fibrous roots. Stem solitary, striate, simple, red-brown hyaline villous in lower part, white arachnoid-villous in upper part. Leaves long petiolate; lower leaves withered by anthesis; petiole not winged, 5–10 cm, red-brown villous. Median leaf blades broadly ovate-cordate or reniform, 7.5–13 × 8–19 cm, with red-brown hyaline glandular hairs, palmately 5–7-veined, veins raised abaxially, impressed adaxially, base deeply cordate, margin triangularly 5-lobulate or deeply serrate, apex acute. Upper leaves smaller, shortly petiolate. Capitula many, arranged in panicles at apex of stem; synflorescence branches crowded; rachis and peduncles white arachnoid; peduncles very short, with 1–3 triangular bractlets. Involucre cylindrical, 10–13 × ca. 3 mm; phyllaries 5 or 6, linear-lanceolate, shortly brown pubescent, margin scarious, apically rounded-obtuse. Florets 5; corolla yellow, ca. 1 cm; tube slender, ca. 3 mm; limb broadly tubular; lobes triangular. Anthers exerted from corolla, basally caudate. Style branches excurved, apically truncate, papillose. Achenes cylindrical, ca. 5 mm, glabrous, ribbed. Pappus white, ca. 1 cm. Fl. Jul–Aug, fr. Sep.

• Grasslands, thickets, forests on slopes; 1100–1800 m. Gansu, Henan, Shaanxi, Sichuan.

*Parasenecio rufipilis* differs from *P. dasythyrsus* and *P. bulbiferoides* by its plants red-brown hyaline glandular pubescent; leaf axils without scaly buds; capitula more dense, larger; and peduncles and involucre red-brown villous.

**45. *Parasenecio tsinlingensis*** (Handel-Mazzetti) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 77. 1999.

秦岭蟹甲草 qin ling xie jia cao

*Cacalia tsinlingensis* Handel-Mazzetti, Oesterr. Bot. Z. 85: 221. 1936.

Plants erect or sometimes curved, 35–70 cm tall. Stem solitary, striate, brown arachnoid or glabrate. Leaves long petiolate; petiole 10–15 cm, densely brown pubescent, base expanded and amplexicaul; lower leaves withered by anthesis; blade abaxially gray-green, adaxially green, reniform or ovate-cordate, 10–15 × 12–18 cm, thinly papery, abaxially sordid arachnoid and brown pubescent, sometimes subglabrous, adaxially sparsely shortly brown pubescent, basally 5–7-veined, lateral veins few, upward furcately branched, veins raised abaxially, impressed adaxially, base deeply cordate or broadly cordate, margin shallowly undulate-lobed at base, apex rounded-obtuse; lobes broadly triangular, obtuse or subrounded-toothed, teeth mucronulate. Upper leaves shortly petiolate, smaller. Capi-

tula many, terminal, arranged in racemes or dense panicles; rachis and peduncle shortly brown pubescent. Involucre cylindrical, 4–6 mm, base with 1 or 2 lanceolate bractlets; bractlets 5–15 mm, brown arachnoid, margin entire or sparsely toothed, apex acuminate; phyllaries 5, oblong or linear-lanceolate, glabrous, margin scarious, apically obtuse. Florets 5 or 6; corolla white, 4–5 mm; tube slender; lobes lanceolate. Anthers exerted from corolla, basally shortly caudate. Style branches excurved, apically truncate, papillose. Achenes brown, cylindrical, ca. 3 mm, glabrous, ribbed. Pappus white, ca. 5 mm. Fl. Jul–Aug, fr. Sep.

• Understories of lax forests, shaded wet places in valleys; 1400–1800 m. Gansu, Shaanxi.

**46. *Parasenecio dasythyrsus*** (Handel-Mazzetti) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 78. 1999.

山西蟹甲草 shan xi xie jia cao

*Cacalia dasythyrsa* Handel-Mazzetti, Acta Horti Gothob. 12: 296. 1938; *Koyamacalia dasythyrsa* (Handel-Mazzetti) H. Robinson & Brettell.

Plants 65–90 cm tall. Rhizomes procumbent, with fibrous roots. Stem solitary, straight or slightly curved, striate, long naked, articulate, glandular pubescent or subglabrous in lower part, arachnoid or shortly glandular hairy in upper part. Lower leaves often fallen by anthesis. Median leaves crowded, long petiolate; petiole 7–14 cm, not winged, glandular hairy; blade abaxially pale green, adaxially dark green, broadly ovate-cordate or cordate, 10–15 × 13–20 cm, thinly papery, palmately 7-veined, lateral veins furcately branched, abaxially sparsely arachnoid and glandular hairy, adaxially brown strigillose, base cordate, rarely subtruncate, basal margin with deeply undulate stout teeth, teeth mucronulate, apex acute or slightly obtuse. Upper leaves shortly petiolate, very small. Capitula many, apically in dense or lax narrow panicles; peduncles 3–4 mm, with 1–3 linear bractlets at base; rachis and peduncles arachnoid and glandular hairy; capitula spreading, pendulous later, arachnoid and glandular hairy. Involucre narrowly campanulate or cylindrical; phyllaries 4 or 5, pale green and nitid, broadly linear-lanceolate, 10–12 × 1.5–2 mm, sparsely glandular hairy, margin narrowly scarious, apex slightly acute or obtuse. Florets 5 or 6; corolla orange, exerted from involucre; tube slender, as long as limb, or rather short; limb narrowly campanulate; lobes lanceolate, ca. 3 mm. Anthers exerted from corolla, basally long caudate. Style branches excurved, apically truncate, penicillate, papillose. Achenes cylindrical, 2–3 mm (immature), glabrous. Pappus white, as long as corolla. Fl. and fr. Aug–Sep.

• Grasslands on slopes; 700–1200 m. Gansu, Shaanxi, Shanxi.

*Parasenecio dasythyrsus* is similar to *P. rufipilis* in aspect but differs by its articulate glandular hairs, orange florets, and longer peduncles.

**5. *Parasenecio* sect. *Delphiniifolii*** (H. Koyama) H. Koyama in Iwatsuki et al., Fl. Japan 3b: 48. 1995 [*“Delphiniifoliae”*].

翠雀叶组 cui que ye zu

*Cacalia* sect. *Delphiniifoliae* H. Koyama, Mem. Fac. Sci. Kyoto Univ., Ser. Biol. 2(2): 168. 1969.

Stem leaves many; blade palmately medially to deeply 5–7-lobed, palmately veined. Phyllaries 3–5, rarely 7 or 8. Florets 3–5, rarely 10–14. Pappus white or red-brown.

Nine species: Bhutan, China, Japan; six species (four endemic) in China.

**47. *Parasenecio delphiniifolius*** (Siebold & Zuccarini) H. Koyama in Iwatsuki et al., Fl. Japan 3b: 49. 1995.

翠雀蟹甲草 cui que xie jia cao

*Cacalia delphiniifolia* Siebold & Zuccarini, Abh. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. 4(3): 190. 1846; *C. delphiniphylla* (H. Léveillé) Handel-Mazzetti; *C. pilgeriana* (Diels) Y. Ling subsp. *delphiniphylla* (H. Léveillé) H. Koyama; *Parasenecio delphiniphyllus* (H. Léveillé) Y. L. Chen; *P. tongchuanensis* Y. L. Chen; *Senecio delphiniphyllus* H. Léveillé; *S. syneilesis* Franchet & Savatier; *S. zuccarini* Maximowicz.

Plants 80–150 cm tall; rhizomes not seen. Stem solitary, erect, striate, often becoming purple in lower part, shortly pubescent or subglabrous. Leaves petiolate; lower leaves withered by anthesis. Median leaves 3 or 4; petiole not winged, 4–6.5 cm, shortly yellow-brown hairy; blade broadly reniform or ovate-reniform, 9–15 × 11–18 cm, base truncate, palmately lobed, apex long caudate-acuminate; lobes 5–7, narrowly obovate or oblong-ovate, sometimes secondarily pinnately lobed, abaxially yellow-brown pubescent, adaxially adpressed shortly hairy, veins raised abaxially, impressed adaxially, basally 5-veined, lateral veins upward branched, margin sparsely serrate, teeth mucronulate, apex caudate or acuminate. Upper leaves shortly petiolate, small. Capitula many, terminal, arranged in narrow panicles; rachis and peduncle densely glandular shortly hairy; peduncles ca. 1 mm, with 1 or 2 linear or triangular bractlets. Involucres cylindrical, 5–6 × 2–3 mm; phyllaries 5, oblong-lanceolate, 1–1.5 mm wide, sparsely shortly pubescent, margin narrowly scarious, apically obtuse or slightly acute. Florets 5; corolla yellow, ca. 8 mm; tube slender, ca. 3 mm; limb broadly tubular, lobes ovate-lanceolate. Anthers not exerted from corolla, basally long caudate. Style branches apically truncate, papillose. Achenes dark brown, cylindrical, 4–5 mm, glabrous, ribbed. Pappus brownish, ca. 6 mm. Fl. Jul–Aug, fr. Sep–Oct.

Shaded wet places of forest understories, slopes; 1600–3200 m. Guizhou, E Yunnan [Japan].

**48. *Parasenecio pilgerianus*** (Diels) Y. L. Chen, Acta Phytotax. Sin. 33: 83. 1995.

太白蟹甲草 tai bai xie jia cao

*Senecio pilgerianus* Diels, Bot. Jahrb. Syst. 36(Beibl. 82): 106. 1905; *Cacalia pilgeriana* (Diels) Y. Ling; *Koyamacalia pilgeriana* (Diels) H. Robinson & Brettell.

Plants erect, 60–100 cm tall. Rhizomes not dilated, with numerous fibrous roots. Stem solitary, striate, glabrous or sparsely arachnoid in lower part, shortly pubescent in upper part and synflorescence branches, long naked in lower part by anthesis. Lower leaves often withered by anthesis; leaves petiolate; petiole not winged, (8–)10–20 cm; blade abaxially pale green, adaxially green, reniform or broadly reniform, 15–22 × 20–30 cm, papery, palmately medially to deeply lobed; lobes 5–7, obovate or oblong, pinnately lobed, abaxially shortly hairy on veins, adaxially adpressed sparsely shortly pubescent, basally 5-veined, lateral veins upward furcate, base cordate or truncate, margin undulately toothed, teeth mucronulate, apex acute. Upper leaves shortly petiolate, smaller. Uppermost leaves very

small, bractlike. Capitula many, usually arranged in crowded branched panicles; rachis and peduncle densely brown shortly hairy, subsessile, with 1 linear-lanceolate bractlet at base. Involucres cylindrical, 5–6 × ca. 1.5 mm; phyllaries 3, linear-lanceolate, ca. 1 mm wide, striate, margin narrowly scarious, apically obtuse, puberulent. Florets 3; corolla white or pale yellow, 6–7 mm; tube slender, ca. 3 mm; limb broadly tubular. Anthers exerted from corolla, basally long caudate. Style branches excurved, slender, truncate, papillose. Achenes cylindrical, 2–3 mm, glabrous, ribbed. Pappus yellow-brown, 5–6 mm. Fl. Jul–Aug, fr. Sep.

• Forests on slopes, shaded wet places, watersides in valleys; 1200–2500 m. Gansu, Qinghai, Shaanxi.

**49. *Parasenecio sinicus*** (Y. Ling) Y. L. Chen, Fl. Reipubl. Popul. Sin. 77(1): 81. 1999.

中华蟹甲草 zhong hua xie jia cao

*Cacalia sinica* Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 5: 7. 1937; *Koyamacalia sinica* (Y. Ling) H. Robinson & Brettell.

Plants erect, to 1 m tall. Rhizomes short, stout, with numerous fibrous roots. Stem solitary, striate, glabrous, naked in lower part, with withered scales or fibrous, with many leaves in lower 1/2. Leaves large; petiole 10–12 cm, narrowly winged; leaf blade abaxially pale, adaxially green, reniform or broadly ovate-triangular, 10–20 × 12–24 cm, thinly papery, usually palmately deeply 5–7-lobed; lobes lanceolate or elliptic-lanceolate, abaxially glabrous, adaxially brown strigose on veins, basally 3–5-veined, lateral veins furcate near base, veins raised abaxially, impressed adaxially, base cordate or subcordate, margin stiffly ciliate and sparsely cartilaginous mucronulately or undulately finely toothed, apex acuminate; central lobe larger, lateral lobes often 1-lobulate, lobule obliquely triangular. Upper leaves smaller, hastately 3-lobed. Uppermost leaves shortly petiolate, very small. Capitula many, terminal or in upper leaf axils, arranged in large, broad panicles to 15–20 cm; peduncles 8–15 mm, stout; rachis shortly brown hairy, base with 2 or 3 subulate bractlets. Involucres cylindrical; phyllaries 7 or 8, linear-lanceolate or linear, 8–10 × ca. 1 mm, outside glabrous, apex acute, puberulent. Florets 10–14; corolla yellow or purple, ca. 8 mm; tube slender, ca. 3 mm; limb broadly tubular, lobes triangular-lanceolate, ca. 1.5 mm. Anthers exerted from corolla, basally shortly caudate. Style branches excurved, apically truncate, penicillate, papillose. Achenes brown, oblong-cylindrical, 5–6 mm, glabrous, ribbed. Pappus red-brown, 7–8 mm. Fl. Jul–Aug, fr. Sep.

• Shaded wet places of forest understories on slopes, forest margins by canal sides; 1000–2000 m. Henan, Shaanxi.

*Parasenecio sinicus* is similar to *P. pilgerianus* but differs in having leaves palmately shallowly to deeply 5–7-divided, lobes pinnately shallowly lobed; peduncles very short; and phyllaries and florets 3 or 4.

**50. *Parasenecio dissectus*** Y. S. Chen, Ann. Bot. Fenn. 48: 166. 2011.

湖北蟹甲草 hu bei xie jia cao

Herbs, perennial, to 1 m tall. Rhizomes short, with numerous elongate fibrous roots. Stem solitary, erect, striate, glabrous. Leaves petiolate; petiole 2.5–9.5 cm, glabrous; blade green on both surfaces, orbicular-ovate, 16–27 × 15–35 cm, thinly papery, palmately and deeply (5 or) 6–9-lobed; lobes lanceolate or elliptic-lanceolate, both surfaces glabrous, basally 3- or 4-veined, lateral veins furcate near base, veins raised abaxially, impressed adaxially, base subcordate, margin undulately finely toothed, apex acuminate; central lobe larger, lateral lobes often 1-lobulate, lobule obliquely triangular; upper leaves gradually smaller, ovate, usually 5-lobed, with shorter petioles; uppermost leaves shortly petiolate, oblong, 13–15 cm × 8–10 mm, 3-lobed; lobe margin entire, apex acuminate. Capitula numerous, discoid, arranged in panicles ca. 20 cm; peduncles 4–6 mm, slender; rachis shortly hairy, base with 2 or 3 subulate bractlets. Involucres cylindrical, 10–12 × ca. 3 mm; phyllaries 5, linear, 7–8 × ca. 1 mm, outer surface glabrous, margin membranous, apex acute. Florets bisexual, 5; corolla tube ca. 4 mm; limb broadly tubular, ca. 4 mm; lobes 5, lanceolate, ca. 1 mm. Anthers exerted from corolla, basally shortly caudate. Style branches excurved, penicillate, papillose, apically truncate. Achenes brown, cylindrical, ca. 3 mm, glabrous, longitudinally ribbed. Pappus white, ca. 8 mm.

- Hubei (?Fangxian).

*Parasenecio dissectus* is known only from the type gathering, *A. Henry 6487*, which was made in 1885–1888 in Hubei, possibly in Fangxian. It is similar to *P. sinicus* but differs in having leaves larger, phyllaries and florets 5, achenes shorter, and pappus white.

**51. *Parasenecio palmatisectus*** (Jeffrey) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 82. 1999.

掌裂蟹甲草 zhang lie xie jia cao

Plants erect, 50–100 cm tall. Rhizomes robust, with numerous tomentose fibrous roots. Stem solitary, striate. Leaves long petiolate; lower leaves fallen by anthesis; petiole not winged, 4–7 cm, sparsely shortly pubescent or subglabrous; median leaf blade abaxially pale green or gray-green, adaxially green, broadly ovate-orbicular or pentagonal-cordate, 5–14 × 7–14 cm, abaxially white crisped-hairy or only pubescent on veins, adaxially sparsely adpressed shortly hairy or glabrous, pinnate-palmately 5–7-divided; lobes oblong, oblong-lanceolate, or spatulate, rarely linear, 2–9 × 2–4 cm, pinnately lobed, or unequally 2–4-denticulate; terminal lobe larger, lateral lobes narrow and small. Upper leaves smaller, same as middle leaves, shorter petiolate. Capitula many, arranged in terminal racemes or lax panicles, spreading or pendulous after anthesis; peduncles 3–5(–7) mm, with 1 or 2 linear bractlets. Involucres cylindrical, 8–10 × 2.5–3 mm; phyllaries 4, green or sometimes becoming purple, linear-oblong, margin narrowly scarious, apically obtuse. Florets 4 or 5, rarely 6 or 7; corolla yellow, 8–12 mm; tube slender, ca. 3 mm; limb narrowly campanulate, lobes ovate-lanceolate. Anthers exerted from corolla, basally caudate. Style branches excurved, apically truncate, papillose. Achenes cylindrical, 5–6 mm, glabrous, ribbed. Pappus white, 5–6 mm. Fl. Jul–Aug, fr. Sep–Oct.

Forest understories, forest margins, thickets on slopes; 2400–3800 m. SW and W Sichuan, E Xizang, NW Yunnan [Bhutan].

- 1a. Stems, rachis, peduncles, and phyllaries sparsely shortly pubescent or subglabrous; leaves abaxially pubescent only on veins ..... 51a. var. *palmatisectus*
- 1b. Upper stems, rachis, peduncles, and phyllaries shortly glandular pubescent or glandular hairy; leaves abaxially white crisped-hairy ..... 51b. var. *moupinensis*

**51a. *Parasenecio palmatisectus* var. *palmatisectus***

掌裂蟹甲草(原变种) zhang lie xie jia cao (yuan bian zhong)

*Senecio palmatisectus* Jeffrey, Notes Roy. Bot. Gard. Edinburgh 9: 128. 1916; *Cacalia palmatisectus* (Jeffrey) Handel-Mazzetti; *Koyamacalia palmatisecta* (Jeffrey) H. Robinson & Brettell.

Stems, rachis, peduncles, and phyllaries sparsely shortly pubescent or subglabrous. Leaves abaxially pubescent only on veins.

- Forest understories, forest margins, thickets on slopes; 2600–3800 m. SW and W Sichuan, E Xizang, NW Yunnan.

**51b. *Parasenecio palmatisectus* var. *moupinensis*** (Franchet) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 82. 1999.

腺毛掌裂蟹甲草 xian mao zhang lie xie jia cao

*Senecio quinquelobus* (Thunberg) Candolle var. *moupinensis* Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 10: 40. 1887; *Cacalia palmatisectus* var. *moupinensis* (Franchet) H. Koyama; *C. palmatisectus* f. *pilipes* H. Koyama; *C. palmatisectus* var. *pubescens* (Jeffrey) C. Y. Wu; *C. pentaloba* Handel-Mazzetti var. *moupinensis* (Franchet) Handel-Mazzetti; *Senecio moupinensis* (Franchet) C. C. Chang; *S. palmatisectus* var. *pubescens* Jeffrey.

Upper stems, rachis, peduncles, and phyllaries shortly glandular pubescent or glandular hairy. Leaves abaxially white crisped-hairy.

Forests, forest margins, secondary thickets on slopes; 2400–2900 m. SW and W Sichuan, E Xizang [Bhutan].

**52. *Parasenecio tripteris*** (Handel-Mazzetti) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 85. 1999.

昆明蟹甲草 kun ming xie jia cao

*Cacalia tripteris* Handel-Mazzetti, Acta Horti Gothob. 12: 300. 1938.

Plants (30–)50–90 cm tall. Rhizomes short, stout, 1.5–2 cm in diam., with numerous brown fibrous roots. Stem solitary, green or base purple-tinged striate, stiff, glabrous. Lower leaves small or withered by anthesis; other leaves usually crowded at middle, gradually smaller. Petiole ca. 1/2 as long as blade, unequally shortly winged, without auricle at base; leaf blade abaxially pale green, adaxially dark green, broadly ovate, 7–10 × 6–11 cm, both surfaces glabrous, palmately veined, veins distinctly raised adaxially, base slightly cordate, truncate, or broadly cuneate, palmately 3–7-divided, lobes broadly obovate-spatulate, apex obtuse or slightly acute, terminal lobe ± lobed, lateral lobes 2-lobed or divided, margin sparsely toothed or

mucronulate only, thicker in texture. Capitula many, terminal or arranged in upper leaf axils in a branched narrow panicle; branches obliquely ascending; capitula upward arranged in racemes, pendulous, glabrous or sparsely shortly pubescent; bracts of lower part similar to leaves, but smaller; upper bracts linear or linear-lanceolate, 5–6 mm; peduncles (2–)3–5 mm, slender, with 1–3 subulate-linear bractlets, pendulous. Involucres cylindrical, 8–9 × 1.5–2 mm; phyllaries 3, pale brown, linear-lanceolate or narrowly lanceolate, 7–9 × 1–1.5 mm, herbaceous, glabrous, margin narrowly or broadly scarious, apically obtuse or

slightly acute, puberulent. Florets 3 or 4; corolla yellow, 6–7 mm; limb broadly tubular; lobes lanceolate, ca. 2 mm. Anthers exerted from corolla, basally long caudate. Style branches truncate, papillose. Achenes yellow-brown, cylindrical, 4–5 mm, glabrous, ribbed. Pappus white, ca. 5 mm. Fl. Jul–Aug, fr. Oct.

- Lax forests or grasslands on slopes; 1900–3100 m. Yunnan.

*Parasenecio tripteris* is similar to *P. palmatisectus* but differs in the leaf thickness, the type of division of leaves, and the numbers of phyllaries and florets.

## 99. *LIGULARIOPSIS* Y. L. Chen, Acta Phytotax. Sin. 34: 631. 1996.

假橐吾属 *jia tuo wu shu*

Chen Yilin (陈艺林 Chen Yi-ling); Bertil Nordenstam

Herbs, perennial. Rhizomes robust, short, with many fibrous roots. Stem with relict petioles at base. Leaves alternate, papery, basal leaves persistent by anthesis, long petiolate, oblong-cordate or broadly ovate-cordate, base cuneate, decurrent into winged petiole; petiole basally expanded and subamplexicaul, but not vaginate. Median leaves similar to lower leaves but smaller, shortly petiolate; petiole winged, gradually expanded from middle to base into leaflike ovate auricles, amplexicaul. Capitula discoid, in terminal racemes; peduncles with 2 bractlets. Involucres cylindrical or narrowly campanulate, 1.5–2 mm in diam., not calyculate; phyllaries uniseriate, 4, linear-lanceolate, margin narrowly scarious. Receptacle foveolate. Florets 4, discoid, distinctly overtopped by disk, bisexual; corolla yellow, tubular limb narrowly campanulate, 5-lobed; lobes lanceolate, apex acute. Anthers linear, exerted from corolla, basally obtuse, apex with lanceolate appendages, antheropodium cylindrical. Style branches excurved, obtuse or truncate, papillose. Achenes cylindrical, glabrous, ribbed. Pappus purple-brown, uniseriate, serrulate, caducous.

- One species: China.

This genus is not only in aspect but also in the head arrangement closely related to *Ligularia*; however, it differs by its petioles winged, expanded and subamplexicaul, but not vaginate at base; capitula discoid, in terminal racemes; and florets 4, all tubular. The genus is also related to *Parasenecio* but differs by its anthers obtuse, not caudate at base; stem leaf base with relict petioles; and basal leaves persistent by anthesis.

### 1. *Ligulariopsis shichuana* Y. L. Chen, Acta Phytotax. Sin. 34: 632. 1996.

假橐吾 *jia tuo wu*

*Cacalia longispica* Z. Ying Zhang & Y. H. Guo, Fl. Tsinling. 1(5): 422. 1985, not Handel-Mazzetti (1938).

Rhizomes short, stout, with many fibrous roots. Stem solitary, erect, 60–100 cm tall, green or becoming purple in lower part, striate, arachnoid and shortly pubescent, glabrescent, base often with withered relict petioles; basal leaves persistent by anthesis, long petiolate; petiole 9–20 cm, basally expanded and subamplexicaul; blade abaxially pale green, oblong-cordate or broadly ovate-cordate, 5.5–13(–16) × 6.5–14.5 cm, papery, abaxially sparsely arachnoid, or later ± glabrescent, adaxially glabrous, midvein stout, lateral veins furcately branched, raised abaxially, impressed adaxially, base deeply cordate, cuneate-decurrent into ca. 1 cm wide winged petiole, margin serrate, apex shortly acuminate or obtuse. Middle stem leaves similar to

lower leaves but smaller; petiole shorter, broadly winged, base distinctly expanded into ovate, leaflike, amplexicaul, large auricle, margin brown ciliate. Upper leaves sessile, ovate-lanceolate to lanceolate, base expanded into a denticulate-amplexicaul auricle, apex acute or acuminate. Capitula many, discoid, arranged in terminal 20–25(–50) cm racemes; rachis and peduncle densely arachnoid and glandular hairy; peduncles 2–3 mm, with 2 or 3 linear or subulate bractlets. Involucres cylindrical or narrowly campanulate, 6–7 × 1.5–2 mm; phyllaries 4, green or becoming purple, linear-lanceolate, 0.5–1 mm, sparsely glandular hairy, margin narrowly scarious, apically slightly acute or obtuse, puberulent. Florets tubular, 4, distinctly overtopping involucre; corolla yellow, ca. 6 mm; limb narrowly campanulate; lobes lanceolate. Anthers exerted from corolla, 3–4 mm, basally obtuse. Style branches excurved, apically truncate, papillose. Achenes brown, cylindrical, 3–4 mm, glabrous. Pappus purple-brown or purple. Fl. Jul, fr. Aug–Sep.

- Forests on slopes, grasslands; 1500–2100 m. Gansu, Shaanxi.

## 100. *SYNEILESIS* Maximowicz, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 9: 165. 1859.

兔儿伞属 *tu er san shu*

Chen Yilin (陈艺林 Chen Yi-ling); Bertil Nordenstam

Herbs, perennial, robust. Basal leaves peltate, palmately parted, long petiolate, densely crisped-hairy when young. Cotyledon involute before blade opens; stem leaves alternate, petiole basally amplexicaul. Capitula discoid; florets tubular, many, arranged in terminal corymb or panicles. Involucres narrowly tubular or cylindrical, base with 2 or 3 linear bractlets; phyllaries 5, unequal, inner

phyllaries broader, outer phyllaries narrow. Receptacle flat, glabrous, alveolate. Florets pale white to pale red, bisexual, fertile, irregularly lobed. Anthers basally hastate, appendages shortly acute. Style branches elongate, outside hairy, apically obtuse or triangular. Achenes cylindrical, glabrous, many ribbed. Pappus many, unequal or subequal, finely bristly; seedlings with a single cotyledon.

Seven species: E Asia, mainly in China, Japan, and Korea; four species (three endemic) in China.

- 1a. Capitula arranged in panicles; leaves 12–20(–25) cm in diam. .... 4. *S. subglabrata*  
 1b. Capitula arranged in flat-topped corymbs.  
 2a. Leaf segments narrow, 2.5–8 mm wide ..... 1. *S. aconitifolia*  
 2b. Leaf segments usually broader than 8 mm.  
 3a. Leaves submembranous when dry; synflorescence branches spreading ..... 2. *S. australis*  
 3b. Leaves subleathery when dry; synflorescence branches not spreading ..... 3. *S. hayatae*

**1. *Syneilesis aconitifolia*** (Bunge) Maximowicz, Mém. Acad. Imp. Sci. St.-Petersbourg Divers Savans 9: 165. 1859.

兔儿伞 tu er san

*Cacalia aconitifolia* Bunge, Enum. Pl. China Bor. 37. 1833; *Senecio aconitifolius* (Bunge) Turczaninow.

Herbs, erect, 70–120 cm tall. Rhizomes procumbent, short, with many fibrous roots. Stem purple-brown, simple, glabrous. Stem leaves usually 2(or 3). Lower leaves long petiolate, peltate; petiole 10–16 cm, not winged, glabrous, base amplexicaul; blade abaxially gray, adaxially pale green, 20–30 cm in diam., palmately parted, segments 7–9, twice 2- or 3-fid, lobes 2.5–8 mm wide, linear-lanceolate, initially reflexed, closed umbraculiform, densely arachnoid-tomentose, later open umbraculiform, glabrescent, apex acuminate, irregularly acute. Median leaf petioles 2–6 cm; blades smaller, 12–24 cm in diam.; segments 4 or 5. Uppermost leaves sessile or shortly petiolate, bractlike, lanceolate. Capitula many, discoid, arranged in dense compound corymbs, 6–7 mm in diam.; peduncles 5–16 mm, with few linear bractlets. Involucres tubular, 9–12 × 5–7 mm, glabrous at base, margin scarious. Florets 8–10; corolla pink-white, ca. 1 cm, with narrow, 3.5–4 mm tube and narrowly campanulate limb; lobes 5. Anthers purple, basally shortly hastate. Style branches elongated, compressed, apically obtuse, penicillate-puberulent. Achenes cylindrical, 5–6 mm, glabrous, ribbed. Pappus of capillary-like bristles, sordid white to reddish, 8–10 mm. Fl. Jun–Jul, fr. Aug–Oct.

Forest margins on slopes, roadsides; 500–1800 m. Anhui, Fujian, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Jiangsu, Liaoning, Shaanxi, Shanxi, Zhejiang [Japan, Korea, Russia (Far East)].

The roots and whole plant are used medicinally to relax and activate the tendons, alleviate pain around the waist and of the lower extremities, and to treat injuries.

**2. *Syneilesis australis*** Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 5: 5. 1937.

南方兔儿伞 nan fang tu er san

Herbs, erect, to 1 m tall. Rhizomes robust, with many fascicled roots. Stem solitary, stiff, sulcate, base villous, glabrate, ca. 5 mm in diam. Median leaves laxly arranged; lower stem leaves long petiolate; petiole 3–8 cm, basally subamplexicaul; blade abaxially gray-green, adaxially green, orbicular, 30–40 cm in diam., submembranous, base broadly peltate (ca. 2 cm), palmately parted; segments oblong-lanceolate, lower segment sometimes entire, other segments lobed or linear-lanceolate, 2–3 cm wide, abaxially shortly pubescent, glabrate, adaxially gla-

brous, palmately veined, veins raised, distinctly reticulate, margin sparsely serrate, teeth mucronulate, apex acute, rarely 2-fid. Upper leaves shortly petiolate, palmately parted or 2-lobed. Uppermost leaves bractlike, linear-lanceolate, ca. 5 cm, sparsely serrate. Capitula discoid, many, arranged in terminal compound corymbs; branches spreading, 2–3 cm, rarely to 8 cm, sparsely pubescent; peduncles ca. 6 mm, with 3 or 4 linear-lanceolate bractlets. Involucres cylindrical; phyllaries 5, oblong-lanceolate, ca. 10 × 2–3.5 mm, apex sparsely villous. Florets 10, all tubular, fertile; corolla 9–10 mm; limb campanulate, ca. 7 mm, lobes lanceolate, ca. 2 mm, apex puberulent. Anthers exerted from corolla, basally hastate. Style branches excurved, apically penicillate-puberulent. Achenes cylindrical, 4–5 mm, glabrous, ribbed. Pappus of many bristles, white or reddish. Fl. Feb–Aug, fr. Oct.

• Forest margins on slopes, roadsides; 700–900 m. Anhui, Zhejiang.

*Syneilesis australis* is distinguished from *S. aconitifolia* by its larger, submembranous, basally broadly peltate leaves, with broader segments, and synflorescence branches spreading.

**3. *Syneilesis hayatae*** Kitamura, J. Jap. Bot. 10: 702. 1934.

台湾兔儿伞 tai wan tu er san

*Senecio intermedius* Hayata, J. Coll. Sci. Imp. Univ. Tokyo 22: 208. 1906, not Wight (1846); *Cacalia intermedia* Hayata (1919), not (Candolle) Kuntze (1891); *Syneilesis intermedia* Kitamura.

Herbs, rhizomatous. Rhizomes procumbent, short. Stem erect, 80–160 cm tall, ca. 7 mm in diam. in lower part, glabrous, sometimes with bulblets in leaf axils, corymbose branched in upper part. Stem leaves 2, lower leaves long petiolate; petiole to 20 cm, not winged, base amplexicaul; blade peltate-orbicular, ca. 35 cm in diam., subleathery, palmately parted; segments 5–9, 2-fid, lobules 15–20 mm wide, margin irregularly serrate, apex acute. Middle stem leaves smaller, segments few, shortly petiolate. Upper leaves distant, bractlike, linear-lanceolate, gradually smaller upward, apex acuminate. Capitula many, 8–10 mm in diam., arranged in terminal compound corymbs; peduncles 5–16 mm; bracts linear, 3–4 mm. Involucres tubular, 9–10 mm, base with 3 or 4 linear bractlets; phyllaries uniseriate, 4 or 5, oblong, glabrous, margin scarious, apically obtuse. Florets 14–16; corolla white, 1–1.3 cm; tube narrow, 4–5 mm, apex 5-lobed. Anthers black-purple, basally hastate. Ovary cylindrical, glabrous. Style branches elongate, apically triangular, puberulent. Pappus of many bristles, reddish, ca. 1 cm, subequal. Fl. May.

• Forest understories; 300–500 m. Taiwan (Miaoli, Xinzhu).

**4. *Syneilesis subglabrata*** (Yamamoto & Sasaki) Kitamura, J. Jap. Bot. 10: 702. 1934.

高山兔儿伞 gao shan tu er san

*Cacalia intermedia* Hayata var. *subglabrata* Yamamoto & Sasaki, J. Soc. Trop. Agric. 3: 242–243. 1931; *C. subglabrata* (Yamamoto & Sasaki) Kitamura.

Stem erect, striate, 50–85 cm tall, glabrous, synflorescence branched in upper part, shortly pubescent. Stem leaves 3 or 4, lower leaves peltate; petiole 4–5 cm, basally white villous at nodes; blade abaxially gray, adaxially green, orbicular, 12–20(–25) cm in diam., thick, palmately 5–7-parted, segments obovate, twice 2-parted, lobules lanceolate, 1–1.5 cm wide, both

surfaces sparsely pubescent, margin sparsely acutely toothed, apex acuminate. Upper leaves gradually smaller upward, palmately parted or 3-fid, bractlike, linear-lanceolate. Capitula many, arranged in terminal panicles, ca. 10 × 6–8 mm; peduncles 1–4 mm, densely shortly pubescent, with 3 linear bractlets at apex. Involucre tubular, ca. 8.5 × 5–7 mm; phyllaries uniseriate, 5, oblong, ca. 8.5 × 2–3 mm, thick, outside glabrous, apically obtuse, puberulent. Florets 6–8; corolla 8–9 mm, 5-lobed; tube narrow, 2–2.5 mm. Anthers black-purple, basally hastate. Ovary cylindrical, glabrous. Style branches elongate, apically puberulent. Pappus of many bristles, sordid white, 7–8 mm. Fl. Jun, fr. Sep.

• Alpine areas in mountains; 1700–2800 m. Taiwan.

## 101. *TUSSILAGO* Linnaeus, Sp. Pl. 2: 865. 1753.

款冬属 kuan dong shu

Chen Yilin (陈艺林 Chen Yi-ling); Bertil Nordenstam

Herbs, scapigerous. Rhizomes perennial, repent or procumbent. Leaves developed after anthesis; basal leaves ovate or triangular-cordate. Scapes few, with many bractlike leaves. Capitulum 1, heterogamous, radiate. Involucre campanulate; phyllaries 1- or 2-seriate, equal, lanceolate, apically acuminate. Receptacle flat, glabrous. Florets yellow; ray florets female, numerous, fertile; disk florets functionally male, few; corolla tubular, 5-lobed. Anthers entire or subauriculate at base, filaments apically with equally sized cells. Style entire, apically obtuse, stigma papillose. Achenes narrowly cylindrical, 5–10-ribbed. Pappus of many fine bristles, white.

One species: temperate N Africa, Asia, Europe.

**1. *Tussilago farfara*** Linnaeus, Sp. Pl. 2: 865. 1753.

款冬 kuan dong

Plants perennial. Rhizomes long creeping, subterranean, brown. Fruiting stems 5–10 cm tall, densely white lanate, with scale-shaped alternate purple-violet bracteate leaves. Basal leaves appearing after anthesis, long petiolate; petiole 5–15 cm, white lanate; blade orbicular-cordate, 3–12 × 3–14 cm, abaxially densely white tomentose, palmately reticulate veined, margin undulate, unequally toothed. Capitula solitary, terminal, 2.5–3 cm in diam., nodding (or drooping) before and after anthesis. Involucre campanulate, 1.5–1.8 cm at fruiting; phyllaries 1- or 2-seriate, linear, white villous, glabrate, sometimes black glandular hairy, apically obtuse, often purple tinged. Ray

florets female, many seriate, yellow, radiate; stigma 2-fid. Disk florets few, functionally male; corolla tubular, 5-lobed; anthers sagittate at base; stigma capitate, usually sterile. Achenes cylindrical, 3–4 mm. Pappus white, 1–1.5 cm.

Wet places, forest understories, valleys; 600–3400 m. Anhui, Gansu, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Nei Mongol, Ningxia, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan, Zhejiang [India, Nepal, Pakistan, Russia; N Africa, SW Asia, W Europe].

The immature capitula and leaves of *Tussilago farfara* are used medicinally for relieving coughs and improving breathing; the plants are also used as honey plants and are widely cultivated in medicinal gardens in China.

## 102. *PETASITES* Miller, Gard. Dict. Abr., ed. 4, [1056]. 1754.

蜂斗菜属 feng dou cai shu

Chen Yilin (陈艺林 Chen Yi-ling); Bertil Nordenstam

*Nardosmia* Cassini.

Herbs, perennial, subdioecious. Rhizomes as stems robust, node-shaped or at least more robust in lower part. Basal leaves long petiolate; blade broadly cordate or reniform-cordate, margin incised or basally lobed, parallel to furcate. Stem leaves bract-shaped, sessile, subamplexicaul. Capitula radiate, disciform or discoid, hetero- or homogamous. Involucre campanulate, basally with bractlets; phyllaries 1–5-seriate, equal. Receptacle flat, glabrous, peltate. Florets in female capitula fertile; corolla filiform, apex obliquely truncate or ± indistinctly radiate, or lamina longer; functionally male florets: corolla tubular, 5-toothed; anthers entire or obtuse at base, or rarely shortly hastate; style apically clavate, conical, 2-fid, style in female florets filiform, 2-fid. Achenes cylindrical, glabrous, ribbed. Pappus of many bristles, white.

Nineteen species: Asia, Europe, North America; six species (two endemic) in China.

- 1a. Leaves palmate-pinnately divided (segments not to middle), reniform, terminal segment 3-lobed, segments with incised, mucronulate teeth; involucre ovate-oblong, synflorescences corymbose and densely paniculate; female florets indistinctly radiate ..... 1. *P. tatewakianus*
- 1b. Leaves undivided, angular or toothed, ± reniform.
- 2a. Capitula numerous, arranged in cymose panicles or panicles, bracteal leaves ovate-oblong, lanceolate, or ovate-lanceolate, apex acute or acuminate.
- 3a. Involucres of female capitula campanulate, 8–9 mm, style exerted from corolla, male capitula with peduncles 10–15 mm, peduncles of female capitula stout, 7–15 mm ..... 2. *P. formosanus*
- 3b. Involucres of female capitula subcylindric, 10–12 mm, peduncles as long as capitula or longer, to 8 cm ..... 3. *P. tricholobus*
- 2b. Capitula few, racemose or corymbose, rarely 2- or 3-branched in lower part, bracteal leaves oblong or ovate-lanceolate.
- 4a. Leaves papery, reniform, 3–5.5 × 5–9 cm; capitula 6–9, arranged in corymbs; peduncles slender, 1–4(–6) cm; involucre obconic, 8–10 mm, female florets shortly radiate, 2- or 3-toothed ..... 4. *P. rubellus*
- 4b. Leaves thin, larger, deeply cordate or orbicular-reniform; capitula numerous, arranged in corymbs or racemes; peduncles ca. 5.5 cm.
- 5a. Bracteal leaves oblong or ovate-lanceolate, apex obtuse; capitula arranged in dense, terminal corymbs, racemose after anthesis; phyllaries narrowly oblong, apex obtuse ..... 5. *P. japonicus*
- 5b. Bracteal leaves broadly ovate, stem leaves and lower bracteal leaves lanceolate, apex acuminate; capitula racemose; phyllaries 11–15, linear, apex obtuse or slightly acute ..... 6. *P. versipilus*

**1. *Petasites tatewakianus*** Kitamura, Acta Phytotax. Geobot. 9: 64. 1940.

掌叶蜂斗菜 zhang ye feng dou cai

Rhizomes long, creeping, 4–10 mm. Scapes of male florets ca. 50 cm tall, of female florets over 50 cm tall, arachnoid-cripsed throughout. Bracteal leaves sessile, ovate-oblong, 4–4.5 × 1.5–1.6 cm, densely crisped, parallel veined, margin entire, apex obtuse. Upper bracts oblong, rudimentary. Leaves all basal, long petiolate; petiole 20–30 cm, initially crisped-villous, glabrescent; blade adaxially green, reniform or orbicular-reniform, 19–23 × 20–40 cm, or broader, palmately dissected (not to middle); segments 7–9, cuneate, terminal segment usually 3-lobed, with mucronulate teeth, abaxially densely white crisped, hairs thin, adaxially crisped-puberulent. Male capitula corymbose or paniculate; peduncles 4–8 cm. Synflorescences of male capitula ca. 40 cm, heterogeneous; involucre ca. 7 × 10–14 mm; female florets numerous, filiform, ca. 6 mm, apex truncate, style ca. 8 mm, 2-fid; male florets ca. 6.5 mm, tube narrow, ca. 3.5 mm. Female capitula homogeneous or heterogeneous; ray florets female. Central florets male, purplish or white; involucre hemispheric, ca. 10 × 10 mm, base with linear-lanceolate bracts; phyllaries uniseriate, imbricate, narrowly oblong, crisped-pubescent, apex obtuse. Female florets fertile, filiform, ca. 10 mm; lamina ca. 1 mm, style 2-fid. Male florets: corolla tubular, ca. 10.5 mm, tube narrow, ca. 6 mm, lobes ca. 3 mm; anthers basally 2-fid; filaments nodiform dilated; style slightly exceeding corolla, apex clavately dilated, with small ring below stigma 2-fid, puberulent. Achenes cylindrical, 3–3.5 mm, glabrous, apex truncate. Pappus in female florets white, 9–12 mm, finely bristly. Pappus in male florets few, ca. 7 mm, bristly. Fl. Jun–Jul.

Sandy and stony banks of forest rivers and streams, forming huge thickets. Heilongjiang [Russia (Far East, Sakhalin)].

**2. *Petasites formosanus*** Kitamura, Acta Phytotax. Geobot. 2: 177. 1933.

台湾蜂斗菜 tai wan feng dou cai

Rhizomes long creeping, ca. 1 cm in diam., with many fibrous roots. Stems scapiform, few, fascicled, erect, 25–30 cm tall, simple, densely brown shortly pubescent and arachnoid-lanate. Basal leaves long petiolate; petiole 15–30 cm, base dilated, glabrous; blade adaxially green, cordate or reniform, 5–8 × 7–12 cm, abaxially sparsely arachnoid-pubescent especially on veins, adaxially shortly pubescent, basally palmately veined, thicker, base deeply or slightly cordate, margin with mucronulate teeth, apex rounded. Stem leaves sessile, bractlike, oblong-lanceolate or oblong, rarely ovate-oblong, 2–4(–6) × 1–1.8 cm, densely arachnoid, parallel veined, base subamplexicaul, margin entire, apex acute or acuminate. Capitula numerous, arranged in a paniculate synflorescence; synflorescence of male capitula 8–10 cm wide, synflorescence of female capitula 7–8 cm wide; peduncles 5–20 mm, slender, shortly brown pubescent; bracts 2–5, linear or linear-lanceolate, 4–5 mm. Involucre campanulate, 8–9 × 10–14 mm; phyllaries uniseriate, purple when dry, oblong or oblong-lanceolate, 3- or 4-veined, apex acute or acuminate, sparsely puberulent. Florets in male capitula mostly or entirely male; corolla tubular, 7–10 mm; limb campanulate–funnel-shaped, 5-lobed; lobes ovate, 1–1.5 mm; anthers basally obtuse; style dilated in upper part, 2-fid below stigma, papillose; corolla in female florets filiform, 8–9 mm, apex irregularly 4-lobed; lobes linear, unequal, ca. 2.5 mm; style filiform, exceeding corolla, apex 2-fid. Male florets few in female capitula; peduncles 7–15 mm, stout. Achenes cylindrical, glabrous. Pappus of many capillary-like bristles, white, ca. 6 mm. Fl. May.

● Grasslands on mountains; 1500–2500 m. Taiwan.

**3. *Petasites tricholobus*** Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 6: 52. 1883.

毛裂蜂斗菜 mao lie feng dou cai

*Ligularia petelotii* Merrill; *Petasites himalaicus* Kitamura;

*P. mairei* H. Léveillé; *P. petelotii* (Merrill) Kitamura; *P. vaniotii* H. Léveillé.

Plants subdioecious. Rhizomes short, with numerous fibrous roots, thinly arachnoid-lanate. Scapes emerging from rhizomes in early spring. Stems of female synflorescences 27–60 cm tall, with scale-shaped leaves; bracteal leaves ovate-lanceolate, 3–4 cm, basal leaves long petiolate; blade broadly reniform-cordate, 2–8 cm, both surfaces white lanate, or later ± glabrescent, palmately veined, margin finely toothed, with cartilaginous mucronulate teeth. Male capitula arranged in terminal corymbs or panicles; corolla tubular, segments lanceolate; style exceeding corolla, stigma capitate, slightly branched. Female capitula densely arranged in terminal cymose panicles, 8–12 mm in diam.; peduncles 1–2.5(–8) cm, with 1 to few lanceolate bracteal leaves; involucre campanulate, 10–12 mm; phyllaries uniseriate, 10–12, lanceolate or lanceolate-oblong, ca. 7 mm, calyculate; corolla apically 4- or 5-lacerate; segments unequal, filiform or subulate; style exceeding corolla, stigma 2-fid. Achenes cylindrical, glabrous. Pappus of many fine bristles in female florets, in male few, shorter than corolla. Fl. Apr–Jun.

Roadsides, by streams in valleys; 700–4300 m. Gansu, Guizhou, Henan, Qinghai, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan [Bhutan, India, Nepal, Vietnam].

The plants of *Petasites tricholobus* are used medicinally as in *P. japonicus*.

**4. *Petasites rubellus*** (J. F. Gmelin) Toman, Folia Geobot. Phytotax. 7: 391. 1972.

长白蜂斗菜 chang bai feng dou cai

*Tussilago rubella* J. F. Gmelin, Syst. Nat., ed. 13[bis], 2: 1225. 1792; *Nardosmia saxatilis* Turczaninow; *Petasites saxatilis* (Turczaninow) Komarov.

Rhizomes repent, thin, with fibrous roots. Stem solitary, erect, 5–25 cm tall, simple, arachnoid in upper part. Basal leaves small, long petiolate; petiole 3–10 cm, densely crisped-pubescent, base slightly expanded; blade abaxially pale green, adaxially green, reniform or reniform-cordate, 3–5.5 × (4–)5–9 cm, thickly papery, with short, thick hairs on petiole and especially on veins abaxially, base slightly cordate, margin acutely toothed, teeth emarginate, apex rounded. Stem leaves scale-shaped, ovate-lanceolate, 1.5–2 × 0.5–1 cm, glabrous, shortly white ciliate on margin, parallel veined, basally amplexicaul, apically obtuse or slightly acute. Capitula 6–9, arranged in corymbs; peduncles 1–4(–6) cm, slender, with linear bractlets. Involucre conical, 8–10 × 5–10 mm; phyllaries biseriate, subequal, narrowly oblong, 1–1.5 mm wide, glabrous or nearly so, apically obtuse. Male florets few, sterile; corolla yellow, ca. 9 mm; tube 3.5–4 mm; limb campanulate, 5-denticulate, lobes ovate-oblong; style basally 2-fid, stigma branches clavate, apex acute, puberulent. Female florets white, 6–7 mm, shortly radiate, apically 2- or 3-denticulate. Achenes oblong, 3–3.5 mm, truncate, constricted at bases. Pappus of many fine bristles, white, 9–11 mm. Fl. and fr. May–Jul.

Alpine regions, adjacent forests, forest margins; 1800–2800 m. Jilin (Changbai Shan), Liaoning [Korea, Mongolia, Russia (Far East, Siberia)].

**5. *Petasites japonicus*** (Siebold & Zuccarini) Maximowicz, Award 34th Demidovian Prize, 212. 1866.

蜂斗菜 feng dou cai

*Nardosmia japonica* Siebold & Zuccarini, Fl. Jap. 181. 1843; *Petasites albus* A. Gray (1857), not Linnaeus (1753); *P. liukuensis* Kitamura; *P. spurius* Miquel; *Tussilago petasites* Thunberg.

Rhizomes creeping, with subterranean procumbent branches, with membranous ovate scales, and numerous fibrous roots. Stems 15–30 cm tall, basally 7–10 mm in diam., simple, densely or laxly shortly brown pubescent. Basal leaves long petiolate; blade adaxially green, orbicular or reniform-orbicular, 15–30 × 15–30 cm, papery, abaxially arachnoid, later glabrescent, adaxially crisped-pubescent when young, base cordate, margin finely toothed. Bracteal leaves oblong or ovate-oblong, 3–8 cm, parallel veined, apically obtuse. Male scapes with numerous capitula (20–30) crowded in a terminal corymb, homogamous; involucre tubular, ca. 6 × 7–8(–10) mm, base with lanceolate bracts; phyllaries biseriate, subequal, narrowly oblong, glabrous, apically obtuse; all florets tubular, functionally male; corolla white, 7–7.5 mm, tube ca. 4.5 mm; anthers basally obtuse; style clavately thickened with small ring below stigma, apex 2-fid. Female scape 15–20 cm tall, densely bracteate, often elongated after anthesis, ca. 70 cm tall, in dense corymbs, rarely branched; capitula homogamous; florets numerous, corolla filiform, ca. 6.5 mm, apex obliquely truncate; stigma distinctly exerted from corolla, capitate, 2-fid, papillose. Achenes cylindrical, ca. 3.5 mm, glabrous. Pappus of many fine bristles, white, ca. 12 mm. Fl. Apr–May, fr. Jun.

Streamsides, grasslands, thickets. Anhui, Fujian, Henan, Hubei, Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Zhejiang [Japan, Korea, Russia (Far East)].

The rhizomes of *Petasites japonicus* are used medicinally for treating injuries, trauma, swelling, and fractures, and for detoxification of snakebites. The stalk is cultivated as a vegetable, and the young immature capitula are delicious.

**6. *Petasites versipilus*** Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 57: 289. 1920.

盐源蜂斗菜 yan yuan feng dou cai

Rhizomes with numerous fibrous roots. Flowering scape solitary, 5–15 cm tall, slender, 3–4 mm in diam.; bracts broadly ovate to narrowly lanceolate, ca. 2 cm, abaxially and marginally crisped-hairy, apex long acuminate. Leaves long petiolate, broadly reniform, ca. 2 × as long as broad, subleathery, palmately veined, base deeply cordate, abaxially and petiole crisped, glabrate, densely glandular furfuraceous, margin sparsely cartilaginous, finely mucronate-toothed. Capitula numerous, arranged in lax racemes. Female capitula campanulate, 10–11 mm, narrow; phyllaries brown, 10–15, linear, 1–1.5 mm wide, glabrous, 3-veined, margin broadly brown scarios, apically obtuse or slightly acute, base with few bractlets; peduncles erect or pendulous, slender, apically dilated; florets numerous, exceeding involucre; female florets filiform, 4.5–7 mm; lobes 5, 0.5–0.8 mm; ovary glabrous; style very short, 2-lobed; pap-

pus white, shorter than corolla, connected in a short ring at base. Male florets tubular; tube slender, 2–4 mm; limb campanulate, 2–2.5 mm; lobes ovate, margin involute; anthers very short, base with small auricle; ovary hairy; style not exceeding

corolla, stigma clavate; pappus shorter than those in female florets. Fl. Apr–Jun.

• Alpine grassy slopes, forest understories, thicket margins; 2700–3800 m. SW Sichuan, NW Yunnan.

## 2. Subtribe TEPHROSERIDINAE

狗舌草亚族 *gou she cao ya zu*

Chen Yilin (陈艺林 *Chen Yi-ling*), Liu Ying (刘莹), Yang Qiner (杨亲二); Bertil Nordenstam, Charles Jeffrey

Antheropodia cylindrical, narrow, without enlarged marginal basal cells; anther endothelial tissue with cell wall thickenings polar, or polar and radial, cells short; stigmatic areas of disk floret styles confluent, contiguous or discrete.  $x = 24, 30$ , rarely 13.

Three genera and ca. 100 species: Asia, Europe, North America; three genera and 60 species (48 endemic) in China.

- 1a. Leaves pinnately lobed ..... 105. *Nemosenecio*  
 1b. Leaves palmately lobed or unlobed.  
 2a. Disk floret corolla limb campanulate, rarely funnelform; leaves palmately veined, rarely pinnately veined; endothelial cell wall thickenings polar, or radial and polar; involucre calyculate or not; phyllaries 8–17 ..... 103. *Sinosenecio*  
 2b. Disk floret corolla limb funnelform, never campanulate (except in *T. koreana*); leaves pinnately veined, never palmately veined; endothelial cell wall thickenings polar and radial; involucre not calyculate; phyllaries 13–25 ..... 104. *Tephrosieris*

### 103. SINOSENECIO B. Nordenstam, *Opera Bot.* 44: 48. 1978.

蒲儿根属 *pu er gen shu*

Chen Yilin (陈艺林 *Chen Yi-ling*), Liu Ying (刘莹), Yang Qiner (杨亲二); Bertil Nordenstam, Charles Jeffrey

Herbs, perennial, rarely annual or biennial, erect, rhizomatous, sometimes stoloniferous, with fibrous roots. Stems scapiform, subscaipiform, or leafy, often villous or arachnoid-tomentose, at least when young. Leaves simple, petiolate, all or mostly radical or both radical and stem leaves present; radical leaves rosulate, persistent at anthesis except in some species with leafy stems; blade orbicular or reniform to ovate, rarely ovate-oblong or elliptic, palmately or rarely pinnately veined, moderately deeply to shallowly palmately lobed, toothed, angled, or subentire, basally cordate to subtruncate or rarely rounded or cuneate; petioles of basal leaves sometimes expanded or winged, petioles of stem leaves sometimes winged, base usually expanded into conspicuous, subamplexicaul, entire or toothed auricle. Capitula solitary to numerous, arranged in terminal subumbelliform simple or compound corymbose cymes, heterogamous, radiate, pedunculate. Involucre not calyculate or very occasionally calyculate, cylindrical, obconic, or campanulate to broadly campanulate; receptacle flat or convex, alveolate or ciliate; phyllaries (7 or) 8–13(–17), uniseriate (or nearly so), linear to ovate, usually lanceolate, apex and on upper margins ciliate or fimbriate-ciliate, margins scarious. Ray florets 6–18, usually 13; lamina yellow, usually oblong or lanceolate-oblong, 4–10-veined, apically shortly dentate. Disk florets numerous; corolla yellow, limb campanulate, lobes 5. Anthers oblong, basally rounded to obtuse, rarely shortly obtuse-sagittate; antheropodia cylindrical, somewhat broader than filament, cells uniform; endothelial cell wall thickenings polar, or polar and radial. Style branches recurved, short, truncate or slightly convex, with apical papillae. Achenes cylindrical or obovoid-cylindrical, ribbed, glabrous or shortly pubescent on ribs, papillate or smooth. Pappus capillary-form, uniform, white, persistent or rarely caducous, present in all florets, absent from ray florets, or absent from all florets.  $x = 24, 30$ , rarely 13.

Forty-one species: all occurring in China, mainly in the C and SW regions, only two extending into Myanmar, Thailand, and Vietnam; 41 species (39 endemic) in China.

Several lines of evidence (morphological, cytological, and molecular) strongly indicate that *Sinosenecio* as circumscribed herein is still not a monophyletic group and needs a further re-circumscription, even after *S. koreanus* has been transferred to the genus *Tephrosieris* and *S. hainanensis* established as a new genus of its own, i.e., *Hainanecio*. It seems that only those *Sinosenecio* species with  $x = 30$  and with strictly polar endothelial cell wall thickenings should be retained in the genus *Sinosenecio* as redefined, whereas those with  $x = 24$  (rarely 13), and with polar and radial endothelial cell wall thickenings may be described as a new genus or transferred to the genus *Nemosenecio*. No formal taxonomic treatment at the generic level, however, is made herein pending further study.

- 1a. Pappus absent in all florets, absent at least in ray florets.  
 2a. Pappus absent in ray florets only, present in disk florets; ovaries and achenes glabrous in ray florets, pubescent in disk florets ..... 23. *S. oldhamianus*  
 2b. Pappus absent in all florets; ovaries and achenes glabrous in all florets, rarely sparsely glandular.  
 3a. Leaf blade pinnately veined, cuneate, truncate, or rounded at base ..... 29. *S. jishouensis*

- 3b. Leaf blade palmately veined, cordate at base.
  - 4a. Capitula small; involucre 2–3 mm in diam. .... 28. *S. phalacrocarpoides*
  - 4b. Capitula large; involucre more than 5 mm in diam.
    - 5a. Petioles of radical leaves not expanded at base; peduncles not dilated distally; receptacle hairy.
      - 6a. Stem scapiform; leaves all basal or subbasal, rosulate.
        - 7a. Capitula usually 1 or 2; leaf blade ovate, broadly ovate-orbicular, or reniform, 2–4(–5) × 2.2–5.5 cm, margin subentire to repand-dentate, apex acuminate or shortly caudate ..... 10. *S. homogyniphyllus*
        - 7b. Capitula usually 2–9 in subumbelliform corymb; leaf blade ovate or broadly ovate, 4–9 × 4.5–9.5 cm, margin repand or sinuate-dentate, apex rounded ..... 11. *S. chienii*
      - 6b. Stem not scapiform, with 2–5 stem leaves.
        - 8a. Capitula solitary; leaf blade 1.7–5.5 × 2–6.5 cm, adaxially glabrous or very sparsely pubescent, shiny ..... 12. *S. yilingii*
        - 8b. Capitula solitary or several; leaf blade 5–9 × 5–10 cm, adaxially pubescent, not shiny ..... 13. *S. sichuanicus*
    - 5b. Petioles of radical leaves expanded at base; peduncles distally dilated; receptacle usually glabrous.
      - 9a. Stem scapiform; leaves all basal or subbasal, rosulate ..... 41. *S. qii*
      - 9b. Stem leafy; both basal and stem leaves present.
        - 10a. Leaf blade abaxially and phyllaries thinly arachnoid-tomentose at least when young; achenes sparsely glandular ..... 27. *S. phalacrocarpus*
        - 10b. Leaf blade and phyllaries not arachnoid-tomentose; achenes glabrous.
          - 11a. Leaf blade irregularly 3–5-lobed or repand-dentate; plants stoloniferous or not stoloniferous.
            - 12a. Phyllaries abaxially fulvous villous, glandular puberulent, or subglabrous; plants with long stolons or not stoloniferous ..... 24. *S. globiger*
            - 12b. Phyllaries abaxially purplish red puberulent; plants with short stolons ..... 25. *S. leiboensis*
          - 11b. Leaf blade regularly 7–9-lobed to 1/4–1/2; plants not stoloniferous.
            - 13a. Leaf blade 7–9-lobed to 1/2, at first sparsely puberulent, later glabrescent on both surfaces; lobes oblong-lanceolate; veins yellowish green ..... 26. *S. palmatisectus*
            - 13b. Leaf blade 7–9-lobed to 1/4–1/3, adaxially pubescent with spreading hairs, abaxially pubescent or sometimes glabrescent; lobes deltoid; veins white ..... 30. *S. albonervius*
- 1b. Pappus present in all florets, at least when young.
  - 14a. Ovaries and achenes pubescent.
    - 15a. Petioles of stem leaves basally auriculate.
      - 16a. Stem slender, erect or flexuous; stem leaves 1–3; leaf blade adaxially villous with spreading hairs, leaf auricles smaller in size ..... 14. *S. latouchei*
      - 16b. Stem somewhat stouter, erect; stem leaves 3–7; leaf blade adaxially pubescent with appressed hairs or sparsely or densely white tomentose, leaf auricles larger in size ..... 15. *S. jiuhuashanicus*
    - 15b. Petioles of stem leaves basally expanded or winged but not auriculate.
      - 17a. Petioles of stem leaves basally expanded; leaf blade adaxially pubescent or glabrescent, abaxially densely white tomentose, or villous or glabrescent ..... 16. *S. guangxiensis*
      - 17b. Petioles of stem leaves basally winged; leaf blade abaxially sparsely arachnoid, later glabrescent ..... 19. *S. hunanensis*
  - 14b. Ovaries and achenes glabrous.
    - 18a. Leaf blade pinnately veined.
      - 19a. Leaf blade ovate-oblong or elliptic, base cuneate, sparsely puberulent on both surfaces ..... 39. *S. trinervius*
      - 19b. Leaf blade ovate-oblong, base cordate, floccose-tomentose on both surfaces ..... 36. *S. changii*
    - 18b. Leaf blade palmately veined.
      - 20a. Capitula solitary.
        - 21a. Leaf blade ovate-cordate; capitula 4–5 cm in diam.
          - 22a. Leaf blade abaxially densely white lanate; pappus hairs few, shorter than corolla tube, soon deciduous ..... 5. *S. cyclaminifolius*
          - 22b. Leaf blade abaxially densely fulvous tomentose; pappus hairs numerous, equaling or exceeding corolla tube, persistent ..... 6. *S. hederifolius*
        - 21b. Leaf blade orbicular or reniform-orbicular; capitula 2–3 cm in diam.
          - 23a. Stem without bracts on upper part ..... 7. *S. rotundifolius*
          - 23b. Stem with several small bracts on upper part.
            - 24a. Leaf blade 0.8–1.7 × 0.8–2 cm, dark green above; stem subglabrous ..... 40. *S. nanchuanicus*
            - 24b. Leaf blade 3–6 × 4–6 cm, green above; stem fulvous villous ..... 3. *S. dryas*
    - 20b. Capitula usually 2 to many.
      - 25a. Stem leafy, usually with at least 4 stem leaves only slightly smaller than basal leaves, rarely fewer.
        - 26a. Petioles of stem leaves basally auriculate.

- 27a. Plants 20–75 cm tall; leaf blade 2–5 × 3–8 cm; stem villous-pubescent especially basally; pappus 5–6 mm ..... 20. *S. euosmus*
- 27b. Plants 35–140 cm tall; leaf blade 4–14 × 6–17 cm; stem sparsely pubescent; pappus 3–4 mm .... 33. *S. denticulatus*
- 26b. Petioles of stem leaves basally expanded but not auriculate.
- 28a. Leaf blade ovate-cordate, not divided, margin denticulate ..... 31. *S. baojingensis*
- 28b. Leaf blade reniform, orbicular-reniform, broadly flabellate, or suborbicular, repand-dentate or palmately lobed.
- 29a. Plants less than 25 cm high; leaf blade 2.5 × 3 cm or less, both surfaces glabrous ..... 17. *S. wuyiensis*
- 29b. Plants more than 30 cm high; leaf blade 3–6 × 4–6 cm, abaxially variously pubescent.
- 30a. Leaf blade repand-dentate, sparsely villous or glabrescent abaxially ..... 32. *S. hupingshanensis*
- 30b. Leaf blade palmately lobed, arachnoid or white tomentose abaxially.
- 31a. Leaf blade 7–9-lobed to 1/2; lobes oblong; phyllaries not purplish on upper margin ..... 22. *S. fangianus*
- 31b. Leaf blade shallowly 5–7-lobed, or undivided, only denticulate; lobes broadly deltoid or ovate-deltoid, denticulate; phyllaries purplish on upper margin ..... 21. *S. sungpanensis*
- 25b. Stem scapiform or subscapiform, leafless or with fewer than 4 stem leaves, otherwise with only lanceolate or linear bracts or at most a few reduced, bractlike leaves markedly smaller than radical leaves.
- 32a. Capitula cylindrical; phyllaries 8–10.
- 33a. Leaf blade ovate-cordate or suborbicular.
- 34a. Leaf blade ovate-cordate, densely lanate with fulvous hairs or sericeous ..... 1. *S. eriopodus*
- 34b. Leaf blade suborbicular, villous with reddish brown hairs or sometimes glabrescent ..... 2. *S. villifer*
- 33b. Leaf blade reniform.
- 35a. Stem leaves 1 or 2 near base; leaf blade smaller, 4–9 × 5–8 cm, arachnoid abaxially ..... 9. *S. subrosulatus*
- 35b. Stem leaves absent or with a bractlike leaf on upper part; leaf blade of basal leaves larger, 7–20 × 5–22 cm, villous abaxially ..... 8. *S. ligularioides*
- 32b. Capitula campanulate; phyllaries more than 10.
- 36a. Rhizome collar and stem base densely sericeous-villous; capitula 1–3, up to 3 cm in diam. .... 4. *S. subcoriaceus*
- 36b. Rhizome collar and stem base not densely sericeous-villous; capitula few or many, usually 1–2 cm in diam.
- 37a. Stem villous with reddish brown hairs, more densely so on lower part; leaf blade ciliate at margin.
- 38a. Leaf blade orbicular or suborbicular, base cordate or subtruncate, margin shortly ciliate ..... 38. *S. confervifer*
- 38b. Leaf blade broadly ovate or broadly elliptic, base truncate or rounded, margin long ciliate ..... 37. *S. bodinieri*
- 37b. Stem subglabrous, sparsely arachnoid, or arachnoid-tomentose; leaf blade not ciliate at margin.
- 39a. Stem arachnoid-tomentose; leaf blade densely white tomentose abaxially.
- 40a. Leaf blade green adaxially, regularly 7–9-palmatilobed to middle ..... 35. *S. septilobus*
- 40b. Leaf blade whitish or pale green adaxially, hardly divided, repand, or irregularly shallowly lobed ..... 34. *S. fanjingshanicus*
- 39b. Stem subglabrous or sparsely arachnoid; leaf blade usually not white tomentose abaxially, rarely so and later glabrescent.
- 41a. Leaf blade broadly flabellate or suborbicular, dentate or palmately lobed to 1/2, lobes apically 2- or 3-denticulate, glabrous on both surfaces ..... 17. *S. wuyiensis*
- 41b. Leaf blade reniform or suborbicular, regularly 5–7-palmatilobed, lobes ovate-triangular, glabrous on both surfaces or sometimes white tomentose abaxially and later glabrescent ..... 18. *S. saxatilis*

**1. *Sinosenecio eriopodus*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 226. 1984.

毛柄蒲儿根 mao bing pu er gen

*Senecio eriopodus* Cummins, Bull. Misc. Inform. Kew 1908: 18. 1908, not Klatt (1888).

Herbs, scapigerous. Rhizomes 5–6 mm in diam., densely lanate with long fulvous hairs or sericeous. Stems solitary, erect or somewhat flexuous, to 60 cm tall, lanate with fulvous hairs or sericeous, simple or branched above middle. Leaves few, radical, long petiolate; petiole 5–22 cm, villous with fulvous

hairs or sericeous; blade ovate-cordate, 6–13 × 4–10 cm, thickly papery, abaxially densely lanate with fulvous hairs or sericeous, adaxially sparsely sericeous-villous and densely adpressed puberulent, palmately 7–9-veined, veins prominent abaxially, obscure adaxially, base cordate, margin repand-dentate with mucronulate teeth, apex acute or subobtuse, mucronulate. Capitula 8–13 arranged in terminal corymbs, ca. 2 cm in diam.; peduncles 2–4 cm, densely tomentose, ± glabrescent, with a basal linear bract; bracteoles 3 or 4, linear-subulate, membranous. Involucres cylindrical, broadly campanulate when flattened, 6–8 × 5–7 mm, not calyculate; phyllaries 8, oblong-lanceolate, 1.5–

3.2 mm wide, glabrescent after anthesis, apex acute, subacute, or acuminate. Ray florets 6–10; corolla tube ca. 3 mm; lamina yellow, oblong, 8–15 × 2–2.5 mm, 4-veined, apically obtuse and 3-denticulate. Disk florets numerous; corolla yellow, 6–11 mm, with 3–4 mm tube and campanulate limb; lobes ovate-triangular, apically acute, papillose. Anthers ca. 2 mm, basally obtuse to rounded, appendages ovate-oblong. Style branches ca. 0.8 mm, apex truncate, papillose. Achenes cylindrical, ca. 3 mm, smooth, glabrous, ribbed. Pappus white, ca. 6 mm. Fl. Apr–Jun, fr. May–Jul.  $2n = 60^*$ .

- Woods, in bushes, on dry rocks near mountain summits; 300–1600 m. E Chongqing, W Hubei, NW Hunan, C Sichuan.

*Sinosenecio eriopodus* is similar to *S. villifer* but is easily distinguished by the ovate-cordate leaf blade, which is abaxially densely lanate with fulvous hairs or sericeous. Specimens from Shizhu, E Chongqing, previously referred to *S. villifer*, belong to this species. Specimens from Luding, W Sichuan, previously identified as this species, actually belong to *S. subrosulatus*.

**2. *Sinosenecio villifer*** (Franchet) B. Nordenstam, *Opera Bot.* 44: 51. 1978 [“*villiferus*”].

紫毛蒲儿根 *zi mao pu er gen*

*Senecio villifer* Franchet, *J. Bot. (Morot)* 8: 362. 1894 [“*villiferus*”]; *Ligularia villifera* (Franchet) Diels.

Herbs, scapigerous. Rhizomes stout, to 10 mm in diam., clad in persistent blackish brown petiole bases. Stems solitary, erect, scapiform, 25–40 cm tall, with or without few villous bracts, villous with long reddish brown hairs. Leaves few, radical, rosulate, long petiolate; petiole 9–11 cm, densely villous or pubescent with long reddish brown hairs; blade suborbicular, 3.5–8.5 × 3.5–11 cm, papery or subleathery, both surfaces villous or pubescent with reddish brown hairs, sometimes glabrescent by anthesis, base cordate, margin shallowly repand-dentate with deltoid mucronulate teeth. Capitula radiate, usually 5–8 in terminal subumbelliform corymbs; peduncles 1–2.5 cm, villous with long reddish brown hairs, with basal bract and 2–4 bracteoles; bracteoles linear-subulate, 5–10 mm, membranous, densely villous, 1-veined, apically acute. Involucre cylindrical, obconic-ovoid when flattened, 6–8 × 7–10 mm, not calyculate; phyllaries 8–10, ovate-lanceolate, 7–8 × 1.5–2 mm, herbaceous, sparsely villous and shortly glandular hairy, margin scarious, apically acute or subacute, purple-reddish, ciliate. Ray florets 8–10, ca. 14 mm; corolla tube ca. 3.5 mm; lamina yellow, ovate-oblong, ca. 11 × 2–2.2 mm, 7-veined, apically 3-denticulate. Disk florets numerous; corolla yellow, ca. 7 mm, with 3–3.5 mm tube and campanulate limb; lobes oblong-ovate, apically acute. Anthers oblong, ca. 2.5 mm, basally obtuse, appendages ovate-oblong. Style branches recurved, ca. 1 mm. Achenes (immature) cylindrical, 2–2.2 mm, smooth, glabrous. Pappus white, ca. 6 mm. Fl. Apr–Jun, fr. Jun–Jul.  $2n = 60^*$ ,  $90^*$ .

- Woods on slopes; 900–1700 m. Chongqing (Chengkou), Sichuan (Tongjiang, Wanyuan, Xuanhan).

*Sinosenecio villifer* is similar to *S. eriopodus* and *S. dryas*. From the former, it differs in the suborbicular leaf blade villous with reddish brown hairs or sometimes glabrescent, and from the latter it differs in the rhizomes stout, the capitula 5–8 in terminal subumbelliform corymbs, and the phyllaries 8–10.

**3. *Sinosenecio dryas*** (Dunn) C. Jeffrey & Y. L. Chen, *Kew Bull.* 39: 231. 1984.

川鄂蒲儿根 *chuan e pu er gen*

*Senecio dryas* Dunn, *J. Linn. Soc., Bot.* 35: 504. 1903.

Herbs, scapigerous. Rhizomes 3–6 mm in diam., with distinct brown villous internodes and slightly swollen nodes, clad in persistent brown petiole bases. Stems solitary, erect, scapiform, 15–33 cm tall, simple, densely brown villous, usually with 3–5 bracts; bracts ovate-lanceolate or linear-lanceolate, 5–10 mm, membranous, densely brown villous, apex acute or acuminate. Leaves several, radical, rosulate, long petiolate; petiole 5–10 mm, densely villous, with brown or reddish brown hairs; blade abaxially green or purplish, adaxially green, orbicular, 3–6 × 3–6 cm, shortly palmately 5–7-lobed, papery, abaxially brown villous on veins or subglabrous, adaxially at first sparsely villous, glabrescent, base cordate, palmately 5-veined, veins prominent abaxially; lobes ovate-triangular, apically callose-mucronulate lobed; terminal lobe rather larger than lateral lobes and sometimes shortly 3-lobulate, apex obtuse. Capitula solitary, terminal, 2.5–3 cm in diam. Involucre campanulate, obconic-campanulate when flattened, (6–)8–10 × 6–8 mm, not calyculate; phyllaries 10–13, lanceolate or oblong-lanceolate, 8–10 × 2–2.5 mm, herbaceous, densely villous and shortly glandular hairy, margin scarious, apically acuminate and green or reddish purple. Ray florets 10–13, ca. 14 mm; corolla tube ca. 3.5 mm; lamina yellow, ovate-oblong, ca. 11 × 2–2.2 mm, 7-veined, apically 3-denticulate. Disk florets many; corolla yellow, ca. 7 mm, with 3–3.5 mm tube and campanulate limb; lobes oblong-ovate, ca. 2 mm, apex acute, papillose. Anthers oblong, ca. 2.5 mm, basally obtuse, appendages ovate-oblong. Style branches ca. 1 mm. Achenes (immature) cylindrical, 3–3.5 mm, smooth, glabrous. Pappus white, 4–6 mm. Fl. May–Jun, fr. Jul–Aug.  $2n = 60^*$ .

- Stony slopes, wooded cliffs; 2000–2100 m. E Chongqing (Wushan), W Hubei.

*Sinosenecio dryas* is similar to *S. villifer* but differs in having plants and leaves smaller, rhizomes slender, and capitula strictly solitary.

**4. *Sinosenecio subcoriaceus*** C. Jeffrey & Y. L. Chen, *Kew Bull.* 39: 232. 1984.

革叶蒲儿根 *ge ye pu er gen*

Herbs, scapigerous. Rhizomes ca. 5 mm in diam., clad in persistent brownish petiole bases, collar densely sericeous-villous. Stems 1–3, erect, scapiform, 10–40 cm tall, slender, simple, sericeous-villous at base, laxly so in lower part, subglabrous or glabrous in upper part. Leaves several, radical, rosulate, long petiolate; petiole 10–20 cm, sparsely villous or subglabrous; blade abaxially pale green or purplish, adaxially green, orbicular, 3–6.5 × 3–8 cm, subleathery, abaxially glabrous or sparsely villous on veins, adaxially glabrous, palmately veined, base deeply or sometimes shallowly cordate, margin irregularly repand-dentate with broadly deltoid, obtuse, apiculate teeth. Capitula 2.5–3 cm in diam., 1–3 in terminal corymbs; peduncles elongate, slender, with basal bract and 2 or 3 bracts.

teoles in upper part; bracteoles linear, 8–15 mm, sparsely villos, apex acute. Involucres broadly campanulate, hemispheric when flattened, 8–10 × 6–10 mm, calyculate with 4 or 5 linear bracteoles; phyllaries 16 or 17, oblong-linear, 2–2.5 mm wide, herbaceous, tomentose at base or glabrous, margin narrowly scarious, apically purplish, ciliate, and acuminate. Ray florets 10–13; corolla tube 5–5.5 mm, glabrous; lamina yellow, ovate-oblong, 16–18 × ca. 2.2 mm, 7-veined, apically 3-denticulate. Disk florets many; corolla yellow, ca. 6.5 mm, with ca. 3.5 mm tube and funnellform campanulate limb; lobes ovate-lanceolate, ca. 1.5 mm, apically acute. Anthers ca. 2.5 mm, base obtuse to rounded, appendages ovate-oblong. Style branches ca. 1 mm. Achenes cylindric, ca. 4.5 mm, smooth, glabrous. Pappus white or sometimes yellowish at base, ca. 6 mm. Fl. Apr–Jun, fr. May–Jul.  $2n = 60^*$ .

• On rocks below waterfalls, by streams, woods, shaded places; 800–1800 m. Chongqing (Fengdu, Nanchuan).

*Sinosenecio subcoriaceus* can be easily distinguished by its relatively larger and fewer capitula. Populations from different habitats vary greatly in plant and leaf size. Individuals growing in woods are up to 40 cm tall, with larger (up to 8 cm wide) and abaxially green leaf blades, whereas those growing on rocks below waterfalls are no more than 15 cm tall, with smaller (ca. 3 cm wide), sometimes abaxially purplish leaf blades.

**5. *Sinosenecio cyclaminifolius*** (Franchet) B. Nordenstam, Opera Bot. 44: 50. 1978.

仙客来蒲儿根 xian ke lai pu er gen

*Senecio cyclaminifolius* Franchet, J. Bot. (Morot) 8: 362. 1894.

Herbs, scapigerous, stoloniferous. Rhizomes procumbent or ascending, slender, with fibrous roots. Stems solitary or few, erect, scapiform, equaling or exceeding leaves, 10–30 cm tall, tomentose, with white or fulvous hairs, ± glabrescent, simple, with a few brown broadly ovate bracts at or near base. Leaves radical, rosulate, long petiolate; petiole 4–22 cm, arachnoid-tomentose, later glabrescent; blade adaxially green, ovate-cordate or rarely suborbicular, 3.5–8 × 3.5–7.5 cm, abaxially densely white lanate, adaxially sparsely arachnoid-tomentose, glabrescent, palmately 5-veined, veins conspicuous abaxially, base narrowly cordate, margin shallowly repand-dentate with mucronulate teeth, apex obtuse, mucronulate. Capitula solitary, terminal, to 5 cm in diam.; scape with a few bracteoles; bracteoles purplish, ovate-lanceolate, membranous, margin entire or sparsely denticulate, apex acute or acuminate. Involucres obconic-campanulate, 12–15 × 10–14 mm, not calyculate; phyllaries ovate or ovate-oblong, purplish red and ciliate on upper margin and apex, densely lanate, or ± glabrescent, apex obtuse to subacute. Ray florets ca. 15; corolla tube ca. 3 mm; lamina yellow, ovate-oblong or oblong, 20–25 × ca. 5 mm, 5–8-veined, apically obtuse and 3-denticulate. Disk florets many; corolla yellow, with ca. 1.5 mm tube and campanulate limb; lobes ovate-lanceolate, ca. 2 mm, apically acute. Anthers ca. 2.5 mm, basally obtuse; appendages ovate-lanceolate. Style branches 1–1.5 mm, truncate, papillose. Achenes (immature) cylindric, 2–2.5 mm, smooth, glabrous. Pappus scant, ca. 3 mm, soon deciduous. Fl. Apr–May, fr. May–Jun.

• Woods, streamsides, rocky places, grasslands; 1300–1900 m. Chongqing (Chengkou, Wuxi), Sichuan (Wanyuan).

*Sinosenecio cyclaminifolius* is readily distinguished by its stoloniferous habit and few short, quickly deciduous pappus bristles. The longer, more copious, persistent pappus bristles and the absence of stolons clearly separate *S. hederifolius* from it. In geographical range, *S. cyclaminifolius* is almost sympatric with *S. villifer*, but it differs markedly from the latter in having leaf blades ovate-cordate, abaxially densely white lanate, and capitula solitary, up to 5 cm in diam.

**6. *Sinosenecio hederifolius*** (Dümmer) B. Nordenstam, Opera Bot. 44: 50. 1978.

单头蒲儿根 dan tou pu er gen

*Gerbera hederifolia* Dümmer, Gard. Chron., ser. 3, 52: 482. 1912 [“*hederaefolia*”]; *Cremanthodium hederifolium* (Dümmer) C. C. Chang; *Senecio goodianus* Handel-Mazzetti.

Herbs, scapigerous. Rhizomes short, stout, 5–6 mm in diam., clad in persistent brown petiole bases. Stems solitary, erect, scapiform, 13–30 cm tall, densely fulvous tomentose, glabrescent to ± glabrous, simple. Leaves radical, long petiolate; petiole stout, 3–7 cm, densely fulvous tomentose; blade adaxially green, broadly ovate or ovate-cordate, 3–7 × 2.7–5.5 cm, thickly papery, abaxially densely fulvous tomentose, adaxially ± glabrous, palmately 5–7-veined, veins inconspicuous, margin entire, repand, or dentate with deltoid teeth, apex rounded. Capitula solitary, terminal, 4–5 cm in diam., scape with few linear-lanceolate bracteoles in upper part. Involucres cylindric, obconic-campanulate when flattened, 8–10 × 5–8 mm, not calyculate; phyllaries ca. 15, ovate-oblong or linear-oblong, 8–10 × 2.5–3 mm, densely white tomentose, glabrescent to ± glabrous, margin broadly scarious, apically acute, purplish and fimbriate-ciliate. Ray florets 10–13; corolla tube 3–3.5 mm; lamina yellow, oblong or oblanceolate-oblong, 5–9-veined, apically 3-denticulate, obtuse to rounded. Disk florets numerous; corolla yellow, ca. 7.5 mm, with ca. 3.5 mm tube and campanulate limb; lobes ovate-oblong, ca. 2 mm, apically acute. Anthers oblong, ca. 2.8 mm, basally obtuse to rounded, appendages ovate-lanceolate. Style branches ca. 0.8 mm, truncate, papillose. Achenes cylindric, 4–5 mm, smooth, glabrous, ribbed. Pappus white, ca. 7 mm. Fl. Apr–May, fr. May–Jun.  $2n = 60^*$ .

• Woods on slopes, limestone cliffs; 500–2000 m. NE Chongqing, SE Gansu, W Hubei, SW Shaanxi, NE Sichuan.

*Sinosenecio hederifolius* is similar in leaf shape to *Gerbera* but completely different in floral structure.

**7. *Sinosenecio rotundifolius*** Y. L. Chen, Acta Phytotax. Sin. 26: 53. 1988.

圆叶蒲儿根 yuan ye pu er gen

Herbs, scapigerous. Rhizomes stout, clad in persistent petiole bases, densely sericeous-lanate, with few fibrous roots. Stems solitary, erect, purplish, scapiform, ca. 20 cm tall, simple, sparsely fulvous pubescent in upper part. Radical leaves rosulate, long petiolate; petiole 3–5 cm, slender, basally expanded, brown sericeous-lanate; blade abaxially pale green, adaxially

green or deep green, orbicular or rarely reniform-orbicular, 1.5–2 × 1.5–2 cm, abaxially sparsely fulvous arachnoid, glabrescent to glabrous, adaxially glabrous, palmately 5–7-veined, veins ± raised abaxially, base cordate, margin subentire or sometimes repand, teeth mucronulate, apex rounded. Capitula terminal, solitary, radiate, 1.5–2 cm in diam. Involucre campanulate, 6–7 × 7–8 mm, not calyculate, densely tomentose below capitulum; phyllaries 13–15, oblong-lanceolate, 1–1.5 mm wide, glabrous, margin narrowly scarios, apically acuminate, purplish, puberulent. Ray florets 11–13, rarely 15; tube 3–3.5 mm; lamina yellow, oblong, 2.5–3 mm wide, 4-veined, apically denticulate. Disk florets numerous; corolla yellow, 5–6 mm, with ca. 2 mm tube and campanulate limb; lobes ovate-lanceolate, apically acuminate, puberulent. Anthers oblong, 2.5–3 mm, basally obtuse. Style branches recurved, apically truncate, papillose. Achenes cylindrical, ca. 3 mm, smooth, glabrous, ribbed. Pappus white, 5–6 mm. Fl. May–Jun, fr. Jun–Jul.  $2n = 60^*$ .

• Woods, in bushes; 2400–3000 m. Gansu (Wenxian), Sichuan (Songpan).

*Sinosenecio rotundifolius* is somewhat similar to *S. dryas* in leaf shape and the solitary capitula, but it differs by its rhizomes with short internodes and stem without bracts. In *S. dryas*, the rhizomes have very long internodes, and the stem bears 3–5 lanceolate bracts. The two species also differ in habitat preference and geographical range.

**8. *Sinosenecio ligularioides*** (Handel-Mazzetti) B. Nordenstam, *Opera Bot.* 44: 50. 1978.

麝香状蒲公英 tuo wu zhuang pu er gen

*Senecio ligularioides* Handel-Mazzetti, *Notizbl. Bot. Gart. Berlin-Dahlem* 13: 640. 1937.

Herbs, scapigerous. Rhizomes robust, densely lanate at collar with fulvous silky hairs. Stems solitary, exceeding leaves, ca. 50 cm tall, ca. 4 mm in diam. at base, fulvous villous, simple, sometimes with 1 bractlike leaf in upper part. Leaves radical, rather few, rosulate, long petiolate; petiole stout, to 35 cm, sparsely reddish villous; blade adaxially pale green, reniform, 7–20 × 5–22 cm, thickly papery, abaxially sparsely pubescent-villous, adaxially glabrous, palmately 5–7-veined, with numerous ascending furcate secondary veins, prominently reticulate abaxially, base cordate, margin irregularly coarsely dentate with large deltoid callose-mucronulate teeth. Capitula ca. 1.5 cm in diam., rather numerous (5–26) in flat-topped terminal corymbs; peduncles 1–4.5 cm, slender, pubescent-villous, bracteate at base and few bracteate below capitula; bracts and bracteoles linear or linear-lanceolate, 5–12 mm. Involucre cylindrical, campanulate when flattened, ca. 8 × 5–6 mm, not calyculate; phyllaries 8, oblong, 1.5–2 mm wide, herbaceous, glabrous or subglabrous, conspicuously 3-veined, margin broadly scarios, apically obtuse to subacute, purplish red, and puberulent. Ray florets ca. 8; corolla tube ca. 4 mm, glabrous; lamina yellow, oblong, ca. 8 × 2–2.2 mm, 4-veined, apically 3-denticulate. Disk florets numerous; corolla yellow, 6–6.5 mm, with ca. 3 mm tube and campanulate limb; lobes ovate-lanceolate, ca. 1.5 mm, apex acute. Anthers linear-oblong, ca. 2 mm, base obtuse to rounded. Style branches recurved, truncate, papillose.

Achenes cylindrical, ca. 2.5 mm, smooth, glabrous, ribbed. Pappus white, ca. 6 mm. Fl. Jun–Jul, fr. Jul–Aug.  $2n = 60^*$ .

• Grassy or rocky slopes; 1600–2300 m. Sichuan (Baoxing, Emei, Hongya).

Recognizable by the large, reniform leaves, *Sinosenecio ligularioides* is very similar to *Ligularia*, but the petioles are not sheathing at the base.

**9. *Sinosenecio subrosulatus*** (Handel-Mazzetti) B. Nordenstam, *Opera Bot.* 44: 51. 1978.

莲座蒲公英 lian zuo pu er gen

*Senecio subrosulatus* Handel-Mazzetti, *Acta Horti Gothob.* 12: 293. 1938.

Herbs, subscapigerous. Rhizomes procumbent, slender, ca. 3 mm in diam., clad in scalelike persistent petiole bases. Stems solitary, erect, or ascending in lower part, scapiform, 20–35 cm tall, at first arachnoid-tomentose, glabrescent to subglabrous, simple. Leaves radical or subradical, rosulate, long petiolate; petiole 6–8 cm, slender, densely arachnoid-tomentose, glabrescent to glabrous, basally expanded; blade adaxially green or dark green, reniform, 4–9 × 5–8 cm, membranous, abaxially at first grayish or fulvous arachnoid, ± glabrescent, adaxially glabrescent, base cordate, margin subentire, repand or sometimes dentate with deltoid mucronulate teeth. Capitula 1.5–2 cm in diam., 2–5 in lax terminal corymbs; peduncles 1–6 cm, slender, sparsely arachnoid and puberulent, bracteate at base and 2- or 3-bracteolate in upper part; bracts and bracteoles linear-subulate or linear. Involucre cylindrical, obconic or campanulate when flattened, 5–8 × 3–5 mm, not calyculate. Phyllaries ca. 10, lanceolate or oblong-lanceolate, 5–7 × 1–1.5 mm, herbaceous, glabrous or sparsely pubescent at base, margin narrowly scarios, apically acute, dark purple and ciliate. Ray florets 8–10; corolla tube 4.4–5 mm; lamina yellow, linear-oblong, 10–11 × 1.5–2 mm, 4-veined, apically 3-denticulate. Disk florets numerous; corolla yellow, 8–9 mm, with 4–4.5 mm tube and campanulate limb; lobes oblong-lanceolate, ca. 1.5 mm, apically acute. Anthers linear-oblong, ca. 3 mm, base obtuse to rounded, appendages ovate-lanceolate. Style branches ca. 1.5 mm. Achenes cylindrical, ca. 2.8 mm, smooth, glabrous. Pappus white, 8–9 mm. Fl. Jun–Jul, fr. Jul–Aug.  $2n = 60^*$ .

• Woods, grassy slopes; 2700–4100 m. S Gansu, Sichuan.

**10. *Sinosenecio homogyniphyllus*** (Cummins) B. Nordenstam, *Opera Bot.* 44: 50. 1978.

肾叶蒲公英 shen ye pu er gen

*Senecio homogyniphyllus* Cummins, *Bull. Misc. Inform. Kew* 1908: 17. 1908; *Sinosenecio lobatus* S. W. Liu & T. N. Ho.

Herbs, scapigerous. Rhizomes ca. 2 mm in diam., densely villous with long fulvous hairs and clad in persistent brownish petiole bases. Stems solitary, erect, scapiform, 10–30 cm tall, simple, sparsely villous, with long fulvous hairs, especially at base and near apex, usually with 1–4 linear-spatulate bracts in upper part. Leaves few to several, radical, rosulate, long peti-

olate; petiole 2.5–9 cm, densely villous, with long fulvous hairs or sometimes subglabrous; blade abaxially green or purple, adaxially green, ovate, broadly ovate-orbicular, or reniform, 2–4(–5) × 2.2–5.5 cm, membranous, sparsely villous on both surfaces, palmately 5–7-veined, base cordate, margin repand-dentate or subentire, with obscure mucronulate teeth, apex rounded. Capitula ca. 2 cm in diam., solitary or 2(–7) arranged in lax terminal subumbelliform corymbs; peduncles 2–3.5 cm, slender, with a basal linear bract and a few linear-spatulate bracteoles in upper part. Involucres obconic, 4–5 × 3–6 mm, not calyculate; phyllaries 7–10, rarely 13, oblong or oblong-lanceolate, 1–1.5 mm wide, herbaceous, dark green, or purplish in upper part, apex obtuse to acuminate and fimbriate-ciliate. Receptacle rather convex, hairy. Ray florets 8–17, ca. 12.5 mm; corolla tube ca. 3 mm, glabrous; lamina oblong, 9–9.5 × 3–3.5 mm, 4-veined, apically 3-denticulate. Disk florets many; corolla yellow, ca. 4.5 mm, with ca. 1.2 mm tube and campanulate limb; lobes ovate-lanceolate, ca. 1.2 mm, apically acute. Anthers linear-oblong, ca. 2 mm, basally obtuse to rounded, appendages ovate-lanceolate. Style branches recurved, ca. 0.8 mm. Achenes obovoid-cylindric, 2–2.5 mm, smooth, glabrous. Pappus absent, rarely of several hairs, soon deciduous. Fl. Apr–Jul, fr. Jun–Aug.  $2n = 60^*$ .

• Woods, streamsides, shaded places, on rocks; 1200–2900 m. SW and W Sichuan.

**11. *Sinosenecio chienii*** (Handel-Mazzetti) B. Nordenstam, Opera Bot. 44: 49. 1978.

雨农蒲儿根 yu nong pu er gen

*Senecio chienii* Handel-Mazzetti, Oesterr. Bot. Z. 88: 311. 1939; *S. homogyniphyllus* Cummins var. *subumbellatus* C. C. Chang.

Herbs, scapigerous. Rhizomes ca. 4 mm in diam., villous with long fulvous hairs and clad at nodes with persistent brownish petiole bases. Stems solitary or paired, erect, scapiform, 20–30 cm tall, simple, fulvous villous or ± glabrescent. Leaves few to several, radical, rosulate, long petiolate; petiole 10–15 cm, rather stout, fulvous villous, ± glabrescent; blade abaxially pale green or purplish, adaxially green or dark green, ovate or broadly ovate, 4–9 × 4.5–9.5 cm, submembranous, abaxially sparsely villous and glabrescent, adaxially sparsely fulvous pilose, basally palmately 5–7-veined, veins prominent, base cordate, margin repand or sinuate-dentate with broadly deltoid callose-apiculate teeth, apex acuminate or shortly caudate, apiculate. Capitula ca. 2.5 cm in diam., 2–9 in terminal subumbelliform corymbs; peduncles 2.5–7 cm, slender, with a basal bract and 1–5 linear bracteoles. Involucres obconic-campanulate, 6–7 × 3.5–5 mm, not calyculate; phyllaries 8–10, lanceolate, 4–5 × 1.5–2 mm, herbaceous, sparsely villous or subglabrous, obscurely 3-veined, apically fulvous ciliate and purplish, acute to obtuse. Receptacle slightly convex, alveolate-ciliate. Ray florets ca. 10, ca. 12 mm; corolla tube 1.5–2 mm; lamina oblong, 8–10 × 2.5–3.5 mm, 4-veined, apically 3-denticulate and obtuse. Disk florets many; corolla yellow, ca. 4 mm, with ca. 1.5 mm tube and broadly campanulate limb; lobes lanceolate, ca. 1.5 mm, apically acute. Anthers oblong, ca. 1.5

mm, appendages ovate-oblong, basally obtuse to rounded. Style branches recurved, ca. 0.7 mm. Achenes obovoid-cylindric, ca. 2.7 mm, smooth, glabrous. Pappus absent or rarely of several ca. 1.5 mm hairs, soon deciduous. Fl. Apr–Jul, fr. May–Aug.  $2n = 60^*$ .

• Woods, streamsides, grasslands, damp places; 800–2800 m. W Sichuan.

The record of the occurrence of *Sinosenecio chienii* in Lijiang, NW Yunnan, is a mistake resulting from the incorrect note of the collecting locality of a specimen.

*Sinosenecio chienii* is closely related to *S. homogyniphyllus*, and they are largely sympatric in geographical range. It differs from *S. homogyniphyllus* mainly by its larger, ovate or broadly ovate leaves, acuminate or shortly caudate at the apex and with repand or sinuate-dentate margin. Although both species are readily distinguishable from each other as to populations from Emei, Hongya, and Tianquan, their delimitation becomes rather obscure in other sites, e.g., Baoxing, Leibo, Mabian, and Shifang. Further studies are needed to clarify their relationships.

**12. *Sinosenecio yilingii*** Y. Liu & Q. E. Yang, Bot. Stud. 51: 270. 2010.

艺林蒲儿根 yi lin pu er gen

Herbs, subscapigerous. Rhizome 2–3 mm in diam. Stems solitary or sometimes several, erect, 10–40 cm tall, simple, densely sericeous at base, sparsely sericeous or glabrescent in upper part. Leaves several, both radical and stem leaves present. Radical leaves usually 1–3, long petiolate; petiole 4–9 cm, densely sericeous at base, sparsely so or glabrescent in upper part; blade abaxially pale green, adaxially green to dark green, shiny, reniform or broadly ovate, 1.7–5.5 × 2–6.5 cm, thinly leathery to membranous, glabrous or very sparsely pubescent on both surfaces, palmately veined, base cordate or deeply so, margin repand or dentate with mucronulate teeth, apex obtuse or sometimes acute. Stem leaves 2–5, smaller, with shorter petioles. Capitula solitary, terminal, 2.5–3 cm in diam.; peduncle sparsely sericeous or glabrescent in lower part, densely sericeous in upper part. Involucre obconic, 7–10 × 5–7 mm, not calyculate; phyllaries 11–13, green, oblong or oblong-lanceolate, 1.5–2.5 mm wide, herbaceous, subglabrous, apex acute or acuminate, fimbriate-ciliate. Ray florets ca. 13; corolla tube ca. 2.5 mm, glabrous; lamina yellow, oblong-elliptic, ca. 10 × 3 mm, 6- or 7-veined, apically 3-dentate. Disk florets many; corolla yellow, ca. 4 mm, with ca. 3 mm tube and campanulate limb; lobes ovate-lanceolate. Anthers ca. 2 mm, base obtuse, appendages ovate-oblong. Style branches ca. 1 mm. Achenes obovoid-cylindric, ca. 1.5 mm, smooth, glabrous. Pappus absent. Fl. May–Jun, fr. Jun–Jul.  $2n = 60^*$ .

• Deciduous broad-leaved forests; 2100–2200 m. Sichuan (Baoxing).

*Sinosenecio yilingii* resembles *S. homogyniphyllus* but is readily distinguishable by the presence of 2–5 stem leaves, the adaxially shiny leaf blades, and the strictly solitary capitula. They are also somewhat different in phenology when they grow together. At the type locality of *S. yilingii*, both species occur in the same ravine. However, individuals of *S. yilingii* usually grow in shaded places along forest margins or on streamside rocks and flower in May and June, while those of *S. homogyniphyllus* prefer more open, sunny places and flower in June and July.

**13. *Sinosenecio sichuanicus*** Y. Liu & Q. E. Yang, Bot. Stud. 52: 219. 2011.

四川蒲儿根 *si chuan pu er gen*

Herbs, subscapigerous, with radical and 2 or 3 stem leaves; stolons absent. Rhizomes 6–7 mm in diam. Stems solitary or several, erect, 20–30 cm tall, simple, densely fulvous sericeous at base, sparsely so in upper part. Leaves several, both radical and stem leaves present. Radical leaves 1 or 2, long petiolate; petiole 6–14 cm, pubescent, densely sericeous at base; blade abaxially pale green, adaxially green, cordate or broadly cordate to reniform in outline, 5–9 × 5–10 cm, submembranous, both surfaces pubescent, palmately veined, base deeply cordate to cordate, margin repand or sinuate-dentate with mucronulate teeth, apex acuminate or acute, apiculate. Stem leaves 2 or 3, smaller, with shorter petioles. Capitula solitary or several, 3.5–4 cm in diam.; peduncles 4–8 cm, sparsely fulvous sericeous in lower part, fulvous sericeous in upper part. Involucre obconic-campanulate, 5–8 × 8–12 mm, ecalyculate. Phyllaries 13, green, oblong or oblong-lanceolate, ca. 8 × 2–3 mm, herbaceous, fulvous sericeous, apex acuminate or acute and fimbriate-ciliate. Ray florets 12 or 13; corolla tube ca. 2 mm, glabrous; lamina yellow, oblong-elliptic, 18–20 × 4–5 mm, 4–7(–9)-veined, apically 3-denticulate. Disk florets many; corolla ca. 4 mm; tube ca. 3 mm; limb campanulate; lobes ovate-lanceolate. Anthers ca. 2 mm, base obtuse, appendages ovate-oblong. Style branches ca. 1 mm, apex truncate. Achenes obovoid-cylindric, ca. 1.5 mm, smooth, glabrous. Pappus absent or rarely of several 1.5–2 mm hairs, soon deciduous. Fl. May, fr. Jun.  $2n = 60^*$ .

• Grasslands, in mosses on streamside rocks in deciduous broad-leaved forests; 1300–2400 m. Sichuan (Emei, Hongya).

*Sinosenecio sichuanicus* resembles *S. chienii* in leaf shape and the epappose achenes but differs in having stem leaves 2 or 3, leaf blade pubescent on both surfaces, and lamina larger. Although both species are overlapping in geographical distribution and occupy basically the same elevational range, they have not as yet been found to co-occur in the same community.

The four species *Sinosenecio chienii*, *S. homogynophyllus*, *S. sichuanicus*, and *S. yilingii* all have obconic-campanulate involucre, ± hairy receptacles, and glabrous and epappose achenes, and are essentially sympatric in geographical distribution. They constitute a very natural group of species.

**14. *Sinosenecio latouchei*** (Jeffrey) B. Nordenstam, Opera Bot. 44: 50. 1978.

白背蒲儿根 *bai bei pu er gen*

*Senecio latouchei* Jeffrey, Notes Roy. Bot. Gard. Edinburgh 9: 128. 1916.

Herbs, subscapigerous. Rhizomes 6–10 mm in diam., collar densely lanate-tomentose with long fulvous hairs and clad in persistent petiole bases. Stems solitary, slender, erect or somewhat flexuous, subscapiform, 15–35 cm tall, simple or branching into synflorescence, villous or floccose-tomentose, with brown or white hairs, glabrescent. Radical leaves few, rosulate, long petiolate; petiole 4–16 cm, villous, base slightly expanded; blade adaxially green, suborbicular, 2.5–5 × 3–6 cm, papery, abaxially densely villous, ± white tomentose, rarely gla-

brescent, adaxially villous with spreading hairs, palmately 5–7-veined, veins rather prominent, base cordate, margin palmately coarsely dentate or sublobed, with ovate-deltoid, conspicuous mucronulate teeth or lobes. Stem leaves 1–3; petiole 1.5–4 cm, basally auriculate; blades similar to basal ones, 1.5–3.3 × 1.5–3 cm. Uppermost stem leaves small, bractlike, 3–5-lobed, or sometimes entire, apically acute. Capitula usually 1–4, arranged in terminal corymbs, 2–2.5 cm in diam.; peduncles 2.5–6 cm, slender, sparsely tomentose or villous, glabrescent, bracteate at base, usually with 1 bracteole in upper part; bracts and bracteoles linear-subulate, 5–10 mm, acute or bracts sometimes lobed. Involucre campanulate, ca. 7 × 7 mm, not calyculate; phyllaries ca. 13, oblong-lanceolate, 6–7 × 1.5–2 mm, herbaceous, sparsely arachnoid to glabrous, inconspicuously 3–5-veined, margin broadly scarious, apically acute to obtuse, purplish red and ciliate. Ray florets 11–13; corolla tube 3.5–4 mm, glabrous; lamina yellow, oblong, 7–10 × 2.5–3 mm, 4-veined, apically 3-denticulate, obtuse. Disk florets many; corolla yellow, 4–5 mm, with 2–2.5 mm tube and campanulate limb; lobes lanceolate, 1–1.2 mm, apically acute. Anthers ca. 1.3 mm, basally obtuse, appendages ovate-triangular. Style branches ca. 0.8 mm. Achenes ca. 2 mm, puberulent, papillate. Pappus white, ca. 4 mm. Fl. Mar–May, fr. May–Jun.  $2n = 48^*$ .

• Wet places, canal sides, damp valleys, wet rocky cliffs, woods; 200–400 m. Fujian (Nanping, Shaowu, Wuyi), Jiangxi (Lichuan, Nanfeng, Ningdu).

*Sinosenecio latouchei* is closely related to *S. jiuhuashanicus* but differs in the stem slender, erect or flexuous; stem leaves 1–3; leaf blade adaxially villous with spreading hairs; and leaf auricles smaller in size.

**15. *Sinosenecio jiuhuashanicus*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 257. 1984.

九华蒲儿根 *jiu hua pu er gen*

Herbs, subscapigerous or with leafy stems. Rhizomes 5–8 mm in diam., collar white tomentose and clad in remains of persistent petiole bases. Stems solitary or several, erect, 13–40 cm tall, simple, villous with multicellular hairs and white with ± deciduous floccose tomentum. Radical leaves few, rosulate, long petiolate; petiole 3.5–6 cm, densely brown villous and ± arachnoid-tomentose, basally expanded; blade orbicular, 2–5 × 2–6 cm, abaxially white floccose-tomentose, adaxially adpressed pubescent and at first sparsely to densely white tomentose, palmately 5–7-veined, base cordate, margin repand-dentate, with broad mucronulate teeth. Stem leaves 3–7, rarely 2; blade similar to basal ones; petiole winged in lower part, expanded into rounded subamplexicaul auricle; auricles larger or smaller upward; uppermost leaves sometimes sessile, blade confluent with auricle. Capitula usually 3–9 arranged in terminal corymbs, ca. 2 cm in diam.; peduncles 1–8 cm, densely white tomentose, not bracteate. Involucre campanulate, ca. 7 × 8 mm, not calyculate; phyllaries ca. 13, oblong-lanceolate, ca. 7 × 1.5–2 mm, white arachnoid-tomentose, ± glabrescent, margin broadly scarious, apically acute or acuminate, reddish purple and ciliate. Ray florets ca. 15; corolla tube 1.5–2 mm; lamina yellow, oblong, 7.5–8 × 1.5–1.7 mm, 4-veined, apically 3-denticulate, obtuse. Disk florets many; corolla yellow, ca. 6 mm, with 1–1.5 mm tube and campanulate limb; lobes ovate-oblong,

ca. 1 mm, apically acute. Anthers ca. 1.2 mm, basally obtuse to rounded, appendages lanceolate. Style branches ca. 0.8 mm. Achenes cylindric, ca. 2 mm, sparsely puberulent, papillate. Pappus white, ca. 2 mm. Fl. Mar–May, fr. May–Jun.  $2n = 48^*$ .

• Canal sides, shaded wet places, woods, on rocks near mountain summits; 200–1700 m. Anhui, E Hunan, Jiangxi.

*Sinosenecio jiuhuashanicus* is closely related to *S. latouchei* but differs in the stem somewhat stouter, erect; stem leaves 3–7; leaf blade adaxially pubescent with appressed hairs, or sparsely or densely white tomentose; and leaf auricles larger in size.

**16. *Sinosenecio guangxiensis*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 254. 1984.

广西蒲儿根 *guang xi pu er gen*

Herbs, scapigerous or subscapigerous. Rhizomes 5–10 mm in diam., collar densely fulvous tomentose and clad in persistent petiole bases. Stems solitary, erect, subscapiform, 10–35 cm tall, slender, simple, brown villous in lower part, sparsely so to subglabrous in upper part. Radical leaves few, rosulate, long petiolate; petiole 2–6 cm, rather stout, densely fulvous villous, basally somewhat expanded; blade adaxially green or deep green, suborbicular or reniform,  $2-7 \times 2.5-9$  cm, thickly papery or subleathery, abaxially densely white tomentose or sometimes sparsely villous and glabrescent, and then often deep purplish red, adaxially sparsely to sometimes densely fulvous hispid, palmately 5–7-veined, base cordate, margin coarsely repand or dentate with ovate-deltoid or shallowly ovate-deltoid mucronulate teeth. Stem leaves usually 1–5, similar to radical ones but smaller upward on stem and with shorter petioles slightly expanded but not auriculate at base. Uppermost leaves bractiform, few, linear or linear-lanceolate, 1–1.5 cm, apically acute. Capitula (1 or) 2–7 or more arranged in terminal corymbs, 1.5–1.8 cm in diam.; peduncles 1–5.5 cm, slender, sparsely puberulent or subglabrous, usually bracteate at base and 1–3-bracteolate in upper part; bracts and bracteoles linear, 3–6 mm, apically callose-mucronulate. Involucres campanulate, hemispheric when flattened,  $5-8 \times$  ca. 7 mm, calyculate; calyculus of 8–10 bracteoles; bracteoles linear, 3–5 mm, apically callose-mucronulate. Phyllaries ca. 13, oblong-lanceolate,  $6-7 \times 1.5-2.5$  mm, herbaceous, glabrous or subglabrous, apically  $\pm$  acute, reddish purple and ciliate. Ray florets ca. 13, uniseriate; corolla tube ca. 2.5 mm, glabrous; lamina yellow, oblong or broadly oblong, ca.  $7 \times 2-3$  mm, 4-veined, apically 3-denticulate, obtuse. Disk florets: corolla yellow, 3.5–4 mm, with ca. 2 mm tube and campanulate limb; lobes ovate-lanceolate, ca. 1 mm, apically acute. Anthers ca. 1.3 mm, basally obtuse, appendages ovate-oblong. Style branches ca. 0.7 mm. Achenes cylindric, 1.5–2 mm, ribs pubescent, papillate. Pappus white, 3.5–4 mm. Fl. May–Oct, fr. Jun–Nov.  $2n = 48^*$ .

• Forests, streamsides, wet rocky places on mountain summits; 800–2300 m. Guangxi, SW Hunan (Chengbu, Dong'an, Jiangyong).

*Sinosenecio guangxiensis* shows great variation within and between populations with respect to plant size and leaf size, shape, and indumentum. It is similar to *S. latouchei* and *S. jiuhuashanicus* in posture, leaf shape, and achene morphology but readily recognizable by the petioles of stem leaves basally expanded but not auriculate and the calyculus of 8–10 bracteoles.

**17. *Sinosenecio wuyiensis*** Y. L. Chen, Acta Phytotax. Sin. 26: 51. 1988.

武夷蒲儿根 *wu yi pu er gen*

Herbs, rhizomatous, with leafy stems or subscapigerous. Rhizomes slender, clad in persistent petiole bases. Stems erect or oblique, (6–)10–23 cm tall, slender, simple or rarely branched, sparsely arachnoid in lower part, glabrous above. Radical leaves rosulate, long petiolate; petiole 3–5 cm, basally slightly expanded; blade abaxially purplish red or green, adaxially green, broadly flabelliform or suborbicular,  $1.5-2.5 \times 1.5-3$  cm, papery or subleathery, both surfaces glabrous, palmately 5–7-veined, coarsely dentate or palmately lobed to 1/2, base cordate or truncate; lobes broadly oblong,  $5-6 \times 6-7$  mm, apically 2- or 3-denticulate. Stem leaves 2–4(or 5), similar to radical ones; blade 1.5–2.5 cm, shortly petiolate; petiole slightly expanded and subamplexicaul at base; uppermost leaves sessile, bractlike, oblanceolate to linear, margin 3–5-lobulate or sometimes entire. Capitula usually 1–3, rarely more, arranged in terminal subcorymbs, ca. 2 cm in diam.; peduncles 2–3.5 cm, slender; bracteoles linear, 5–15 mm, margin entire or sometimes 2- or 3-denticulate. Involucres campanulate, hemispheric when flattened,  $5-6 \times 8-10$  mm; phyllaries ca. 13, oblong-lanceolate, 1–1.5 mm wide, herbaceous, sparsely pubescent or subglabrous, inconspicuously 3-veined, margin scarios, apically acute, purplish and ciliate. Ray florets 13 or 14; corolla tube ca. 2 mm; lamina yellow, oblong,  $10-11 \times 2-3$  mm, apically 3-denticulate. Disk florets numerous, 3.5–4 mm, with ca. 1.5 mm tube and campanulate limb; lobes ovate-lanceolate. Anthers oblong, basally obtuse, ca. 1.3 mm. Style branches recurved. Achenes cylindric, ca. 2 mm, glabrous, papillate. Pappus white, 2–3 mm. Fl. Apr–Sep.  $2n = 48^*$ .

• Montane meadows, rocky cliffs; 1200–2200 m. Fujian (Chong'an), Jiangxi.

In the protologue of *Sinosenecio wuyiensis*, the achenes were incorrectly described as sparsely puberulent.

**18. *Sinosenecio saxatilis*** Y. L. Chen, Acta Phytotax. Sin. 33: 76. 1995.

岩生蒲儿根 *yan sheng pu er gen*

Herbs, scapigerous or subscapigerous. Rhizomes short, slender, clad in persistent black-brown petiole bases. Stems solitary, erect, 3–12 cm, simple, glabrous or subglabrous. Radical leaves several, rosulate, long petiolate; petiole slender, densely yellow lanate, basally slightly expanded, pilose at upper part; blade abaxially purplish, adaxially green, reniform or suborbicular,  $0.5-1 \times 1-1.5$  cm, subleathery, both surfaces glabrous or sometimes white tomentose abaxially and later glabrescent, inconspicuously palmately 5-veined, base cordate or rarely subtruncate, margin reflexed when dry, palmately regularly 5(–7)-lobed; lobes ovate-triangular, apex acute, mucronulate. Stem leaves 1–3, lower leaves similar to radical leaves but smaller, shortly petiolate, 3–5-lobed; uppermost ones sessile, oblanceolate or spatulate, or sometimes bract-shaped, linear, 2–3 mm. Capitula solitary, sometimes 2, 10–15 mm in diam. Involucres broadly campanulate, ca.  $5 \times 7-8$  mm, not calyculate; phyllaries 11–13, oblong-lanceolate, ca. 1 mm wide, herbaceous, ob-

scurely 3-veined, glabrous, margin narrowly scarious, apically acute or rather acute. Ray florets 11–13; corolla tube ca. 2 mm; lamina yellow, oblong, 5–6 × ca. 1.5 mm, 5-veined, apically 3-denticulate. Disk florets many; corolla yellow, 3–3.5 mm, with ca. 1 mm tube and campanulate limb; lobes ovate-lanceolate, apically acute. Anthers oblong, basally obtuse. Style branches recurved. Achenes cylindric, ca. 1 mm, glabrous, papillate. Pappus white, ca. 2 mm. Fl. May–Jun, fr. Jun–Jul.  $2n = 48^*$ .

- Mountain summits, on rocks, among grasses; 1200–1700 m. Guangdong (Ruyuan), Hunan (Lanshan, Yizhang).

*Sinosenecio saxatilis* resembles *S. wuyiensis* in posture, plant size, achene morphology, and habitat preference, but it differs in its leaf blade reniform or suborbicular, regularly 5–7-palmatilobed, lobes ovate-triangular, sometimes abaxially white tomentose and later glabrescent. These two species, together with *S. guangxiensis*, *S. jiuhuashanicus*, and *S. latouchei*, all have smaller chromosomes and papillate achenes and most likely constitute a very natural group of species.

**19. *Sinosenecio hunanensis*** (Y. Ling) B. Nordenstam, Opera Bot. 44: 50. 1978.

湖南蒲儿根 hu nan pu er gen

*Senecio hunanensis* Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 5: 15. Jan 1937, not Handel-Mazzetti (Nov 1937).

Herbs, with leafy stems. Rhizomes 5–6 mm in diam., clad in remains of petiole bases, tomentose at collar. Stems solitary, erect, ca. 40 cm, simple, sparsely arachnoid, glabrescent to glabrous. Radical leaves few, rosulate, long petiolate; petiole 12–15 cm, sparsely arachnoid, basally expanded; blade reniform, ca. 4 × 5 cm, membranous, both surfaces thinly arachnoid but soon ± glabrous, palmately 5-veined, base cordate, margin palmately shallowly duplicate-lobed or duplicate-dentate into ca. 9 deltoid, apically callose-mucronulate, laterally dentate short lobes or coarse teeth. Stem leaves 3, smaller, with narrow lobes and teeth, shortly petiolate; petiole winged at base, wings shortly decurrent. Capitula 5 or 6 arranged in terminal subumbelliform corymb; peduncles ca. 2 cm, densely fulvous puberulent, with filiform bract. Involucre cupuliform, 6–8 mm in diam., not calyculate; phyllaries ca. 13, elliptic-oblong, 7–8 × ca. 2.5 mm, herbaceous, margin scarious, glabrous, apex acute and ciliate. Ray florets ca. 10; corolla tube ca. 3.5 mm, glabrous; lamina yellow, oblong-linear, ca. 13 × 2.5 mm, 4-veined, apically 3-denticulate. Disk florets many; corolla yellow, ca. 6 mm, with slender tube and funnellform limb; lobes lanceolate, apically acute. Anthers oblong, basally obtuse; appendages lanceolate. Style branches recurved. Achenes cylindric, ca. 1.5 mm, puberulent. Pappus white, ca. 4.5 mm. Fl. Mar.

- Forest margins on slopes. Hunan (Yizhang).

*Sinosenecio hunanensis* is currently known only from a single locality. The type specimen consists of one plant with the synflorescence missing. The species is similar to *S. euosmus* in leaf shape and texture but differs by the petioles of stem leaves winged at base, the wings shortly decurrent, and the achenes puberulent. Geographically, they are also disjunct. From *S. sungpanensis* it differs in the puberulent achenes and ± glabrous leaves. On the basis of geographical distribution and the puberulent achenes, this species seems more closely related to *S. latouchei* and *S. jiuhuashanicus*, but it is easily distinguished by the leaves not white tomentose and the petiole not auriculate at the base.

**20. *Sinosenecio euosmus*** (Handel-Mazzetti) B. Nordenstam, Opera Bot. 44: 50. 1978.

耳柄蒲儿根 er bing pu er gen

*Senecio euosmus* Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 148. 1925; *S. acerifolius* C. Winkler (1893), not K. Koch (1861), nor Hemsley (1881); *S. cortusifolius* Handel-Mazzetti; *S. doryotus* Handel-Mazzetti; *S. winklerianus* Handel-Mazzetti; *Sinosenecio cortusifolius* (Handel-Mazzetti) B. Nordenstam; *S. doryotus* (Handel-Mazzetti) B. Nordenstam; *S. winklerianus* (Handel-Mazzetti) B. Nordenstam.

Herbs, stoloniferous, with leafy stems. Rhizomes ascending or procumbent, slender. Stems solitary, erect, 20–75 cm or taller, ca. 6 mm in diam. at base, simple, ± villous or arachnoid-tomentose, especially in lower part, sometimes glabrescent in upper part. Radical leaves withered by anthesis; median stem leaves long petiolate; blade adaxially green, ovate, broadly ovate, or reniform, 2–5 × 3–8 cm, abaxially arachnoid-tomentose or villous on veins or rarely subglabrous, adaxially villous, sparsely arachnoid, shortly pubescent, or subglabrous, base shallowly cordate to subtruncate, margin shallowly to sometimes rather deeply palmately divided into 5–13 lobes or large teeth; lobes subdeltoid, shallowly crenate or shallowly to deeply mucronulate-dentate, apex rounded to acute. Upper leaves smaller. Uppermost leaves linear, bractlike. Petiole 1–2 × as long as blade, ± villous arachnoid or subglabrous, those of lower leaves not auriculate, slightly expanded at base, those of median and upper leaves usually gradually expanded into ovate or orbicular, entire or dentate subplexicaul auricles, rarely all leaves inconspicuously auriculate. Capitula 5–15 or more arranged in terminal subumbelliform corymbs or compound corymbs; peduncles 0.5–5.5 cm, slender, sparsely to densely ascending villous, sometimes with a linear basal bract, without or sometimes with a subulate bracteole. Involucre subcampanulate, 4–6 × 2.5–6.5 mm, not calyculate; phyllaries ca. 13, lanceolate or linear-lanceolate, ca. 1 mm wide, herbaceous, glabrous or subglabrous, margin membranous, apically acute, purplish and ciliate. Ray florets 10–13; corolla tube ca. 2 mm, glabrous; lamina yellow, oblong or linear-oblong, 3.5–4 × ca. 1.5 mm, 4-veined, apically 3-denticulate. Disk florets many; corolla yellow, ca. 4 mm, with ca. 2 mm tube and campanulate limb; lobes oblong, apically acute. Anthers ca. 1.5 mm, basally obtuse to rounded, appendages lanceolate. Style branches ca. 1 mm. Achenes cylindric, ca. 1.8 mm, smooth, glabrous. Pappus white, 5.5–6 mm. Fl. Jun–Aug, fr. Jul–Sep.  $2n = 48^*$ .

- Woods, grasslands, streamsides; 1800–4000 m. Gansu, Hubei, Shaanxi, Sichuan, Yunnan [Myanmar].

*Sinosenecio euosmus* is a rather widespread species, which shows great variation in the size and shape of leaf auricles, the indumentum along the stem, and the degree of division of leaves. Its close putative relatives include *S. fangianus*, *S. sungpanensis*, and perhaps also *S. oldhamianus*.

**21. *Sinosenecio sungpanensis*** (Handel-Mazzetti) B. Nordenstam, Opera Bot. 44: 51. 1978.

松潘蒲儿根 song pan pu er gen

*Senecio sungpanensis* Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 149. 1925.

Herbs, stoloniferous, with leafy stems. Rhizomes 6–8 mm in diam., clad in persistent brown petiole bases. Stems solitary, erect, 40–50 cm tall, 5–6 mm in diam. at base, simple, purplish below, at first sparsely white arachnoid-tomentose, glabrescent. Radical leaves withered by anthesis; lower stem leaves long petiolate; petiole 6–7 cm, somewhat white arachnoid, basally expanded; blade adaxially green, reniform, 3–3.5 × 4–4.5 cm, abaxially densely white tomentose, adaxially sparsely shortly pubescent to subglabrous, palmately divided into 5–7 lobes, or undivided, only denticulate; lobes broadly deltoid or ovate-deltoid, usually coarsely few denticulate and apiculate. Upper stem leaves similar, but shortly petiolate, smaller. Uppermost leaves lanceolate, margin denticulate or entire. Capitula 2–2.5 cm in diam., usually 4 or 5 arranged in terminal subumbelliform corymbs; peduncles 2–5 cm, sparsely arachnoid, basally bracteate and sometimes with a median subulate bracteole. Involucres broadly campanulate, ca. 10 × 7–12 mm, not calyculate; phyllaries 15–17, oblong-elliptic, 2–2.5 mm wide, herbaceous, sparsely villous, glabrescent, upper margin purplish red and ciliate, apically acute. Ray florets 12 or 13; corolla tube 4.5–5 mm, glabrous; lamina yellow, oblong, ca. 9 × 2 mm, apically 3-denticulate. Disk florets many; corolla yellow, 6.5–7 mm, with ca. 3.8 mm tube and campanulate limb; lobes lanceolate, ca. 1.5 mm, apically acute. Anthers ca. 1.5 mm, basally obtuse to rounded, appendages lanceolate. Style branches ca. 1 mm. Achenes cylindric, ca. 1.8 mm, glabrous, papillate. Pappus white, 5.5–6 mm. Fl. Jun–Jul, fr. Jul–Aug.  $2n = 48^*$ .

• Montane meadows, woods; 3300–4300 m. Sichuan (Hongyuan, Songpan).

*Sinosenecio sungpanensis* differs from *S. euosmus* in the leaf blade abaxially white tomentose, involucre larger, and petiole bases only expanded but never auriculate. It is very similar to *S. fangianus* in posture, the palmately lobed leaf blade abaxially white tomentose, the petioles basally expanded but never auriculate, and the achenes glabrous yet papillate. It differs from *S. fangianus* in the leaf blade shallowly 5–7-lobed or undivided, only denticulate, the lobes broadly deltoid or ovate-deltoid, and the phyllaries purplish on upper margin.

**22. *Sinosenecio fangianus*** Y. L. Chen, Acta Phytotax. Sin. 26: 52. 1988.

植夫蒲儿根 zhi fu pu er gen

Herbs, stoloniferous, with leafy stems. Rhizomes 4–5 mm in diam. Stems solitary, erect, 30–60 cm tall, simple, sparsely white pubescent. Radical leaves withered by anthesis, petiolate; blade adaxially green, reniform, 3–6 × ca. 6 cm, abaxially white arachnoid or pilose, ciliate on margin, adaxially glabrous or sparsely pilose, palmately 5-veined, base deeply cordate, 7–9-palmatilobed nearly to middle; lobes oblong, 1.5–2.5 × 1–2 cm, margin entire or sometimes 2- or 3-denticulate. Median and upper stem leaves similar to lower leaves, but smaller; petioles of lower leaves 3–7 cm, basally expanded, sparsely shortly pubescent. Uppermost leaves small, bractlike, 3–5-lobed or entire, shortly petiolate or sessile. Capitula radiate, usually 4 or 5 arranged in terminal corymb, rarely solitary, 2–2.5 cm in diam.; peduncles 1.5–2 cm, slender, sparsely shortly pubescent with 1

bract. Involucres campanulate, 4–5 × 5–7 mm, not calyculate; phyllaries ca. 15, lanceolate or broadly lanceolate, 1.5–2 mm wide, glabrous, 1–3-veined, margin white ciliate and narrowly scarious, apically acuminate. Ray florets ca. 13; corolla tube ca. 2 mm; lamina yellow, oblong or linear-oblong, 8–10 × 1–1.5 mm. Disk florets many, yellow, with 1.5–2 mm tube and campanulate limb; lobes ovate-lanceolate, apically puberulent. Anthers oblong, ca. 1.5 mm, basally obtuse. Style branches recurved. Achenes cylindric, ca. 1 mm, glabrous, papillate. Pappus white, ca. 3 mm. Fl. Jun–Jul, fr. Jul–Aug.

• Grassy slopes, forest margins, in bushes, canal sides in ravines; 2300–3200 m. Sichuan (Lixian, Maowen).

*Sinosenecio fangianus* differs from *S. sungpanensis* by the leaves 7–9-palmatilobed to the middle, the lobes oblong, and the phyllaries not purplish on upper margin.

**23. *Sinosenecio oldhamianus*** (Maximowicz) B. Nordenstam, Opera Bot. 44: 50. 1978.

蒲儿根 pu er gen

*Senecio oldhamianus* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 16: 219. 1871; *S. martini* Vaniot; *S. savatieri* Franchet; *Sinosenecio savatieri* (Franchet) B. Nordenstam.

Herbs, annual or biennial, rhizomatous, with leafy stems. Stems solitary or few, erect, 40–80 cm or taller, sparsely villous and arachnoid, glabrescent to subglabrous. Radical leaves withered by anthesis, long petiolate; lower stem leaf petioles 3–6 cm, white arachnoid, basally somewhat expanded; blade adaxially green, ovate-orbicular or suborbicular, 3–5(–8) × 3–6 cm, membranous, abaxially white arachnoid, sometimes ± glabrescent, adaxially sparsely arachnoid or subglabrous, palmately 5-veined, base cordate, margin shallowly to deeply duplicate-dentate or duplicate-serrate with mucronulate teeth, apex obtuse to acute, acuminate and mucronulate. Upper leaves shortly petiolate, smaller, with ovate or ovate-deltoid, basally cuneate blades; uppermost leaves ovate or ovate-lanceolate. Capitula numerous, arranged in compound terminal corymbs; peduncles 1.5–3 cm, slender, sparsely pubescent, usually with a basal linear bract. Involucres broadly campanulate, 3–4 × 2.5–4 mm, not calyculate; phyllaries ca. 13, oblong-lanceolate, ca. 1 mm wide, herbaceous, with membranous margins, white arachnoid or puberulent to glabrous, apically acuminate and sometimes purplish. Ray florets ca. 13; corolla tube 2–2.5 mm, glabrous; lamina yellow, oblong, 8–9 × 1–2 mm, 4-veined, apically 3-denticulate, obtuse. Disk florets numerous; corolla yellow, 3–3.5 mm, with 1.5–1.8 mm tube and campanulate limb; lobes ovate-oblong, ca. 1 mm, apically acute. Anthers oblong, 0.8–0.9 mm, basally obtuse, appendages ovate-oblong. Style branches recurved. Achenes cylindric, ca. 1.5 mm, smooth and glabrous in ray florets, puberulent and papillate in disk florets. Pappus absent in ray florets, in disk florets white, 3–3.5 mm. Fl. Jan–Dec.  $2n = 26^*$ .

Forest margins, streamsides, wet rocky and grassy places, margins of cultivated fields; 400–2100 m. Anhui, Chongqing, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shanxi, Sichuan, Yunnan, Zhejiang [Myanmar, Thailand, Vietnam].

*Sinosenecio oldhamianus* is a rather derived species in the genus with respect to floral morphology, chromosome number, and habit. Its achenes have differentiated into two types: those in ray florets larger in size, glabrous, and epappose, and those in disk florets smaller, puberulent, and pappose. Its chromosome number is  $2n = 26$ , the lowest in the genus. It is the only annual or biennial species of *Sinosenecio* and is the commonest and most widespread one to exhibit weedy tendencies.

**24. *Sinosenecio globiger*** (C. C. Chang) B. Nordenstam, *Opera Bot.* 44: 50. 1978 [*"globigerus"*].

匍枝蒲儿根 pu zhi pu er gen

Herbs, long stoloniferous or not stoloniferous, with leafy stems. Rhizomes 6–10 mm in diam., clad in persistent petiole bases; stolons slender, distally leafy or remotely leafy at nodes. Stems 1(–3), erect, 30–80 cm tall, to 6 mm in diam. at base, not branched below synflorescence, sparsely arachnoid, fulvous villous, or glandular. Radical leaves several, rosulate, long petiolate; petiole 6–15 cm, sparsely to densely villous or glandular with long hairs, rarely subglabrous, basally expanded; blade abaxially pale green, adaxially green, ovate-cordate, broadly ovate, or reniform, 2.5–21 × 3–22 cm, papery, abaxially sparsely pubescent or glabrous, adaxially sparsely fulvous puberulent, palmately veined, base deeply to shallowly cordate, margin palmately 3–5-lobed; lobes broadly deltoid, mucronulate, apex obtuse-acuminate-mucronulate. Stem leaves usually 3–5, similar to radical ones, progressively smaller upward and shorter petiolate. Capitula 2–3 cm in diam., (2–)5–15 arranged in terminal and axillary subumbelliform corymbs; peduncles 2–13 cm, not bracteate, slightly dilated at apex, sparsely fulvous villous, puberulent, or glandular pilose, rarely subglabrous. Involucres obconic-campanulate, 6–7 × 3–8 mm, not calyculate; phyllaries ca. 13, oblong, 1.5–2 mm wide, fulvous villous, glandular villous, pilose, or glabrescent, obscurely 3-veined, apically obtuse to rather acute, ciliate in upper part. Ray florets 13, uniseriate; corolla tube 2–2.5 mm, glabrous; lamina yellow, oblong or oblong-elliptic, 10–11 × 3–4 mm, 4-veined, apically 3-denticulate, obtuse. Disk florets many; corolla yellow, ca. 4 mm, with 1.5–1.8 mm tube and campanulate limb; lobes oblong-lanceolate, ca. 1 mm. Anthers oblong, 1.5–2 mm, basally obtuse; appendages ovate-lanceolate. Style branches recurved. Achenes cylindrical, ca. 2 mm, smooth, glabrous. Pappus absent. Fl. Apr–Jun, fr. May–Jul.  $2n = 48^*$ ,  $72^*$ .

• Wet shaded places, streamsides, woods, roadsides, forest margins; 500–2100 m. Chongqing, Guizhou, W Hubei, Hunan, Jiangxi, E Sichuan, N Yunnan.

*Sinosenecio globiger* resembles *S. phalacrocarpus* but differs by the stolons (if present), abaxial surface of leaves, and phyllaries not arachnoid-tomentose and the achenes glabrous.

- 1a. Involucres 5–8 mm in diam.; indumentum of peduncles and phyllaries not glandular; stolons present and long, or absent, if present then usually not leafy in basal and middle parts, but densely leafy in upper part ..... 24a. var. *globiger*
- 1b. Involucres 3–5 mm in diam.; indumentum of peduncles and phyllaries glandular; stolons present but shorter, remotely leafy at nodes ..... 24b. var. *adenophyllus*

**24a. *Sinosenecio globiger* var. *globiger***

匍枝蒲儿根(原变种) pu zhi pu er gen (yuan bian zhong)

*Senecio globiger* C. C. Chang, *Sunyatsenia* 6: 21. 1941 [*"globigerus"*]; *Sinosenecio guizhouensis* C. Jeffrey & Y. L. Chen.

Stolons present and long, or absent, if present then usually not leafy in basal and middle parts, but densely leafy in upper part. Involucres 5–8 mm in diam. Indumentum of peduncles and phyllaries not glandular. Fl. Apr–Jun, fr. May–Jul.  $2n = 48^*$ ,  $72^*$ .

• Wet shaded places, streamsides, woods; 500–2000 m. Chongqing, Guizhou, W Hubei, Hunan, Jiangxi, E Sichuan, N Yunnan.

Two types of plants have been observed within *Sinosenecio globiger* var. *globiger*, one with stolons and the other without. The two types have almost the same geographical distribution, but, so far, both types were found to co-occur only in one site of SW Hubei. They seem to have differentiated to some extent in habitat preference, flowering time, and also in some morphological characters. The stoloniferous type has long stolons and a simple synflorescence, flowers in May and June, and grows in woods, whereas the estoloniferous type has a branched synflorescence, flowers in April, and usually grows along streamsides. At this site, only one individual was found to be a possible hybrid between the two types. Further studies are needed to determine if the two types are worthy of formal taxonomic recognition.

**24b. *Sinosenecio globiger* var. *adenophyllus*** C. Jeffrey & Y. L. Chen, *Kew Bull.* 39: 240. 1984.

腺苞蒲儿根 xian bao pu er gen

Stolons present, shorter, remotely leafy at nodes. Involucres smaller, 3–5 mm in diam. Peduncles and phyllaries glandular. Fl. May–Jun, fr. Jun–Jul.  $2n = 48^*$ ,  $72^*$ .

• Streamsides, roadsides, forest margins; ca. 2100 m. Chongqing (Nanchuan), Guizhou (Zheng'an).

Morphologically, *Sinosenecio globiger* var. *adenophyllus* can be readily distinguished from the typical variety and may be recognized as an independent species of its own.

**25. *Sinosenecio leiboensis*** C. Jeffrey & Y. L. Chen, *Kew Bull.* 39: 242. 1984.

雷波蒲儿根 lei bo pu er gen

Herbs, shortly stoloniferous, with leafy stems. Rhizome elongated, ca. 4 mm in diam. Stems solitary, erect, ca. 60 cm tall, ascending and 5–6 mm in diam. at base, villous, with brownish hairs. Radical and lower stem leaves withered by anthesis; median stem leaves 3 or 4; petiole 7–9 cm, basally somewhat expanded, villous, with fulvous multicellular hairs; blade broadly ovate or reniform, 4–5 × 5.5–7.5 cm, papery, abaxially sparsely pilose mainly on veins, adaxially sparsely pilose, palmately 5-veined, base deeply cordate, palmately 5–7-lobed, apex obtuse, mucronulate; lobes broadly triangular, teeth callose-mucronulate, laterally callose-unidenticulate. Upper stem leaves shorter petiolate, smaller. Uppermost leaves shortly petiolate, lanceolate. Capitula 5–9 in terminal corymbs; peduncles 0.5–1 cm, puberulent, basally bracteate. Involucres obconic-campanulate, hemispheric when flattened, 5–6 × 5–6 mm, not calyculate; phyllaries 13–15, green, oblong-elliptic, 5–

6 × 2–2.5 mm, herbaceous, abaxially purplish red puberulent, white fimbriate on upper margins and apex, margin scarious, apically acute. Ray florets 13; corolla tube ca. 2 mm, glabrous; lamina yellow, oblong, 9–10 × 2.5–3 mm, 4-veined, apically 3-denticulate, obtuse. Disk florets many; corolla yellow, ca. 3 mm, with ca. 1.8 mm tube and campanulate limb; lobes lanceolate, ca. 1.5 mm, apically acute. Anthers oblong, basally obtuse, ca. 1.5 mm, appendages lanceolate. Ovary cylindrical, ca. 1 mm, smooth, glabrous; style branches recurved. Pappus absent. Fl. May–Jun, fr. Jun–Jul.  $2n = 48^*$ .

- Valley thickets, wet places; ca. 2000 m. SW Sichuan (Leibo).

*Sinosenecio leiboensis* is very similar to *S. globiger* in posture, leaf shape, and the epappose achenes. From the latter, it differs only in the phyllaries purplish puberulent abaxially and in the presence of short stolons.

**26. *Sinosenecio palmatisectus*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 242. 1984.

鄂西蒲儿根 e xi pu er gen

Herbs, with leafy stems. Rhizomes ca. 8 mm in diam. Stems solitary, erect, to 55 cm, 5–6 mm in diam. at base, simple, sparsely pubescent when young, glabrescent. Radical leaves few, long petiolate; petiole 6–16.5 cm, ± glabrous, rather dilated at base; blade abaxially pale green, adaxially green, reniform, 5–15 × 5.5–18 cm, submembranous, both surfaces at first sparsely pubescent or glabrous, palmately yellowish green 5–7-veined, base broadly cordate or subtruncate, palmately 7–9-lobed to middle; lobes oblong-lanceolate, laterally 2- or 3-dentate or lobulate with callose-mucronulate teeth or lobules, apically acute or acuminate, mucronulate. Stem leaves usually 2–4, lower leaves similar to radical ones, upward smaller, shortly petiolate; uppermost leaves ovate-lanceolate, base cuneate, margin 5–7-dentate or lobulate, apex acute or acuminate. Capitula 2.5–3 cm in diam., 3 or 4(–7), arranged in terminal or axillary subumbelliform corymbs; peduncles 3–5.5 cm, stout, expanded at apex, sparsely fulvous villous, not bracteate. Involucres obconic-campanulate, 7–8 × 6–8 mm; phyllaries 13, oblong-lanceolate, ca. 2 mm wide, 3–5-veined, sparsely fulvous villous, apex rather acute or obtuse, white ciliate. Ray florets ca. 11; corolla tube 2–2.5 mm, glabrous; lamina yellow, oblong-elliptic, ca. 11 × 3–4 mm, 4-veined, apically 3-denticulate, obtuse. Disk florets many; corolla yellow, ca. 3 mm, with ca. 1.5 mm tube and campanulate limb; lobes ovate-lanceolate, apically acute. Anthers oblong, ca. 1.5 mm, basally obtuse, appendages ovate-oblong. Ovary cylindrical, 1.3–1.5 mm, smooth, glabrous; style branches recurved. Pappus absent. Fl. Apr, fr. May–Jun.  $2n = 48^*$ .

- Wet places on slopes, woods; ca. 1400 m. W Hubei (Hefeng).

*Sinosenecio palmatisectus* is very similar to *S. albonervius* in the leaves palmately divided but differs by the leaf blade at first sparsely pubescent adaxially, later glabrescent, 7–9-palmatilobed to the middle, the lobes oblong-lanceolate, and the veins yellowish green adaxially.

**27. *Sinosenecio phalacrocarpus*** (Hance) B. Nordenstam, Opera Bot. 44: 50. 1978.

秃果蒲儿根 tu guo pu er gen

*Senecio phalacrocarpus* Hance, J. Bot. 19: 151. 1881.

Herbs, rhizomatous, with leafy stems; upper parts arachnoid-tomentose. Stems solitary, erect, ca. 30 cm or taller, robust, hollow, 5–6 mm in diam. at base, not branched below synflorescence. Radical leaves long petiolate, withered by anthesis; median stem leaf petiole 5–7 cm, basally slightly expanded, thinly arachnoid; blade adaxially green, reniform, ca. 6 × 8–9 cm, abaxially thinly arachnoid-tomentose, adaxially sparsely pubescent, palmately 5-veined, margin irregularly sublobed or coarsely dentate, with apically mucronulate deltoid teeth. Upper leaves smaller, shallowly cordate, shortly petiolate. Capitula 5 to many, arranged in terminal and axillary subumbelliform corymbs, ca. 2.5 cm in diam.; peduncles 0.5–2.5 cm, distally slightly dilated, basally not bracteate, sparsely arachnoid-tomentose, glabrescent, not bracteolate. Involucres hemispheric when flattened, ciliate; phyllaries ca. 10, green, lanceolate, herbaceous, sparsely arachnoid or glabrescent, 3-veined, margin scarious, apically ciliate, acute or acuminate. Ray florets ca. 13; corolla tube 2–2.5 mm, glabrous; lamina yellow, oblong, ca. 13 × 3 mm, 4-veined, apically 3-denticulate. Disk florets many; corolla yellow, ca. 4.5 mm, with 1.5–1.7 mm tube and campanulate limb; lobes lanceolate, apically acute. Anthers ca. 1.5 mm, basally obtuse, appendages lanceolate. Style branches ca. 0.8 mm. Achenes cylindrical, ca. 1.5 mm, sparsely minutely glandular puberulent. Pappus absent. Fl. Jun.

- Sides of rocks, forest margins. Guangdong (Bei Jiang).

*Sinosenecio phalacrocarpus* is very likely related to *S. globiger* but differs by the leaf blade abaxially arachnoid-tomentose and the achenes glandular puberulent.

**28. *Sinosenecio phalacrocarpoides*** (C. C. Chang) B. Nordenstam, Opera Bot. 44: 50. 1978.

假光果蒲儿根 jia guang guo pu er gen

*Senecio phalacrocarpoides* C. C. Chang, Acta Phytotax. Sin. 1: 313. 1951.

Herbs, dwarf, with leafy stems. Rhizomes 3–4 mm in diam., clad in persistent brown petiole bases. Stems solitary, to 10 cm tall, branching from near base, sparsely arachnoid, glabrescent. Radical leaves several, long petiolate; petiole 5–8 cm, rather stout, basally slightly expanded, glabrous; blade abaxially pale green, adaxially dark green, subreniform or suborbicular, 3–4 × 3.5–4 cm, glabrous, basally 3-veined, base shallowly cordate or subtruncate, margin palmately shortly duplicate-lobed or coarsely duplicate-dentate, with apically mucronulate deltoid teeth or lobes. Stem leaves 4 or 5, shorter petiolate, smaller. Uppermost leaves ovate-deltoid, lobed or denticulate. Capitula small, rather numerous, arranged in contracted terminal compound corymbs; peduncles campanulate, very short, 2–3 mm, sparsely arachnoid or glabrous, not bracteate. Involucres campanulate, 2–3 mm in diam., not calyculate; phyllaries 8 or 9, subbiserial, linear, ca. 0.5 mm, herbaceous, glabrous, margin broadly scarious, denticulate in upper part, apex acuminate. Ray florets ca. 6; corolla tube ca. 1.5 mm; lamina yellow, ovate-oblong, ca. 1.5 × 0.5–0.6 mm, inconspicuously 4-veined, margin repand, apically rounded. Disk florets ca. 9; corolla yellow, ca. 2.5 mm, with ca. 1.3 mm tube and campanulate limb; lobes

ovate-oblong, apically acute. Anthers ca. 1 mm, basally obtuse, appendages ovate-oblong. Style branches ca. 0.5 mm. Achenes cylindrical, 1–1.3 mm, smooth, glabrous. Pappus absent. Fl. Mar.

- Mixed forests; ca. 2700 m. W Yunnan (Yongde).

*Sinosenecio phalacrocarpoides* is distinct in its very small capitula, many arranged in contracted corymbs, very short peduncles, and duplicate-dentate leaves. From the absence of the pappus, this species may be somewhat related to *S. globiger* and its allies.

**29. *Sinosenecio jishouensis*** D. G. Zhang, Y. Liu & Q. E. Yang, Bot. Stud. 49: 287. 2008.

吉首蒲儿根 *ji shou pu er gen*

Herbs, rhizomatous, with leafy stems, without stolons. Stems solitary or several, erect, to 40 cm tall, simple, pubescent. Basal leaves long petiolate; petiole 4–16 cm, sparsely pubescent, basally expanded; blade elliptic-lanceolate, 4–14 × 2–5 cm, papery or thinly so, both surfaces sparsely pubescent, pinnately veined, lateral veins 6–10, base broadly cuneate, margin irregularly sinuate-dentate, apex acute or acuminate. Stem leaves similar but smaller, with shorter petioles. Capitula 5 to many in terminal corymbs; peduncles 1–2 cm, pubescent, apically dilated. Involucres campanulate, 5–7 × 6–8 mm; phyllaries ca. 13, oblong-lanceolate, 6–7 × 1.5–2 mm, herbaceous, pubescent, apically acute to subacute. Ray florets ca. 13; corolla tube ca. 2 mm, glabrous; lamina yellow, oblong-elliptic, 8–10 × 3–4 mm, 4-veined, apically 3-denticulate. Disk florets numerous; corolla ca. 4 mm, with ca. 2 mm tube and campanulate limb; lobes ovate-lanceolate. Anthers ca. 1.5 mm, basally obtuse, appendages ovate-oblong. Style branches ca. 1 mm. Achenes cylindrical, ca. 1.5 mm, smooth, glabrous. Pappus absent. Fl. Mar–Apr, fr. May.  $2n = 48^*$ ,  $96^*$ .

- Wet soil on limestone, along streams, below waterfalls; ca. 300 m. NW Hunan (Jishou).

*Sinosenecio jishouensis* is readily distinguishable by the pinnately veined leaves and epappose achenes. This species is related to *S. globiger* and its allies in habit and floral structure.

**30. *Sinosenecio albonervius*** Y. Liu & Q. E. Yang, Bot. Stud. 52: 359. 2011.

白脉蒲儿根 *bai mai pu er gen*

Herbs, rhizomatous, with leafy stems; stolons absent. Rhizomes ca. 6 mm in diam. Stems solitary or several, erect, 24–45 cm tall, simple, pubescent or glabrous. Radical leaves long petiolate; petiole 8–20 cm, pubescent or sometimes glabrescent, base expanded, not auriculate; blade abaxially pale green, adaxially matte green, reniform to orbicular-reniform in outline, 3–13 × 4–13 cm, submembranous, abaxially pubescent with spreading hairs or sometimes glabrescent, adaxially pubescent, palmately white veined, base shallowly to deeply cordate, shallowly palmately 7–9-lobed to 1/4–1/3, apex acute to obtuse; lobes deltoid, margin remotely denticulate. Upper stem leaves smaller, with shorter petioles. Capitula many in apical compound corymbs; peduncles 1–3 cm, distally expanded, sparsely fulvous villous. Involucres campanulate, 7–8 × 8–9 mm, ecalyculate; phyllaries 12 or 13, green, oblong-lanceolate, ca. 7 × 2 mm, herbaceous, sparsely fulvous villous or sometimes glabres-

cent, apex fimbriate-ciliate and acuminate or acute. Ray florets 9–13; corolla tube 2–3 mm, glabrous; lamina yellow, oblong-elliptic, ca. 10 × 3 mm, 4-veined, apically 3-denticulate. Disk florets many; corolla ca. 4 mm, tube ca. 3 mm, limb campanulate; lobes ovate-lanceolate. Anthers ca. 1.7 mm, base obtuse, appendages ovate-oblong. Style branches ca. 0.6 mm, apex truncate. Achenes cylindrical, ca. 2 mm, smooth, glabrous. Pappus absent. Fl. Apr, fr. May–Jun.  $2n = 48^*$ .

- Shaded places along streamsides; 800–1200 m. Hubei (Wufeng), Hunan (Shimen).

*Sinosenecio albonervius* resembles *S. palmatisectus* but differs in the leaf blade adaxially spreading pubescent, 7–9-palmatilobed to 1/4–1/3, the lobes deltoid in outline, and the veins white adaxially.

**31. *Sinosenecio baojingensis*** Y. Liu & Q. E. Yang, Bot. Stud. 50: 107. 2009.

保靖蒲儿根 *bao jing pu er gen*

Herbs, rhizomatous, with leafy stems, without stolons. Stems solitary, erect, 75–150 cm tall, simple, villous or lanate. Basal leaves petiolate; petiole 14–28 cm, sparsely lanate, basally expanded, not auriculate; blade adaxially green, ovate-cordate, 12–20 × 10–18 cm, abaxially pale green or whitish lanate, adaxially sparsely villous, palmately veined, base cordate, margin denticulate, apically acute. Upper stem leaves similar but smaller, with shorter petioles. Capitula numerous in terminal compound corymbs; peduncles 1.5–4 cm, sparsely villous. Involucres campanulate, 6–7 × 6–9 mm; phyllaries ca. 13, oblong-lanceolate, 6–7 × 1.5–2 mm, herbaceous, puberulent, apically acute. Ray florets ca. 13; corolla tube ca. 3 mm, glabrous; lamina yellow, oblong-elliptic, ca. 8 × 3–4 mm, 4–7-veined, apically 3-denticulate. Disk florets numerous; corolla ca. 5 mm, with ca. 3 mm tube and campanulate limb; lobes ovate-lanceolate. Anthers ca. 1.5 mm, basally obtuse, appendages ovate-oblong. Style branches ca. 1 mm. Achenes cylindrical, ca. 1.5 mm, smooth, glabrous. Pappus white, ca. 3 mm. Fl. Mar–Apr, fr. May.  $2n = 48^*$ .

- Open hillsides, in grass beside rice fields; ca. 300 m. NW Hunan (Baojing).

*Sinosenecio baojingensis* is similar to *S. denticulatus* in the leafy stem, tall stature, and smooth, pappose achenes, but it differs by its leaf blade ovate-cordate with margin denticulate and petioles not auriculate. It is the tallest species known in the genus, up to 150 cm.

**32. *Sinosenecio hupingshanensis*** Y. Liu & Q. E. Yang, Bot. Stud. 51: 387. 2010.

壶瓶山蒲儿根 *hu ping shan pu er gen*

Herbs, rhizomatous, with leafy stems; stolons absent. Rhizomes ca. 10 mm in diam. Stems solitary, erect, 16–60 cm tall, simple, pubescent. Radical leaves long petiolate; petiole 5–20 cm, pubescent, base expanded, not auriculate; blade abaxially pale green, adaxially green, reniform to orbicular-reniform, 4.5–12 × 5–13 cm, abaxially sparsely villous or sometimes glabrescent, adaxially pubescent, palmately veined, base shallowly to deeply cordate, margin very indistinctly repand-dentate, apex obtuse to acute. Upper stem leaves smaller, with shorter petioles. Capitula many in apical compound corymbs; peduncles 1–4 cm, pubescent or sometimes sparsely to densely villous. In-

volucres campanulate, 7–10 × 6–7 mm, ecalyculate; phyllaries 10–14, green, oblong-lanceolate to oblong-oblancheolate, ca. 7 × 1.5 mm, herbaceous, pubescent, apex fimbriate-ciliate and acuminate or acute. Ray florets ca. 13; corolla tube ca. 3 mm, glabrous; lamina yellow, oblong-elliptic, 10–14 × 2.5–4 mm, 6- or 7-veined, apically 3-denticulate. Disk florets many; corolla ca. 5 mm, tube ca. 4 mm, limb campanulate; lobes ovate-lanceolate. Anthers ca. 1.5 mm, base obtuse, appendages ovate-oblong. Style branches ca. 0.8 mm, apex truncate. Achenes cylindrical, 1–1.5 mm, smooth, glabrous. Pappus white, ca. 3 mm. Fl. Apr–May, fr. May–Jun.  $2n = 48^*$ .

• Broad-leaved forest margins; 1000–1600 m. Hubei (Wufeng), Hunan (Shimen).

*Sinosenecio hupingshanensis* is similar to *S. baojingensis* and *S. denticulatus* in posture, the ray floret lamina 6- or 7-veined, and the achenes glabrous and pappose. From the former, it differs in the leaf blade reniform or orbicular-reniform, margin repand-dentate, smaller size, and much shorter stature; from the latter, it differs in the petioles expanded basally but never auriculate and the shorter stature.

**33. *Sinosenecio denticulatus*** J. Q. Liu, Acta Phytotax. Sin. 38: 192. 2000.

齿裂蒲儿根 chi lie pu er gen

Herbs, rhizomatous, with leafy stems. Stems solitary, erect, 35–140 cm tall, simple, sparsely puberulent below, glabrous in upper part. Radical leaves withered by anthesis, long petiolate; blade reniform, 4–14 × 6–17 cm, abaxially sparsely white pilose on veins, palmately 5–7-veined, base deeply cordate, margin subentire or 5–7-denticulate. Median and upper leaves similar to lower ones, but smaller, petioles basally auriculate; uppermost small and bractiform, lanceolate. Capitula 1–1.5 cm in diam., 8 to many, arranged in terminal subumbelliform corymbs; peduncles 2–3 cm, slender, sparsely puberulent or subglabrous, 1-bracteate. Involucres campanulate, 5–7 × 5–7 mm; phyllaries ca. 12, lanceolate or broadly lanceolate, 5–7 × 1–2 mm, glabrous, 1- or 2-veined, apically acuminate and ciliate. Ray florets 8–12; corolla tube ca. 2 mm; lamina yellow, oblong or linear-oblong, 7–9 × 1.5–2.5 mm, 4–7-veined, apically denticulate. Disk florets numerous; corolla yellow, 4–6 mm, with 2.5–3.5 mm tube and campanulate limb; lobes ovate-lanceolate, glabrous, apically acute. Anthers oblong, ca. 1.3 mm, basally obtuse. Style branches recurved. Achenes cylindrical, ca. 2 mm, smooth, glabrous. Pappus white, 3.5–4 mm. Fl. May–Jun, fr. Jun–Jul.  $2n = 48^*$ .

• Ravines, wet places; ca. 1500 m. Sichuan (Xuyong).

In the protologue of *Sinosenecio denticulatus*, the petioles were described as being exauriculate and the ray floret laminae as being 7-veined. However, the petioles are actually auriculate at the base, and the ray floret laminae are 4–7-veined.

**34. *Sinosenecio fanjingshanicus*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 248. 1984.

梵净蒲儿根 fan jing pu er gen

Herbs, subscapigerous. Rhizomes ca. 3 mm in diam., clad in persistent petiole bases. Stems solitary, erect, 5–30 cm tall, simple, densely white arachnoid-tomentose, ± glabrescent. Radical leaves several, rosulate, long petiolate; petiole 1.5–7 cm, densely to sparsely tomentose, basally slightly ex-

panded; blade adaxially whitish or pale green, suborbicular or pentagonal, 1–6 × 1–6 cm, abaxially densely white tomentose, adaxially sparsely white arachnoid and shortly pilose, obscurely palmately veined, base cordate, margin shallowly 5-lobed or angled or shallowly lobed with mucronulate teeth, apex rounded-obtuse. Stem leaves 1 or 2, small, shallowly lobed, shortly petiolate. Capitula 1.5–2 cm in diam., 2–10 or more, arranged in at first contracted terminal umbelliform corymbs; peduncles short, with a small basal leaflike bract and few small linear bracteoles. Involucres campanulate, 4–6 × ca. 6 mm, not calyculate; phyllaries 17, broadly lanceolate or lanceolate, 1.5–2 mm wide, herbaceous, inconspicuously 3-veined, apically acuminate or acute, marginally and apically reddish purple and ciliate. Ray florets ca. 13, uniseriate; corolla tube 0.5–1 mm, glabrous; lamina yellow, oblong, 3–4 mm, 4-veined, apically 3-denticulate, obtuse. Disk florets: corolla yellow, ca. 2.5 mm, with ca. 1 mm tube and campanulate limb; lobes lanceolate, 0.5–1 mm, acute. Anthers 1–1.5 mm, basally obtuse to rounded, appendages ovate-lanceolate. Ovary cylindrical, ca. 0.8 mm, smooth, glabrous; style branches 0.7–0.8 mm. Pappus white, shorter than corolla. Fl. May–Jun, fr. Jul.  $2n = 48^*$ .

• On rocks, roadsides, shaded places; 1400–2500 m. Chongqing (Wulong), Guizhou (Jiangkou, Songtao).

*Sinosenecio fanjingshanicus* is similar to *S. septilobus* in the leaf blade abaxially white tomentose but differs in the leaf blade adaxially whitish or pale green, hardly divided, repand, or irregularly shallowly lobed.

**35. *Sinosenecio septilobus*** (C. C. Chang) B. Nordenstam, Opera Bot. 44: 51. 1978.

七裂蒲儿根 qi lie pu er gen

*Senecio septilobus* C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 59. 1935.

Herbs, subscapigerous, with leafy stem. Rhizomes 3–5 mm in diam., clad in persistent petiole bases. Stems usually solitary, erect, 30–35 cm tall, 2.5–3 mm in diam. at base, simple, sparsely white arachnoid or subglabrous. Radical leaves several, rosulate, long petiolate; petiole 9–12 cm, sparsely villous, glabrescent, basally slightly expanded; blade adaxially green, orbicular, 3.5–5 × 4–8 cm, abaxially densely white tomentose, adaxially thinly adpressed arachnoid to rarely subglabrous, base deeply cordate, margin usually deeply palmately 7–9-lobed to middle, lobes deltoid, margin entire or inconspicuously dentate, apex obtuse to rounded, mucronulate. Stem leaves 1 or 2, smaller, palmately lobed, shortly petiolate. Capitula 1.5–2 cm in diam., 7–13 arranged in terminal ± subumbelliform corymbs; peduncles 1–3(–7) cm, slender, with a basal oblanceolate or leaflike or 3–7-lobed bract, with 1 or 2 linear bracts in upper part, sparsely pubescent. Involucres campanulate, subhemispheric when flattened, 5–6 × 4–5.5 mm, not calyculate; phyllaries ca. 13, ovate-oblong or lanceolate-oblong, rarely linear, 1.5–2.5 mm wide, herbaceous, sparsely arachnoid, margin broadly scarious, apically obtuse to subacute and ciliate. Ray florets ca. 13; corolla tube 2–2.5 mm; lamina yellow, oblong, 6–7 × 1.5–2 mm, 4-veined, apically 3-denticulate. Disk florets many; corolla yellow, ca. 4 mm, with ca. 2 mm tube and campanulate limb; lobes lanceolate, 1–1.5 mm, apically acute. An-

thers oblong, ca. 1.4 mm, appendages ovate-lanceolate. Style branches recurved, ca. 0.7 mm. Achenes cylindrical, ca. 1.5 mm, smooth, glabrous. Pappus white, ca. 3 mm. Fl. May–Jul, fr. Jun–Jul.  $2n = 48^*$ .

• Thickets, on rocks, in bushes, roadsides; 400–2300 m. Chongqing (Nanchuan), Guizhou (Daozhen).

*Sinosenecio septilobus* is easily distinguished by its leaves 7–9-palmatilobed to the middle, green adaxially owing to the absence of white tomentum, and densely white tomentose abaxially.

**36. *Sinosenecio changii*** (B. Nordenstam) B. Nordenstam, *Compositae Newslett.* 49: 4. 2011.

莲座狗舌草 *lian zuo gou she cao*

*Tephrosieris changii* B. Nordenstam, *Opera Bot.* 44: 44. 1978; *Senecio rosulifer* C. C. Chang, *Bull. Fan Mem. Inst. Biol., Bot.* 6: 58. 1935 [*“rosuliferus”*], not H. Léveillé & Vaniot (1910).

Herbs, subscapigerous. Rhizomes ca. 10 mm in diam., clad in persistent brown petiole bases. Stems solitary, rarely 2 or 3, erect, scapiform, to 40 cm tall, simple, floccose-tomentose, fulvous pubescent especially in lower part. Radical leaves several, rosulate, present at anthesis; petiole 2.5–4 cm, rather broad, floccose-tomentose and fulvous hirtellous, basally expanded; blade ovate-oblong, 2.5–9 × 2–6 cm, papery, abaxially densely floccose-tomentose, adaxially thinly floccose-tomentose and densely addressed hirtellous, pinnately veined, lateral veins 10–14, veins prominent, base cordate, margin irregularly shallowly repand-dentate, teeth mucronulate, apex rounded, apiculate. Stem leaves usually 1, on lower part of stem, similar to basal ones but smaller. Capitula 1.8–2 cm in diam., 6–15, arranged in simple to compound subumbelliform terminal corymbs; peduncles 1–4.5 cm, densely arachnoid, usually bracteate at base, not bracteolate or with 1 or more linear bracteoles in upper part; bracts 5–10 mm, densely tomentose. Involucres broadly campanulate to hemispheric, ca. 5 × 5 mm, not calyculate; phyllaries ca. 13, linear-lanceolate, 4–5 × 1–1.5 mm, sparsely arachnoid, margin broadly scarious, apically acute or acuminate, purplish and puberulent. Ray florets ca. 18; corolla tube ca. 2.5 mm, glabrous; lamina yellow, oblong, ca. 9 × 2–2.9 mm, 4-veined, apically 3-denticulate, obtuse. Disk florets numerous; corolla yellow, ca. 4 mm, with 1.5–2 mm tube and campanulate limb; lobes ovate-lanceolate, ca. 1 mm, apically acute, papillose. Anthers ca. 1.3 mm, basally obtuse, appendages lanceolate. Style branches recurved, 0.6–0.7 mm. Achenes cylindrical, ca. 1.5 mm, smooth, glabrous. Pappus white, ca. 3 mm. Fl. May–Jul, fr. Jun–Aug.  $2n = 48^*$ .

• Roadsides, forest margins; 1800–2700 m. Chongqing (Nanchuan).

*Sinosenecio changii* was recently provisionally transferred from *Tephrosieris* to *Sinosenecio* on the basis of molecular and morphological evidence. The pinnately veined leaves and numerous ray florets are somewhat unusual in the genus, and the systematic position of this taxon will be further investigated.

**37. *Sinosenecio bodinieri*** (Vaniot) B. Nordenstam, *Opera Bot.* 44: 49. 1978.

黔西蒲儿根 *qian xi pu er gen*

*Senecio bodinieri* Vaniot, *Bull. Acad. Int. Géogr. Bot.* 11: 348. 1902; *S. bodinieri* var. *brevior* Vaniot; *S. bodinieri* var. *parcepilosus* Vaniot; *S. palmatilobus* Kitamura; *Sinosenecio brevior* B. Nordenstam; *S. palmatilobus* (Kitamura) C. Jeffrey & Y. L. Chen.

Herbs, scapigerous. Rhizomes 5–10 mm in diam., clad in persistent brown petiole bases. Stems solitary, rarely 2, erect, scapiform, 10–40 cm tall, villous with brown hairs, especially in lower part, usually with 1 ovate or spatulate bractlike leaf in upper part. Leaves several, radical, rosulate; petiole 3.5–10 cm, densely villous with long reddish brown hairs; blade abaxially pale green, adaxially lustrous, green or deep green, broadly ovate or broadly elliptic, 3–7 × 2.5–5 cm, subleathery, abaxially sparsely addressed pilose on veins or glabrous, adaxially sparsely or densely villous, long ciliate with purplish brown hairs on margins, palmately 5–7-veined, base truncate or rounded, margin lobed with ovate-deltoid or deltoid mucronulate teeth. Capitula 1.5–2 cm in diam., 1–7, rarely 9, arranged in terminal corymbs, at first rather dense, becoming lax; peduncles 1–6 cm, slender, pubescent or subglabrous, with basal bract and several bracteoles; bracts and bracteoles linear or linear-spatulate, 5–10 mm. Involucres campanulate, 5–7 × 5–7 mm, not calyculate; phyllaries ca. 13, lanceolate or broadly lanceolate, 6–7 × 1–1.5 mm, herbaceous, inconspicuously 3-veined, puberulent, margin broadly scarious, apically acuminate or obtuse, ciliate at apex and on upper margin. Ray florets ca. 13, 9–13 mm; corolla tube 2.5–3 mm, glabrous; lamina yellow, oblong, 8–9 × 1.5–2 mm, 4-veined, apically 3-denticulate. Disk florets many; corolla yellow, ca. 4.5 mm with ca. 2 mm tube and campanulate limb; lobes ovate-lanceolate, ca. 1.5 mm, apically acute. Anthers oblong, ca. 1.5 mm, base obtuse to rounded, appendages lanceolate. Style branches recurved, ca. 0.8 mm. Achenes cylindrical, ca. 1.8 mm, smooth, glabrous. Pappus white, 4–4.5 mm. Fl. Mar–Apr, fr. May.  $2n = 48^*$ .

• Riverbanks, waterfalls, rocky cliffs; 900–1000 m. Guizhou (Huangguoshu, Xingyi).

*Sinosenecio bodinieri* is very similar to *S. confervifer*, so much so that they may be treated as being conspecific. The former differs mainly by the leaf blade broadly ovate or broadly elliptic, base truncate or rounded, and margin long ciliate.

**38. *Sinosenecio confervifer*** (H. Léveillé) Y. Liu & Q. E. Yang, **comb. nov.**

西南蒲儿根 *xi nan pu er gen*

Basionym: *Senecio confervifer* H. Léveillé, *Fl. Kouy-Tchéou*, 105. 1914–1915 [*“conferviferus”*]; p. 104: *“conferviferus”*]; *S. bodinieri* Vaniot var. *elatior* Vaniot; *S. bodinieri* var. *elatissimus* Handel-Mazzetti; *Sinosenecio elatior* (Vaniot) B. Nordenstam; *S. elatissimus* (Handel-Mazzetti) B. Nordenstam.

Herbs, scapigerous. Rhizomes 5–10 mm in diam., clad in persistent brown petiole bases. Stems solitary, sometimes 2–5, erect, scapiform, 10–65 cm tall, villous with brown hairs, especially in lower part, fulvous tomentose near apex, with 1 or 2 shortly petiolate bractlike leaves in upper part. Leaves several, radical, rosulate; petiole 2–20 cm, densely villous with long reddish brown hairs; blade abaxially pale green or purplish,

adaxially lustrous, green or deep green, orbicular or suborbicular, 1.5–6 × 2–6 cm, subleathery, abaxially sparsely villous or pubescent on veins, somewhat shortly ciliate with purplish brown hairs on margins, adaxially densely or sparsely villous or glabrous, palmately 5–7-veined, base cordate or subtruncate, margin repand or lobed, with rounded or broadly deltoid mucronulate or obscurely mucronulate shallow teeth or lobes. Capitula 1.5–2 cm in diam., 1–7(–10 or more), arranged in terminal corymbs, at first rather dense, becoming lax; peduncles 1–6 cm, slender, pubescent or subglabrous, with basal bract and 2 or 3 bracteoles; bracts and bracteoles linear or linear-spatulate, 5–10 mm. Involucre campanulate, 5–7 × 5–7 mm, not calyculate; phyllaries ca. 13, lanceolate or broadly lanceolate, 6–7 × 1–1.5 mm, herbaceous, inconspicuously 3-veined, puberulent, margin broadly scarious, apically acuminate or obtuse, ciliate at apex and on upper margin. Ray florets ca. 13, 9–13 mm; corolla tube 2.5–3 mm, glabrous; lamina yellow, oblong, 8–9 × 1.5–2 mm, 4-veined, apically 3-denticulate. Disk florets many; corolla yellow, ca. 4.5 mm with ca. 2 mm tube and campanulate; lobes ovate-lanceolate, ca. 1.5 mm, apically acute. Anthers oblong, ca. 1.5 mm, base obtuse to rounded, appendages lanceolate. Style branches recurved, ca. 0.8 mm. Achenes cylindrical, ca. 1.8 mm, smooth, glabrous. Pappus white, 4–4.5 mm. Fl. Apr–Jun, fr. May–Jul.  $2n = 48^*$ .

• Hillsides, streamsides, woods, shaded places; 500–2200 m. Chongqing, Guizhou, W Hunan, SE Sichuan, NE Yunnan.

*Sinosenecio confervifer* is very similar to *S. bodinieri*, distinguishable only by its leaf blade orbicular or suborbicular, base cordate or subtruncate, and margin shortly ciliate.

**39. *Sinosenecio trinervius*** (C. C. Chang) B. Nordenstam, Opera Bot. 44: 51. 1978.

三脉蒲儿根 san mai pu er gen

*Senecio trinervius* C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 60. 1935.

Herbs, scapigerous. Rhizomes 3–5 mm in diam., clad in persistent petiole bases. Stems solitary, erect, purplish, scapiform, 18–26 cm tall, slender, glabrous or sparsely puberulent. Leaves several, radical, rosulate, long petiolate; petiole 7–12 cm, slender, sparsely puberulent or subglabrous, basally slightly expanded; blade abaxially pale green, adaxially green, ovate-oblong or elliptic, 2.9–7.5 × 1.3–3 cm, membranous, both surfaces sparsely puberulent, brown ciliate on margin, basally 3-veined, base cuneate, margin coarsely mucronulate-dentate with 4–6 large deltoid teeth on each side, apex obtuse-acuminate, mucronulate. Capitula ca. 1.7 cm in diam., 4–8 in terminal corymbs or compound-corymbs; peduncles to 3 cm, slender, linear-bracteolate at base. Phyllaries 12 or 13, ovate-lanceolate or lanceolate, 4–4.5 × 0.3–1.3 mm, herbaceous, margin broadly scarious, apically acute, puberulent. Ray florets ca. 13, 10–11 mm; corolla tube ca. 3 mm, glabrous; lamina yellow, oblong, 6–8 × 2–2.5 mm, 4-veined, apically 3-denticulate and obtuse. Disk florets: corolla yellow, ca. 4.5 mm, with 2–2.5 mm tube and campanulate limb; lobes ovate, 1–1.5 mm, basally obtuse to rounded, appendages ovate-oblong. Ovary cylindrical, ca. 1 mm, glabrous; style branches recurved, ca. 0.8 mm. Pappus white, 3.5–4 mm. Fl. May, fr. Jun.

• W Guizhou (Xingyi).

*Sinosenecio trinervius* is somewhat similar to *S. bodinieri* and *S. confervifer*, particularly in the scapigerous habit, but it is readily distinguishable by the leaves basally 3-veined. It is currently only known from the type locality. The record of its occurrence in S and NW Yunnan most likely resulted from misidentifications.

**40. *Sinosenecio nanchuanicus*** Z. Y. Liu, Y. Liu & Q. E. Yang, Bot. Stud. 52: 105. 2011.

南川蒲儿根 nan chuan pu er gen

Herbs, scapigerous; stolons absent. Rhizomes 3–4 mm in diam. Stems solitary, erect, purple, scapiform, 10–12 cm tall, simple, glabrescent, with several small spatulate, leaflike bracts in upper part. Leaves several, radical, long petiolate; petiole 1–4 cm, pubescent, base expanded, not auriculate; blade abaxially purple, adaxially dark green, orbicular or suborbicular in outline, 0.8–1.7 × 0.8–2 cm, subleathery, nitid, abaxially sparsely pubescent or glabrescent on midvein, adaxially pubescent, palmately veined, veins impressed adaxially, base shallowly cordate, shallowly regularly 5–7-lobed with broadly deltoid or rounded, entire, apiculate lobules, margin ciliate, apex acute. Capitula solitary, terminal; peduncles sparsely pubescent or glabrescent in upper part. Involucre campanulate, ca. 7 × 9 mm, ecalyculate; phyllaries 13, green at base, purple in upper part, oblong-lanceolate, ca. 6 × 1.5 mm, herbaceous, sparsely pubescent, apex fimbriate-ciliate and acuminate or acute. Ray florets 14 or 15; corolla tube ca. 1.5 mm, glabrous; lamina yellow, oblong-elliptic, ca. 9 × 1.5 mm, 4-veined, apically 3-denticulate. Disk florets many; corolla ca. 4 mm, tube ca. 3 mm, limb campanulate; lobes ovate-lanceolate. Anthers ca. 1.5 mm, base obtuse, appendages ovate-oblong. Style branches ca. 0.5 mm, apex truncate. Achenes cylindrical, ca. 1 mm, smooth, glabrous. Pappus white, ca. 2.5 mm. Fl. May–Jun, fr. Jun.  $2n = 144^*$ .

• Streamsides, rocky cliffs under waterfalls; 1200–1700 m. Chongqing (Nanchuan).

*Sinosenecio nanchuanicus* resembles *S. confervifer* in posture and leaf shape but is distinguished by the leaf blade smaller, adaxially dark green, the veins impressed adaxially, and the capitula strictly solitary.

**41. *Sinosenecio qii*** S. W. Liu & T. N. Ho in Y. R. Lin et al., Int. Symp. *Artemisia* Allies, 185. 2005.

承经蒲儿根 cheng jing pu er gen

Herbs, scapigerous. Rhizomes short. Stems solitary, scapiform, erect, slender, ca. 32 cm tall, densely white tomentose at base, glabrous in middle and upper parts. Leaves 3, radical, long petiolate; petiole ca. 3 cm, densely arachnoid-pubescent; blade orbicular, 5–7 × 5–7 cm, thinly papery, abaxially sparsely pale arachnoid-pubescent, adaxially sparsely pubescent, palmately 7–9-veined, base cordate, margin subentire, ciliate. Capitula many in corymbs; peduncles 2–3 cm, 1-bracteate at middle. Involucre campanulate, 3–5 × 3–4 mm, ecalyculate; phyllaries 10–13, lanceolate, ca. 4 × 1.5 mm, apex acute, glabrous. Ray florets yellow; corolla tube ca. 2 mm; lamina lanceolate, 5–6 × ca. 2 mm, apex acute. Disk florets many; corolla ca. 3 mm, limb campanulate or cupular. Achenes cylindrical, ca. 2.5 mm, ribbed, glabrous. Pappus absent. Fl. Jun, fr. Jul.

- Woods, S Hunan (Jianghua).

*Sinosenecio qii* is imperfectly known. It was described from a single locality in S Hunan. The type material includes only one fruiting

plant without any florets. The species may be somewhat related to *S. globiger*, but it differs by the absence of stem leaves. More material is needed to confirm this character and to increase the list of differences between the species and its putative relatives.

**104. TEPHROSERIS (Reichenbach) Reichenbach, Deut. Bot. Herb.-Buch (Nom.), 87. 1841.**

狗舌草属 *gou she cao shu*

Chen Yilin (陈艺林 Chen Yi-ling); Bertil Nordenstam, Charles Jeffrey

*Cineraria* sect. *Tephroseris* Reichenbach, Fl. Germ. Excurs. 241. 1831.

Herbs, erect, perennial, rarely stoloniferous, rhizomatous, or rarely biennial or annual, with fibrous roots. Stems leafy, sometimes subscapiform, often arachnoid-tomentose at least when young. Leaves simple, petiolate or sessile, both radical and on stem. Radical leaves rosulate, persistent at or withered by anthesis; petiole winged or not winged, basally not auriculate; blade broadly ovate or deltoid to linear-spatulate, pinnately veined, base cordate to attenuate, margin coarsely sinuate-serrate or dentate to subentire. Capitula usually few to rather numerous, arranged in terminal, subumbelliform, simple or compound, corymbose cymes, rarely solitary, heterogamous and radiate, sometimes also homogamous and discoid, pedunculate. Involucres hemispheric, campanulate, or cylindrical-campanulate, not calyculate, receptacle flat; phyllaries 18–25, rarely 13, uniseriate, linear-lanceolate or lanceolate, herbaceous, margin usually narrowly scarious or membranous. Ray florets 7–15, commonly 13, rarely 18 or 20–25; lamina yellow, orange, or purplish red, oblong, rarely linear or elliptic-oblong, 4-veined, apically usually 3-denticulate. Disk florets many, corolla yellow, orange, or orange-red, sometimes purple tinged; limb funnelform or rarely campanulate; lobes 5. Anthers linear-oblong, rarely oblong, base usually obtuse to rounded; antheropodium narrowly cylindrical to cylindrical, somewhat broader than filament, cells uniform, endothelial cell wall thickenings numerous, polar and radial. Style branches convex or less often truncate, with short, often few, obtuse marginal papillae. Achenes cylindrical, ribbed, glabrous or sparsely to strongly pubescent. Pappus capillary-like, uniform, white or rarely rubescent, persistent, present in all florets.

About 50 species: temperate and arctic regions of Asia and Europe, and extending into North America; 14 species (four endemic) in China.

*Tephroseris* first appeared in the literature as the epithet of the name of a taxon of *Cineraria* Linnaeus of infrageneric, supraspecific rank (conventionally treated as sectional), validly published by Reichenbach in 1831: *C. sect. Tephroseris* Reichenbach (Fl. Germ. Excurs. 241. 1831). This taxon was later raised to generic rank by Reichenbach in 1841 as *Tephroseris* (Reichenbach) Reichenbach (Deut. Bot. Herb.-Buch (Nom.), 87. 1841). There, Reichenbach accepted three infrageneric, supraspecific taxa (conventionally treated as sections) within his genus, one of which was “3. *Pericallis* DeC.” [sic]. This refers to Candolle (Prodr. 6: 340. 1838), who treated “*Pericallis* D. Don” in synonymy under *Senecio* but treated the species of that affinity (loc. cit.: 409) under *S. “Ser. IX. Canarienses”* [a nomen nudum] “§ [i.e., unranked]. 1. *Pericallides*” and nowhere there cited Don. However, within that taxon (loc. cit.: 410), Candolle included *S. tussilaginis* (L’Héritier) Lindley, the type (by monotypy, as *P. tussilaginis* (L’Héritier) D. Don) of the generic name *Pericallis* D. Don (in Swartz, Brit. Fl. Gard. 6: 228. 1838). Reichenbach, in citing “3. *Pericallis* DeC.” under *Tephroseris*, effectively transferred *S.* [unranked] *Pericallides* Candolle to *Tephroseris*, as *T. sect. Pericallides* (Candolle) Reichenbach, and thereby implicitly included the type of *Pericallis* D. Don (1838) within *Tephroseris* (Reichenbach) Reichenbach (1841). The latter was therefore nomenclaturally superfluous when published (*Vienna Code*, Art. 52.1), but not illegitimate because it has a basionym (Art. 52.3). The following year, Reichenbach accepted *Tephroseris* (Reichenbach) Reichenbach in his *Deutsche Bot. Fl. Sax.* (146. 1842), and there (as in the present treatment) the generic name was correct because *Pericallis* was not included.

- 1a. Plants biennial or annual; pappus hairs conspicuously elongating at fruiting; ray lamina pale yellow ..... 14. *T. palustris*
- 1b. Plants perennial; pappus hairs not conspicuously elongating at fruiting; ray lamina yellow, orange, or purplish red.
  - 2a. Plants with long flagelliform stolons arising from base ..... 1. *T. stolonifera*
  - 2b. Plants without stolons.
    - 3a. Achenes pubescent at least in part.
      - 4a. Ray lamina yellow, 6–11 mm.
        - 5a. Stem leaves and peduncles densely arachnoid and fulvous pubescent; radical leaves ovate or ovate-oblong, basally cordate or truncate; petioles not winged; achenes sparsely pubescent ..... 11. *T. phaeantha*
        - 5b. Stem leaves and peduncles usually densely arachnoid-tomentose; radical leaves oblong or obovate-oblong, basally cuneate to attenuate; petioles winged; achenes densely hirsute ..... 12. *T. kirilowii*
      - 4b. Ray lamina orange to purplish red, 15–20 mm.
        - 6a. Radical leaves present at anthesis; phyllaries 20–22; ray lamina oblong ..... 10. *T. rufa*
        - 6b. Radical leaves withered by anthesis; phyllaries ca. 25; ray lamina linear ..... 13. *T. flammaea*
    - 3b. Achenes glabrous.
      - 7a. Ray lamina orange or dark purplish red; involucre dark purple or fuscous-purple.
        - 8a. Stem 10–20 cm tall, densely glandular villous and multicellular hairy; ray lamina orange with purple streaks, ca. 15 mm; pappus white, ca. 5.5 mm ..... 9. *T. turczaninovii*

- 8b. Stem to 60 cm tall, floccose-tomentose; ray lamina orange to dark purplish red, ca. 20 mm; pappus rubescent, 3.5–4 mm ..... 10. *T. rufa*
- 7b. Ray lamina yellow; involucre green.
- 9a. Involucre 7–9 mm; stem floccose-tomentose or arachnoid-tomentose, or rarely glabrescent.
- 10a. Phyllaries densely fulvous glandular pubescent; ray lamina ca. 17 mm ..... 8. *T. adenolepis*
- 10b. Phyllaries 20–22, sparsely arachnoid or puberulent.
- 11a. Stem and leaves arachnoid; involucre 10–14 mm in diam.; ray florets 20–25, lamina 7–8 mm ..... 6. *T. pierottii*
- 11b. Stem and leaves puberulent or subglabrous; involucre 6–8 mm in diam.; ray florets 13–15, lamina ca. 12 mm ..... 7. *T. taitoensis*
- 9b. Involucre 4–6 mm; stem sparsely arachnoid or ± glabrous.
- 12a. Phyllaries 20–25, lanceolate, sparsely puberulent; ray lamina ca. 10 mm; stem leaves basally auriculate and subamplexicaul ..... 4. *T. pseudosonchus*
- 12b. Phyllaries 13–20, glabrous or hairy; ray lamina less than 8 mm; leaves basally not auriculate.
- 13a. Leaf blades cordate-hastate; phyllaries 13; ray florets 7 ..... 5. *T. koreana*
- 13b. Leaf blades spatulate to ovate, not cordate; phyllaries 15–20; ray florets 13–20.
- 14a. Phyllaries 18–20, glabrous; ray lamina 6–7 mm; leaves spatulate, linear-spatulate, or oblanceolate, margin entire or subentire ..... 2. *T. subdentata*
- 14b. Phyllaries 15 or 16, arachnoid; ray lamina 5–6 mm; leaves ovate, apically obtuse to rounded, margin sparsely denticulate ..... 3. *T. praticola*

**1. *Tephroseris stolonifera*** (Cufodontis) Holub, Folia Geobot. Phytotax. 8: 174. 1973.

蒲枝狗舌草 pu zhi gou she cao

*Senecio stolonifer* Cufodontis, Repert. Spec. Nov. Regni Veg. Beih. 70: 100. 1933.

Herbs, stoloniferous, rhizomatous. Stolons slender, flagelliform, with elongated internodes and very small leaves. Stem solitary, erect, leafy, 30–60(–80) cm tall, floccose-tomentose, ± glabrescent. Radical leaves several, rosulate, petiolate, usually present at anthesis; petiole 1.5–12 cm, rather broad, floccose-tomentose, fulvous hirtellous; blade adaxially green, broadly ovate or ovate-spatulate, 5–8 × 3–5 cm, papery, abaxially arachnoid or floccose-tomentose, adaxially thinly arachnoid-tomentose and glabrescent, lateral veins 6, base broadly cuneate or subcordate and narrowly decurrent into petiole, margin subentire or remotely shallowly repand-dentate, apex obtuse to rounded, apiculate. Lower and median stem leaves similar but smaller, more shortly petiolate to subsessile, ovate to lanceolate, 3–6 × 0.5–1.5 cm. Upper leaves lanceolate to linear, sessile, bractlike. Capitula 2.5–3 cm in diam., 5–15 in terminal subumbelliform corymbs or compound corymbs; peduncles 1.5–3.5 cm, white arachnoid, fulvous puberulent, with a basal subulate bract, not bracteolate. Involucre broadly campanulate, 7–8 × 5–7 mm, not calyculate; phyllaries ca. 20, linear-lanceolate, 1–1.5 mm wide, herbaceous, with submembranous margin, ± glabrous, apex acuminate and sparsely puberulent. Ray florets 11–13, corolla tube ca. 5 mm; lamina oblong, ca. 9 × 2–2.5 mm, 4-veined, apically 3-denticulate, obtuse. Disk florets numerous; corolla yellow, ca. 7 mm, with 4–5 mm tube and funnelliform limb; lobes ovate-lanceolate, ca. 1 mm, apically acute, papillose. Anthers ca. 1.7 mm, basally obtuse to rounded, appendages ovate-lanceolate. Style branches ca. 0.5 mm. Achenes cylindrical, 2.5–3 mm, glabrous. Pappus white, ca. 7 mm. Fl. Apr–Jun.

• Wet places, streamsides; 1400–2800 m. SW Sichuan, NW Yunnan.

**2. *Tephroseris subdentata*** (Bunge) Holub, Folia Geobot. Phytotax. 8: 174. 1973.

尖齿狗舌草 jian chi gou she cao

*Cineraria subdentata* Bunge, Enum. Pl. China Bor. 39. 1833; *C. pratensis* Hoppe ex Reichenbach var. *borealis* Herder; *Crepis chanetii* H. Léveillé; *Senecio campestris* (Retzius) Candolle var. *subdentatus* (Bunge) Maximowicz; *S. imaii* Nakai; *S. linaresensis* Soldano; *S. pratensis* (Hoppe ex Reichenbach) Candolle var. *polycephalus* Regel; *S. pseudosonchus* Vaniot var. *borealis* (Herder) S. Y. Hu; *S. pseudosonchus* var. *polycephalus* (Regel) Kitamura; *S. subdentatus* (Bunge) Turczaninow (1837), not Ledebour (1833); *S. subdentatus* var. *borealis* (Herder) Cufodontis; *S. subdentatus* var. *polycephalus* (Regel) Cufodontis; *Tephroseris polycephala* (Regel) Barkalov.

Herbs, rhizomatous. Stem solitary, erect, leafy, 20–60 cm tall, at first sparsely arachnoid, ± glabrescent. Radical leaves several, rosulate, usually present at anthesis, long petiolate; petiole 2–13 cm, narrowly winged, sparsely arachnoid, glabrescent, basally expanded; leaf blade spatulate, linear-spatulate, or oblanceolate, 6–15(–22) × 1–2 cm, papery, both surfaces sparsely arachnoid and glabrescent, pinnately veined, base gradually narrowed into petiole, margin entire, subentire, or irregularly mucronulate-dentate, apex obtuse to subacute. Lower stem leaves similar to radical leaves. Median leaves sessile, lanceolate to linear, 4–9 × 0.5–1 cm, smaller upward, margin entire or few toothed, apex acute or acute-acuminate. Upper leaves linear or linear-subulate, bractlike. Capitula 1.5–2 cm in diam., 7–30, arranged in terminal subumbelliform corymbs or compound corymbs; peduncles 1.5–3 cm, sparsely arachnoid and fulvous puberulent, basally bracteate; bracts linear-subulate, 7–8 mm, apically acuminate. Involucre campanulate, 4.5–5 × 4–5 mm, not calyculate; phyllaries 18–20, lanceolate or linear-lanceolate,

0.5–1 mm wide, herbaceous, with narrow membranous margin, glabrous, apex acuminate or long acuminate and green or somewhat purplish. Ray florets 13–15, corolla tube ca. 4 mm, glabrous; lamina yellow, oblong, 6–7 × 1.5–2 mm, 4-veined, apically 3-denticulate, obtuse. Disk florets many; corolla yellow, 6–7 mm with ca. 3.5 mm tube and funnelform limb; lobes oblong-lanceolate, ca. 1 mm, apically acute, papillose. Anthers ca. 1.5 mm, basally obtuse, appendages ovate-lanceolate. Style branches ca. 0.7 mm. Achenes cylindrical, ca. 2 mm, glabrous. Pappus white, 6–9 mm. Fl. Jun–Jul.

Wet meadows, damp places. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Qinghai [Korea, Russia (Far East, E Siberia)].

Probatova and Barkalov (in Kozhevnikov & Probatova, Fl. Ross. Dal'nego Vostoka, 253. 2006) elevated *Senecio pratensis* var. *polycephalus* to the rank of species, i.e., *Tephrosieris polycephala*, which is doubtfully specifically distinct.

**3. *Tephrosieris praticola*** (Schischkin & Sergievskaya) Holub, Folia Geobot. Phytotax. 8: 174. 1973.

草原狗舌草 cao yuan gou she cao

*Senecio praticola* Schischkin & Sergievskaya, Sist. Zametki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kuybysheva 1949(1–2): 28. 1949; *S. asiaticus* Schischkin & Sergievskaya; *S. campestris* (Retzius) Candolle var. *glabratus* Candolle; *S. glabellus* Candolle (1838), not Poiret (1806); *S. integrifolius* (Linnaeus) Clairville var. *glabratus* (Candolle) Cufodontis; *S. subdentatus* Ledebour var. *glabellus* Cufodontis.

Herbs, rhizomatous. Stem solitary, erect, 20–40 cm tall, simple, green or purplish at base, glabrous or sparsely arachnoid. Radical leaves present at anthesis; petiole 3.5–4 cm, not winged or inconspicuously narrowly winged; blade ovate, 2–4.5 × 1–2 cm, both surfaces inconspicuously arachnoid or subglabrous, base narrowed into petiole, margin sparsely denticulate or subentire, apex obtuse to rounded. Lower stem leaves similar to basal leaves. Median stem leaves sessile, usually lanceolate, 3–4 × 0.3–0.5 cm, base subamplexicaul, margin entire or denticulate, apex rather acute or obtuse. Upper leaves smaller, linear, apex acuminate or acute. Capitula 2–12, arranged in terminal corymb; peduncles 1.5–2 cm, not bracteate, white arachnoid. Involucres hemispheric-campanulate, 5–8 × 5–7(–10) mm; phyllaries 15 or 16, herbaceous, linear-lanceolate, sparsely arachnoid or rarely subglabrous, apically acuminate. Ray florets 12–20, corolla yellow, tube 3–4 mm; lamina 5–6 × 1.5–2 mm, apically 3-denticulate. Disk florets numerous; corolla yellow, ca. 7 mm, with ca. 4 mm tube and funnelform limb; lobes lanceolate, ca. 1 mm. Anthers linear-oblong, basally obtuse. Style branches ca. 1 mm. Achenes cylindrical, 2–2.5 mm, glabrous. Pappus white, ca. 7 mm. Fl. Jun–Jul.

Meadows; 3000–3200 m. N Xinjiang (Altay) [Russia (Siberia)].

**4. *Tephrosieris pseudosonchus*** (Vaniot) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 272. 1984.

黔狗舌草 qian gou she cao

*Senecio pseudosonchus* Vaniot, Bull. Acad. Int. Géogr. Bot. 11: 349. 1902.

Herbs, rhizomatous. Stem solitary, erect, 50–70 cm tall, rather stout, simple, sparsely arachnoid when young, glabrescent. Radical leaves usually present at anthesis, several, rosulate, long petiolate; petiole 3–17 cm, winged, glabrescent, basally expanded; blade ovate-elliptic to oblanceolate, 6–15 × 2.5–4 cm, papery, both surfaces at first sparsely arachnoid, glabrescent, pinnately veined, lateral veins 10–12, base cuneately narrowed into petiole, margin repand with mucronulate teeth, apex obtuse to rarely acute. Lower stem leaves similar to radical leaves. Median leaves sessile, oblong or oblong-lanceolate, 6–15 × 1–3 cm, smaller upward, base auriculate and amplexicaul, apex obtuse to acute. Upper leaves linear-lanceolate, bractlike. Capitula 2.5–3 cm in diam., 6–12 arranged in simple or compound subumbelliform terminal corymbs; peduncles 1.5–4.5 cm, sparsely pubescent, basally bracteate, not bracteolate, or with a linear-subulate bract in upper part, slightly dilated at apex. Involucres broadly campanulate or hemispheric, 5–6 × 6–7 mm, not calyculate; phyllaries 20–25, lanceolate, ca. 1.5 mm wide, herbaceous, with membranous margin, sparsely pubescent or glabrous, apically acuminate. Ray florets 13–15, corolla tube ca. 4 mm, glabrous; lamina yellow, oblong, ca. 10 × 2.5–3 mm, 4-veined, apically obtuse, 3-denticulate. Disk florets many; corolla yellow, 7–7.5 mm, with 3.8–4 mm tube and campanulate limb; lobes ovate-triangular, ca. 1.2 mm, apically papillose. Anthers linear-oblong, ca. 2 mm, basally obtuse, appendages ovate-lanceolate; style branches ca. 0.5 mm. Achenes cylindrical, 2–2.5 mm, glabrous. Pappus white, 7–7.5 mm. Fl. Apr–May.

• Stream-sides, wet meadows; 300–400 m. Guizhou, Hubei, Hunan, Shaanxi, Shanxi.

**5. *Tephrosieris koreana*** (Komarov) B. Nordenstam & Pelser, Compositae Newslett. 49: 5. 2011.

朝鲜蒲公英 chao xian pu er gen

*Senecio koreanus* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 18: 421. 1901; *Sinosenecio koreanus* (Komarov) B. Nordenstam.

Herbs, with leafy stems. Rhizomes 10–15 mm in diam., clad in persistent brown petiole bases. Stem solitary, erect, green or purplish, 30–60 cm tall, 3–4 mm in diam. at base, simple, sparsely arachnoid or pubescent, glabrescent. Radical leaves mostly withered by anthesis, long petiolate; petiole 5–17 cm, slender, sparsely arachnoid or subglabrous, not winged, basally slightly expanded; blade abaxially pale green, adaxially green, deltoid or deltoid-cordate, 4–7 × 2.5–4 cm, abaxially sparsely arachnoid-tomentose, adaxially sparsely pubescent, base broadly cordate, margin coarsely dentate with deltoid mucronulate teeth, apex acute-acuminate. Lower and median stem leaf petioles 8–13 cm, slightly winged, basally subamplexicaul; blades similar in shape and size to basal leaves, 3–8 × 3–6 cm, base cordate or hastate. Upper stem leaves shortly petiolate; blades gradually smaller upward, deltoid-lanceolate to lanceolate, base cuneate. Capitula rather numerous, in terminal corymbs; peduncles 2–3.4 cm, slender, with or without a basal linear bract, usually not bracteolate, glandular puberulent or subglabrous. Involucres campanulate, ca. 5 × 4–6 mm, not calyculate; phyllaries ca. 13, uniseriate, oblong or oblong-linear,

herbaceous, sparsely puberulent, margin scarious, apically acute to obtuse or shortly acuminate, and white ciliate. Ray florets ca. 7; corolla tube ca. 2.5 cm, glabrous; lamina oblong, ca. 8 × 2.5–3 mm, 4-veined, apically 3-denticulate, obtuse. Disk florets many; corolla yellow, 5.5–6 mm, with ca. 2.5 mm tube and campanulate limb; lobes oblong-lanceolate, ca. 1.5 mm, apically acute. Anthers oblong, ca. 1.7 mm, basally obtuse; appendages ovate-oblong. Style branches recurved. Achenes cylindrical, 2–2.5 mm, glabrous, ribbed. Pappus white, ca. 5 mm. Fl. Jun, fr. Aug.

Wet forests. Jilin (Changbai Shan), Liaoning [Korea].

Until recently, *Tephrosieris koreana* was treated in *Sinosenecio*, but it was transferred to *Tephrosieris* on the basis of molecular and other evidence (Nordenstam & Pelsner, *Compositae Newslett.* 49: 5. 2011).

However, one of us (Jeffrey) does not accept the transfer of *Sinosenecio koreanus* to *Tephrosieris*; i.e., phenetically, *S. koreanus* is *Sinosenecio*, not *Tephrosieris*, as shown by the combination of leaf shape and venation, low phyllary and ray floret numbers, short ray floret and disk floret corolla tubes, and campanulate disk floret corolla limbs.

**6. *Tephrosieris pierotii*** (Miquel) Holub, *Folia Geobot. Phytotax.* 8: 174. 1973.

浙江狗舌草 zhe jiang gou she cao

*Senecio pierotii* Miquel, *Ann. Mus. Bot. Lugduno-Batavi* 2: 182. 1866; *S. subdentatus* Ledebour var. *pierotii* (Miquel) Cufodontis.

Herbs, rhizomatous. Stem solitary, erect, 50–60 cm tall, rather stout, simple, arachnoid or ± glabrescent. Radical leaves usually present at anthesis, several, rosulate, long petiolate; petiole 4–10 cm, ± winged, at first arachnoid-tomentose, glabrescent, basally expanded; leaf blade oblong, narrowly oblong, or oblanceolate, 12–20 × 1.5–3 cm, papery, both surfaces at first arachnoid-tomentose, later ± glabrescent, pinnately veined, base cuneate or gradually narrowed into petiole, margin mucronulate-dentate or sometimes subentire, apex obtuse to subacute. Stem leaves rather numerous, sessile; lower leaves oblong to oblanceolate, base subamplexicaul; upper leaves gradually smaller upward, lanceolate to linear, base broadly subamplexicaul, apex acuminate; uppermost leaves bractlike, linear or linear-subulate, white arachnoid-tomentose, apex acute. Capitula 2.5–3 cm in diam., usually 6–30 arranged in subumbelliform or umbelliform corymbs; peduncles to 5 cm, sparsely arachnoid or pubescent, basally bracteate, not bracteolate; bracts linear-subulate. Involucres hemispheric, 7–8.5 × 10–14 mm, not calyculate; phyllaries 20–22, broadly lanceolate, ca. 1 mm wide, herbaceous, with membranous margin, sparsely arachnoid or glabrescent, apex acute-acuminate. Ray florets 20–25; corolla tube 4–6 mm; lamina yellow, 7–8 mm, oblong, 4-veined, apically obtuse, 3-denticulate. Disk florets many; corolla yellow, 7–9 mm, with 5–6 mm tube and funnelform limb; lobes ovate-oblong, 1–1.2 mm, apically acute, papillose. Anthers ca. 1.5 mm, basally obtuse. Style branches ca. 1 mm. Achenes cylindrical, 2.5–3 mm, glabrous. Pappus white, 7–9 mm. Fl. Apr–May.

Marshes, wet places; 300–500 m. Fujian, Heilongjiang, Jiangsu, Liaoning, Zhejiang [Japan, Korea].

**7. *Tephrosieris taitoensis*** (Hayata) Holub, *Folia Geobot. Phytotax.* 8: 174. 1973 [*“taitonensis”*].

台东狗舌草 tai dong gou she cao

*Senecio taitoensis* Hayata, *J. Coll. Sci. Imp. Univ. Tokyo* 30(1): 156. 1911; *S. pierotii* Miquel var. *taitoensis* (Hayata) Kitamura; *S. subdentatus* Ledebour var. *taitoensis* (Hayata) Cufodontis.

Herbs, rhizomatous. Stem solitary, erect, 30–60 cm tall, simple, sparsely arachnoid to subglabrous. Radical leaves few, usually present at anthesis, rosulate; petiole 3–6 cm, winged, basally expanded; blade ovate-oblong or broadly oblong, 9–15 × 4.5–6.5 cm, thinly papery, glabrous, base cuneate-attenuate into petiole, margin irregularly repand-dentate to subentire, apex obtuse to rounded, apiculate. Stem leaves few, progressively smaller upward; lower leaves shortly petiolate, oblong or oblanceolate-oblong, basally subamplexicaul; upper leaves sessile, ovate-lanceolate or lanceolate, margin few dentate or entire, apically obtuse to subacute; uppermost leaves small, bractlike. Capitula 2.5–3 cm in diam., 8–12 arranged in terminal subumbelliform simple or compound corymbs; peduncles 1.5–4 cm, slender, pubescent, basally bracteate, not bracteolate; bracts linear-subulate. Involucres campanulate, 6–7 × 6–8 mm, not calyculate; phyllaries 20–22, lanceolate or linear-lanceolate, 0.8–1 mm wide, herbaceous, with narrow membranous margin, glabrous, apex acuminate. Ray florets 13–15; corolla tube ca. 7 mm; lamina yellow, ca. 12 × 2.5 mm, 4-veined, apically 3-denticulate, obtuse. Disk florets: corolla yellow, 11–12 mm, with 8–8.5 mm tube and funnelform limb; lobes ovate-oblong, ca. 1 mm, apically acute, papillose. Anthers ca. 1.5 mm, basally obtuse, appendages ovate-lanceolate. Style branches ca. 0.5 mm. Achenes cylindrical, 2–2.5 mm, glabrous. Pappus white, 10–11 mm. Fl. Mar–Apr.

• Marshes. Taiwan.

**8. *Tephrosieris adenolepis*** C. Jeffrey & Y. L. Chen, *Kew Bull.* 39: 275. 1984.

腺苞狗舌草 xian bao gou she cao

Herbs, rhizomatous. Stem solitary, erect, 40–50 cm tall, simple, rather densely white arachnoid-tomentose, glandular pubescent. Radical leaves several, usually present at anthesis, rosulate, long petiolate; petiole 2–7 cm, narrowly winged, arachnoid-tomentose, basally expanded; blade obovate-lanceolate or elliptic-lanceolate, 6–12 × 1.5–3 cm, papery, both surfaces white arachnoid-tomentose, base cuneate or attenuate into petiole, margin subentire or obscurely mucronulate-dentate, apex obtuse to rounded, mucronulate. Stem leaves few, progressively smaller upward. Lower leaves petiolate, oblanceolate-oblong or spatulate, 12–15 × 1.5–2.5 cm, attenuate into a broadly winged, basally subamplexicaul petiole; upper leaves small, linear-lanceolate or linear. Capitula 3–3.5 cm in diam., 3–8 arranged in terminal umbelliform corymbs; peduncles 3–9 cm, rather stout, sparsely arachnoid, also brownish glandular hairy, with or without a small linear basal bract, not bracteolate. Involucres broadly campanulate, 8–9 × ca. 10 mm, not calyculate; phyllaries ca. 18, lanceolate, ca. 1.5 mm wide, herbaceous, with narrow membranous margin, densely glandular pu-

bescent with brownish hairs, apically acute-acuminate. Ray florets 13–15; corolla tube ca. 7 mm; lamina yellow, oblong, ca. 17 × 2.5 mm, 4-veined, apically 2- or 3-denticulate. Disk florets many; corolla yellow, ca. 8.5 mm, with ca. 5.5 mm tube and funnellform limb; lobes ovate-lanceolate, ca. 1 mm, apically acute, papillose. Anthers ca. 1.7 mm, basally obtuse, appendages ovate-lanceolate. Style branches ca. 0.8 mm. Achenes cylindric, ca. 3 mm, glabrous. Pappus white, 7–7.5 mm. Fl. Jul–Aug.

Stony mountain slopes. Not recorded from China but expected in Heilongjiang, Jilin, and adjacent mountains [Russia (Far East)].

Probatova and Barkalov (in Kozhevnikov & Probatova, Fl. Ross. Dal'nego Vostoka, 254. 2006) considered that this may be a synonym of *Tephroseris subscaposa* (Komarov) Czerepanov (Vasc. Pl. Russia, 108. 1995).

**9. *Tephroseris turczaninovii*** (Candolle) Holub, Folia Geobot. Phytotax. 8: 174. 1973.

天山狗舌草 tian shan gou she cao

*Senecio turczaninovii* Candolle, Prodr. 6: 360. 1838; *Cineraria frigida* Richardson var. *robusta* Herder; *S. integrifolius* (Linnaeus) Clairville var. *robustus* (Herder) Cufodontis; *S. nemorensis* Linnaeus var. *turczaninovii* (Candolle) Komarov; *S. sarracenicus* Linnaeus var. *turczaninovii* (Candolle) Nakai.

Herbs, rhizomatous. Stems solitary, rarely 2 or 3, erect, 10–20 cm tall, simple, at first arachnoid-tomentose, glabrescent, glandular villous with purplish hairs in upper part. Radical leaves several, present at or withered by anthesis, rosulate, long petiolate; petiole 2–8 cm, narrowly winged in upper part, sparsely arachnoid, glabrescent, basally expanded; blade oblong-ovate, 3–10 × 1–2 cm, papery, sparsely white arachnoid, base cuneate or attenuate into petiole, margin entire or sinuate-dentate, apex obtuse to rounded, apiculate. Median stem leaves sessile, oblong-lanceolate or lanceolate, 4–10 × 0.8–2 cm, base expanded and subamplexicaul, margin few dentate or subentire, apex obtuse. Upper leaves lanceolate or linear-lanceolate, base cordate and subamplexicaul. Capitula ca. 3 cm in diam., sometimes discoid, 2 or 3(–6) arranged in terminal corymbs; peduncles 0.5–2 cm, densely arachnoid-lanate, bracteate at base, not bracteolate. Involucres broadly campanulate, 8–12 × ca. 10 mm, not calyculate; phyllaries 18–20, dark purple, lanceolate or linear-lanceolate, 1–1.5 mm wide, herbaceous, densely glandular villous with dark purple hairs, apex acuminate. Ray florets ca. 15; corolla tube ca. 3.5 mm; lamina orange-yellow, oblong, ca. 15 × 3–3.5 mm, 4-veined, apically 3-denticulate, obtuse. Disk florets many; corolla deep yellow, ca. 6.5 mm, with ca. 3 mm tube and funnellform limb; lobes ovate-lanceolate, ca. 1 mm, apically acute, papillose. Anthers obtuse at base, appendages ovate-lanceolate. Style branches ca. 1 mm. Achenes cylindric, 2.5–3 mm, glabrous. Pappus white, ca. 5.5 mm. Fl. Jul–Aug. 2n = 90, 104.

Montane meadows; below 3000 m. N Xinjiang (Altay) [Mongolia, Russia (Siberia)].

**10. *Tephroseris rufa*** (Handel-Mazzetti) B. Nordenstam, Opera Bot. 44: 45. 1978.

橙舌狗舌草 cheng she gou she cao

Herbs, rhizomatous. Stem solitary, erect, green or purplish in lower part, 9–60 cm tall, white floccose-tomentose, often ± glabrescent. Radical leaves several, present at anthesis, rosulate, shortly petiolate; petiole 0.5–3 cm, broadly to narrowly winged, basally expanded; blade ovate, elliptic, or oblanceolate, 2–10 × 1.5–3 cm, papery, both surfaces at first sparsely arachnoid-tomentose, glabrescent, pinnately veined, base cuneate-attenuate into petiole, margin entire or remotely mucronulate-dentate, apex obtuse to rounded. Lower stem leaves oblong or oblong-spatulate; median leaves sessile, oblong or oblong-lanceolate, 3–6 × 0.5–1 cm, progressively smaller upward, base expanded and subamplexicaul, apex obtuse; upper leaves linear-lanceolate to linear, both surfaces sparsely arachnoid and glabrescent to subglabrous, and sparsely to densely pilose, apex acute. Capitula radiate, less often discoid, 2–20 arranged in dense to lax terminal subumbelliform corymbs; peduncles 1–4.5 cm, densely to sparsely white arachnoid-tomentose, and pilose, linear-bracteate at base, bracteolate or not. Involucres campanulate, 6–7 × 7–10 mm, not calyculate; phyllaries 20–22, wholly fulvous-purple or purple only at apex, lanceolate to linear-lanceolate, 1–1.5 mm, herbaceous, densely to sparsely arachnoid and fulvous pilose to glabrescent, apically acute-acuminate. Ray florets ca. 15, corolla tube ca. 5 mm; lamina yellow, 4-veined, 3-denticulate. Disk florets many; corolla orange to orange-red or yellow with orange lobes, 7–8 mm, with 3.5–4 mm tube and funnellform limb; lobes ovate-lanceolate, ca. 1.2 mm, apically acute, papillose. Anthers ca. 2.5 mm, basally obtuse, appendages ovate-lanceolate. Achenes cylindric, ca. 3 mm, glabrous or pubescent. Pappus somewhat rubescent, 3.5–4 mm. Fl. Jun–Aug.

• Montane meadows, slopes, roadsides; 2600–4000 m. Gansu, Hebei, Qinghai, Shaanxi, Shanxi, NW Sichuan, NE Xizang.

1a. Achenes glabrous ..... 10a. var. *rufa*  
1b. Achenes pubescent ..... 10b. var. *chaetocarpa*

**10a. *Tephroseris rufa* var. *rufa***

橙舌狗舌草(原变种) cheng she gou she cao (yuan bian zhong)

*Senecio rufus* Handel-Mazzetti, Acta Horti Gothob. 12: 291. 1938; *S. flammeus* Turczaninow ex Candolle var. *rufus* (Handel-Mazzetti) Z. Ying Zhang & Y. H. Guo.

Achenes glabrous.

• Montane meadows; 2600–4000 m. SW Gansu, Hebei, SE Qinghai, Shaanxi, NW Sichuan, NE Xizang.

**10b. *Tephroseris rufa* var. *chaetocarpa*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 279. 1984.

毛果橙舌狗舌草 mao guo cheng she gou she cao

*Tephroseris flammea* (Turczaninow ex Candolle) Holub var. *chaetocarpa* (C. Jeffrey & Y. L. Chen) Y. M. Yuan.

Achenes pubescent.

• Slopes, meadows, roadsides; 2800–3200 m. Gansu, Hebei, Qinghai, Shanxi.

**11. *Tephroseris phaeantha*** (Nakai) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 279. 1984.

长白狗舌草 chang bai gou she cao

*Senecio phaeanthus* Nakai, Bot. Mag. (Tokyo) 31: 110. 1917; *S. birubonensis* Kitamura; *S. fauriei* H. Léveillé (1910), not *S. fauriae* Franchet (1888); *S. integrifolius* (Linnaeus) Clairville subsp. *fauriei* Kitamura; *Tephroseris birubonensis* (Kitamura) B. Nordenstam.

Herbs, rhizomatous. Stem solitary, erect, subscapiform, 13–45 cm tall, simple, sparsely arachnoid and pubescent, ± glabrescent after anthesis. Radical leaves few to several, present at anthesis, rosulate; petiole 2–6(–8) cm, densely arachnoid and pubescent, not winged, basally slightly expanded; blade ovate-oblong or elliptic, 6–13 × 2–4 cm, papery, both surfaces arachnoid and fulvous pubescent, somewhat glabrescent, pinnately veined, lateral veins 10–14, obscure, margin irregularly sinuate-serrate or dentate with mucronulate teeth, apex rounded. Stem leaves few, progressively smaller upward; lower and median oblong, with winged petioles or sessile, lanceolate, sparsely arachnoid, glandular pubescent, margin subentire or mucronulate-serrate, apex obtuse to acute or acuminate. Capitula 1.8–2.5 cm in diam., 2–6(–8) arranged in terminal umbelliform corymbs; peduncles 1.5–4(–6) cm, sparsely arachnoid, densely glandular with fulvous hairs, basally bracteate, not bracteolate. Involucre campanulate, 7–8 × 7–9 mm, not calyculate; phyllaries 18–20, lanceolate, ca. 1 mm wide, herbaceous, purple and glandular ciliate at margin in upper part, sparsely arachnoid and fulvous puberulent to glabrescent, margin narrowly scarious, apically acute-acuminate. Ray florets ca. 13; corolla tube 2.5–3 mm; lamina yellow, oblong, ca. 11 × 2–2.5 mm, 4-veined, apically 3-denticulate. Disk florets many; corolla yellow, with fuscous-purplish lobes, ca. 6.5 mm, with 2.5–3 mm tube and funnelform limb; lobes ovate-lanceolate, ca. 1.2 mm, apically acute, papillose. Anthers ca. 2 mm, basally obtuse, appendages ovate-lanceolate. Style branches ca. 1 mm. Achenes cylindrical, 3–3.5 mm, sparsely pubescent to subglabrous. Pappus white, ca. 6 mm. Fl. Jul–Aug.

Rocky montane slopes; 2000–2500 m. Jilin (Changbai Shan) [Korea].

**12. *Tephroseris kirilowii*** (Turczaninow ex Candolle) Holub, Folia Geobot. Phytotax. 12: 429. 1977.

狗舌草 gou she cao

*Senecio kirilowii* Turczaninow ex Candolle, Prodr. 6: 361. 1838; *S. amurensis* Schischkin; *S. aurantiacus* (Hoppe ex Willdenow) Lessing var. *spathulatus* Miquel; *S. campestris* (Retzius) Candolle var. *tomentosus* Franchet; *S. integrifolius* (Linnaeus) Clairville subsp. *kirilowii* (Turczaninow ex Candolle) Kitagawa; *S. integrifolius* var. *spathulatus* (Miquel) H. Hara; ?*S. spathulifolius* Turczaninow; *S. tashiroi* Hayata; *Tephroseris integrifolia* (Linnaeus) Holub subsp. *kirilowii* (Turczaninow ex Candolle) B. Nordenstam.

Herbs, rhizomatous. Stems solitary or rarely 2 or 3, erect, subscapiform, 20–60 cm tall, densely white arachnoid, sometimes ± glabrescent. Radical leaves several, present at anthesis, rosulate, shortly petiolate; blade oblong or ovate-oblong, 5–10 × 1.5–2.5 cm, both surfaces densely to sparsely white arachnoid-tomentose, base cuneate to gradually attenuate into narrowly to broadly winged petiole, margin irregularly mucronulate-dentate or subentire, apex obtuse. Stem leaves few, pro-

gressively smaller upward; lower leaves sessile, oblanceolate or oblanceolate-oblong, 4–8 × 0.5–1.5 cm, base subamplexicaul, apex obtuse to acute; upper leaves small, bractlike, lanceolate, apically acute. Capitula 1.5–2 cm in diam., 3–11 arranged in ± umbelliform terminal corymbs; peduncles 1.5–5 cm, densely arachnoid-tomentose, ± glandular with fulvous hairs, basally bracteate, not bracteolate. Involucre subcylindric-campanulate, 6–8 × 6–9 mm, not calyculate; phyllaries 18–20, lanceolate or linear-lanceolate, 1–1.5 mm wide, herbaceous, with narrow membranous margin, densely to sometimes sparsely arachnoid, sometimes ± glabrescent, apically acuminate or acute, and green or purplish. Ray florets 13–15; corolla tube 3–3.5 mm; lamina yellow, oblong, 6.5–7 × 2.5–3 mm, 4-veined, apically 3-denticulate, obtuse. Disk florets many; corolla yellow, ca. 8 mm, with ca. 4 mm tube and funnelform limb; lobes ovate-lanceolate, ca. 1.2 mm, apically acute, papillose. Anthers ca. 2.2 mm, basally obtuse, appendages ovate-lanceolate. Style branches ca. 1 mm. Achenes cylindrical, ca. 2.5 mm, densely hirsute. Pappus white, ca. 6 mm. Fl. Feb–Aug.

Grassy and stony slopes and meadows; 200–2000 m. Anhui, Fujian, Gansu, Guangdong, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Zhejiang [Japan, Korea, Mongolia, Russia (Far East)].

Vibe (in Krasnoborov, Fl. Sibir. 13: 155–156. 1997) recorded *Tephroseris integrifolia* (Linnaeus) Holub for China; however, we have seen no specimens. *Tephroseris kirilowii* might prove not to be specifically distinct from *T. integrifolia*.

**13. *Tephroseris flammea*** (Turczaninow ex Candolle) Holub, Folia Geobot. Phytotax. 8: 173. 1973.

红轮狗舌草 hong lun gou she cao

*Senecio flammeus* Turczaninow ex Candolle, Prodr. 6: 362. 1838; *S. flammeus* var. *glabrifolius* Cufodontis; *S. flammeus* f. *limprichtii* Cufodontis; *S. flammeus* f. *simplex* Y. Ling; *S. longeligulatus* H. Léveillé & Vaniot; *Tephroseris flammea* subsp. *glabrifolia* (Cufodontis) B. Nordenstam.

Herbs, rhizomatous, with leafy stems. Stem solitary, erect, to 60 cm tall, white arachnoid-tomentose and pubescent, ± glabrescent. Radical leaves withered by anthesis, long petiolate; leaf blade elliptic-oblong, base cuneately narrowed, apex obtuse to acute. Lower stem leaves oblanceolate-oblong, 8–15 × 1.5–3 cm, thickly papery, both surfaces sparsely arachnoid-tomentose and pubescent or adaxially ± glabrescent and sometimes abaxially also, base cuneately narrowed into winged, subamplexicaul, slightly decurrent petiole, margin irregularly mucronate-dentate, apex obtuse to subacute, mucronulate. Median stem leaves sessile, elliptic, oblong, or oblong-lanceolate, apically acute to obtuse, mucronulate; upper leaves linear-lanceolate to linear, smaller. Capitula ca. 3 cm in diam., 2–9 arranged in ± umbelliform terminal corymbs; peduncles fulvous pubescent and usually white arachnoid-tomentose, basally bracteate, 2- or 3-bracteolate. Involucre campanulate, 5–6 × 6–10 mm, not calyculate; phyllaries ca. 25, lanceolate or linear-lanceolate, ca. 1 mm wide, herbaceous, dark purple, sparsely arachnoid or subglabrous, apex acute. Ray florets 13–15; corolla tube 3–3.5 mm; lamina dark orange, linear, 12–16 × ca. 1.6 mm, 4-veined, 3-denticulate. Disk florets many; corolla yellow or purplish

yellow, 6–6.5 mm, with ca. 3 mm tube and funnelform limb; lobes tinged purplish, ovate-lanceolate, ca. 1 mm, apically acute, papillose. Anthers ca. 2 mm, basally obtuse, appendages ovate-lanceolate. Achenes cylindric, 2.5–3 mm, pubescent. Pappus whitish, ca. 5.5 mm. Fl. Jul–Aug.

Montane meadows, forests; 1200–2100 m. Hebei, Heilongjiang, Jilin, Nei Mongol, Shaanxi, Shanxi [Russia (Far East, E Siberia)].

**14. *Tephroseris palustris*** (Linnaeus) Reichenbach, Fl. Saxon. 146. 1842.

湿生狗舌草 shi sheng gou she cao

*Othonna palustris* Linnaeus, Sp. Pl. 2: 924. 1753; *Cineraria congesta* R. Brown; *C. palustris* (Linnaeus) Linnaeus; *Senecio arcticus* Ruprecht; *S. congestus* (R. Brown) Candolle; *S. gracillimus* C. Winkler; *S. palustris* (Linnaeus) Hooker (1834), not Vellozo (1831); *S. palustris* var. *congestus* (R. Brown) Hooker; *Tephroseris palustris* subsp. *congesta* (R. Brown) Holub.

Herbs, biennial or annual, with numerous fibrous roots. Stem solitary, erect, 20–60 cm tall, hollow, glandular pubescent

at upper part, leafy. Radical leaves petiolate, withered by anthesis; lower stem leaves petiolate; median stem leaves sessile, oblong or oblong-lanceolate or lanceolate-linear, 5–15 × 0.7–1.8 cm, papery, both surfaces glandular pubescent, rarely glabrous, base subamplexicaul, margin coarsely sinuate-serrate to repand-dentate or rarely entire, apex obtuse. Capitula radiate, few to many arranged in dense to lax terminal corymbs; peduncles densely glandular pubescent. Involucres campanulate, 5–7 × 5–7 mm, not calyculate; phyllaries 18–20, green, lanceolate, herbaceous, with membranous margin, sparsely glandular, apically acuminate. Ray florets 20–25; corolla tube 3–3.5 mm; lamina pale yellow, elliptic-oblong, ca. 5.5 × 2.5 mm, apically obtuse, 2- or 3-denticulate or entire. Disk florets many; corolla yellow, ca. 5 mm, with ca. 2.5 mm tube and funnelform limb; lobes ovate-lanceolate, apically acute, papillose. Anthers ca. 1.2 mm, basally obtuse, appendages ovate-lanceolate. Achenes cylindric, ca. 2.5 mm, glabrous. Pappus copious, white, 3–3.5 mm at anthesis, 12–13 mm in fruit. Fl. Jun–Aug.

Wet places; 600–1000 m. Hebei, Heilongjiang, Nei Mongol [circumboreal (except Greenland and most of NW Europe)].

**105. NEMOSENECIO** (Kitamura) B. Nordenstam, Opera Bot. 44: 45. 1978.

羽叶菊属 yu ye ju shu

Chen Yilin (陈艺林 Chen Yi-ling); Bertil Nordenstam, Charles Jeffrey

*Senecio* sect. *Nemosenecio* Kitamura, Acta Phytotax. Geobot. 6: 266. 1937.

Herbs, perennial or biennial, erect, rhizomatous, with fibrous roots. Leaves alternate, herbaceous, green; basal and lower stem leaves usually fallen by anthesis; petiole unwinged; blade broadly ovate to ovate-oblong, pinnately veined, deeply pinnatifid to usually lobulate or coarsely shortly dentate lobes. Capitula few to moderately numerous in terminal, lax, subumbelliform cymes, heterogamous, radiate; peduncles slender. Involucres ecalyculate, broadly campanulate, cupuliform, or subhemispheric; phyllaries 6–8 or 11–13, oblong to ovate-lanceolate, with minutely puberulent tips and scarios margins. Receptacle convex-hemispheric, alveolate, glabrous. Ray florets 5–13; lamina yellow, linear-lanceolate, oblong-lanceolate, or oblong, 4(–6)-veined, apically shortly bifid or 3-dentate. Disk florets many; corolla yellow, tube narrow; limb campanulate; lobes 5. Anthers rounded to obtuse at base; antheropodia narrowly cylindric to cylindric, not or somewhat broader than filaments, with uniform cells, endothelial cell wall thickenings scattered or radial, never strictly polarized. Style branches short, apically truncate, with rather short, obtuse marginal papillae, dorsally glabrous or minutely papillate. Achenes cylindric, ribbed, shortly pubescent or glabrous; carpopodium distinct. Pappus of barbellate bristles, persistent, or absent from all florets, white.

Six species: China, Japan; five species (all endemic) in China.

- 1a. Pappus absent from all florets ..... 5. *N. concinnus*
- 1b. Pappus present in all florets, at least when young.
  - 2a. Phyllaries usually 6–8; achenes and ovary glabrous ..... 4. *N. solenoides*
  - 2b. Phyllaries more than 10; achenes and ovary pubescent or apically sparsely setose.
    - 3a. Capitula small; involucre 2–3 × 2–3 mm; ray lamina short, ca. 2 mm ..... 1. *N. formosanus*
    - 3b. Capitula larger; involucre 4.5–7 × 3–8 mm; ray lamina 5–13 mm.
      - 4a. Involucres 3–4 mm in diam.; leaves usually with 3 or 4(or 5) lateral lobes on each side; ray lamina 5–7 mm ..... 2. *N. incisifolius*
      - 4b. Involucres 6–8 mm in diam.; leaves usually with 6 or 7 lateral lobes on each side; ray lamina 11–13 mm ..... 3. *N. yunnanensis*

**1. *Nemosenecio formosanus*** (Kitamura) B. Nordenstam, Opera Bot. 44: 46. 1978.

台湾刘奇奴 tai wan liu qi nu

*Senecio formosanus* Kitamura, Acta Phytotax. Geobot. 3: 140. 1934 [“*formosnus*”]; *S. nikoensis* Miquel var. *formosanus* Sasaki.

Plants biennial, stoloniferous; stems solitary, erect, green or purple, 9–60 cm tall, simple or branched above, ± pubescent with white crisped hairs. Basal leaves usually shed by anthesis; lower and median stem leaves petiolate; blade abaxially pale green, adaxially green, ovate-oblong, 2.5–15 × 1.5–6 cm, pinnatifid or subbipinnatifid with 3–6 lateral lobes on each side, both surfaces puberulent; lateral lobes spreading,

ovate-oblong or oblong, usually 3–6-denticulate, apex acute to obtuse; upper stem leaves progressively smaller, shortly petiolate. Capitula few to many, pseudumbellate, pedunculate, 8–10 mm across ray florets; peduncles 0.5–2.2 cm, slender, minutely puberulent, ebracteolate. Involucres cupuliform, 2–3 × 2–3 mm; phyllaries 13, uniseriate, narrowly oblong, 3–4 × ca. 1 mm, herbaceous, externally glabrous, margin hyaline, ciliate, apex acuminate. Ray florets ca. 13; corolla tube ca. 2.5 mm; lamina oblong, ca. 2 × 1 mm, 4-veined, apically 3-dentate. Disk florets many; corolla yellow, ca. 3.5 mm, with tube ca. 2.5 mm and campanulate limb; lobes 5, ovate-triangular, ca. 0.5 mm, apex acute. Anthers oblong, ca. 0.5 mm, obtuse to rounded at base. Style branches ca. 0.5 mm. Achenes (immature) 1–1.2 mm, puberulent. Pappus persistent, white, 4.5–5 mm. Fl. Aug.

- Mountain slopes; 2300–2900 m. Taiwan (Gaoxiong).

**2. *Nemosenecio incisifolius*** (Jeffrey) B. Nordenstam, *Opera Bot.* 44: 46. 1978.

刻裂羽叶菊 ke lie yu ye ju

*Senecio incisifolius* Jeffrey, *Notes Roy. Bot. Gard. Edinburgh* 9: 127. 1916; *S. incisifolius* var. *gracilior* Y. Ling.

Stems solitary, erect or ± flexuous, 30–75 cm tall, sparsely puberulent or glabrous. Basal and lower stem leaves shed by anthesis; median stem leaves petiolate; blade ovate-oblong, 5–10 × 3–6 cm, rather thickly herbaceous, glabrous or abaxially sparsely white pilose on veins, pinnatifid with 3–5 lateral lobes on each side; lateral lobes subopposite or alternate, oblong, margin acutely coarsely (1–)3–5-dentate, apex acute or acuminate. Capitula (4–)15–30 in terminal subumbelliform corymbs, 1.5–2 cm across ray florets; peduncles 1.5–3(–4) cm, slender, sparsely fulvous puberulent. Involucres broadly campanulate or subhemispheric, 3–4 mm in diam.; phyllaries 10–13, subuniseriate to subbiseriate, oblong, ca. 5 × 1–1.5 mm, glabrous, with puberulent tips and scarious margins, obscurely 3–5-veined, apex acute or acuminate. Ray florets 7 or 8; corolla tube ca. 3 mm; lamina linear-oblong, 5–7 × 1–1.5 mm, 4-veined, apically 3-dentate. Disk florets many; corolla yellow, 4–4.5 mm, with tube ca. 2 mm and distinctly campanulate limb; lobes 5, equal, ovate-triangular. Anthers 1–1.2 mm, obtuse to rounded at base. Style branches ca. 0.7 mm. Achenes narrowly cylindrical, 1.3–1.5 mm, minutely puberulent. Pappus persistent, 4–5 mm. Fl. Aug.

- Mixed woods; 2200–2800 m. Yunnan.

**3. *Nemosenecio yunnanensis*** B. Nordenstam, *Opera Bot.* 44: 46. 1978.

滇羽叶菊 dian yu ye ju

Stems solitary, erect, 50–70 cm tall, sparsely adpressed pubescent in upper parts. Lower leaves usually shed by anthesis; median stem leaves petiolate; petiole 0.5–1.5 cm, sparsely puberulent, somewhat expanded at base; blade abaxially dull, adaxially green, ovate-oblong, 5–16 × 2.5–7 cm, rather thinly herbaceous, abaxially sparsely setulose-puberulent, adaxially ± glabrescent, pinnatifid with 6 or 7 lateral lobes on each side; lateral lobes subopposite or alternate, ovate-oblong, apex acute or shortly acuminate, usually 1–3(or 4)-lobulate; lobules ob-

long-ovate, apex acuminate. Capitula 6–14 in terminal or upper axillary subumbelliform corymbs; peduncles somewhat flexuous, 2–3 cm, slender, sparsely puberulent. Involucres broadly campanulate, 6–8 mm in diam.; phyllaries 10–13, subuniseriate or subbiseriate, ovate-lanceolate, 6–7 × 1.3–3 mm, herbaceous, externally puberulent, with thin margins and puberulent tips, faintly many veined, apex acute. Ray florets ca. 13; corolla tube 2–3 mm; lamina linear-oblong, 11–13 mm, 4(–6)-veined, apically shortly 3-dentate. Disk florets many; corolla yellow, 4–4.5 mm, with tube 2–2.5 mm and campanulate limb; lobes 5, equal, ovate-triangular, ca. 1 mm, apex acute. Anthers ca. 1.3 mm, obtuse to rounded at base. Style branches 0.6–0.7 mm, dorsally minutely papillate. Achenes narrowly cylindrical, 1.5–1.8 mm, shortly pubescent especially in upper half, or subglabrous. Pappus persistent, 4–4.5 mm. Fl. Jul–Aug.

- Grasslands, scrub; 1700–2800 m. W Guizhou, E Yunnan.

**4. *Nemosenecio solenoides*** (Dunn) B. Nordenstam, *Opera Bot.* 44: 46. 1978.

茄状羽叶菊 qie zhuang yu ye ju

*Senecio solenoides* Dunn, *J. Linn. Soc., Bot.* 35: 508. 1903.

Stems erect, 50–90 cm tall, simple, glabrous. Lower leaves shed by anthesis; median stem leaves petiolate; petiole 3–4 cm, shorter in upper leaves, sparsely puberulent to subglabrous; blade broadly ovate, 6–12 × 3–12 cm, membranous, abaxially sparsely puberulent, adaxially minutely pubescent, deeply pinnatifid with 3 or 4 lateral lobes on each side; lateral lobes subopposite, oblong-lanceolate or lanceolate, apex acute or acuminate, coarsely and irregularly 3–5-dentate, teeth mucronate; terminal lobe subequaling lateral ones. Capitula 5–9 in terminal subumbelliform corymbs, 1.5–2 cm across ray florets; peduncles 0.8–1.8 cm, slender, sparsely glandular. Involucres campanulate, 5–6 × ca. 3 mm; phyllaries 6–8, subuniseriate, ovate-oblong, ca. 5 × 1.2–2 mm, herbaceous, externally minutely puberulent, with puberulent tips and pale brown scarious margins, apex obtuse or acuminate. Ray florets 5–9; corolla tube ca. 2.7 mm; lamina linear or oblong-linear, ca. 8 × 1–1.5 mm, 5-veined, apically shortly 2-dentate. Disk florets many; corolla yellow, 4–4.5 mm, with tube 2–2.5 mm and campanulate limb; lobes 5, equal, ovate-triangular, ca. 1.5 mm. Anthers 1–1.5 mm, obtuse to rounded at base. Style branches 0.7–0.8 mm. Achenes narrowly cylindrical, ca. 2 mm, glabrous. Pappus persistent, ca. 4 mm. Fl. Aug–Nov.

- Mountains; ca. 1800 m. S Yunnan.

**5. *Nemosenecio concinnus*** (Franchet) C. Jeffrey & Y. L. Chen, *Kew Bull.* 39: 266. 1984.

裸果羽叶菊 luo guo yu ye ju

*Senecio concinnus* Franchet, *J. Bot. (Morot)* 10: 418. 1896.

Stems solitary, erect, 35–70 cm tall, slender, subglabrous. Basal leaves shed by anthesis; stem leaves petiolate; petiole 1–2 cm, slender, glabrous; blade ovate or ovate-oblong, 4–12 × 1.5–4.5 cm, membranous, abaxially sparsely puberulent, adaxially glabrous, deeply pinnatifid with 4–6 lobes on each side; lateral lobes obovate-oblong and 2- or 3-lobulate, or linear and

entire, basally cuneate, apex mucronate; terminal lobe sub-equaling lateral ones. Capitula 1–3(–6), terminal, lax; peduncles 1–2 cm, slender, sparsely puberulent. Involucre depressed-campanulate, ca. 5 × 5–7 mm; phyllaries ca. 13, subuniseriate, oblong-lanceolate. 4–5 × ca. 1 mm, herbaceous, externally glabrous, with scarios margins and minutely puberulent or ciliate tips, 3–5-veined, apex acute or acuminate. Ray florets ca. 13; corolla tube ca. 1.5 mm; lamina pale yellow, linear-oblong or

linear, 7–8.5 × 1.3–1.8 mm, 4-veined, apically shortly 3-dentate. Disk florets many; corolla yellow, 2.5–3 mm, with tube ca. 1 mm and campanulate limb; lobes 5, equal, ovate-triangular, ca. 0.8 mm. Anthers ca. 1 mm, obtuse to rounded at base. Style branches ca. 0.5 mm. Achenes (immature) narrowly cylindrical, 1.5–1.7 mm, sparsely hispidulous. Pappus absent. Fl. Jul.

• Woods; ca. 1900 m. Chongqing (Chengkou).

### 3. Subtribe SENECIONINAE

千里光亚族 qian li guang ya zu

Chen Yilin (陈艺林 Chen Yi-ling), Liu Ying (刘莹), Yang Qiner (杨亲二);  
Bertil Nordenstam, Charles Jeffrey, Leszek Vincent

Antheropodia balusterform, with enlarged marginal basal cells; endothelial tissue with usually radial cell wall thickenings, rarely scattered; stigmatic areas usually discrete, rarely contiguous or confluent; gametic chromosome number usually 20 or 10, less often 52, 50, 30, 23, 22, 19, or 5.

About 100 genera and 2,500 species: worldwide (except Antarctica); nine genera (one endemic, three introduced) and 135 species (74 endemic, six introduced) in China.

- 1a. Anther bases with sterile caudate auricles.  
 2a. Plants erect or subscandent, without prehensile petioles ..... 106. *Synotis*  
 2b. Plants scandent, with basally thickened, prehensile petioles ..... 107. *Cissampelopsis*
- 1b. Anther bases without sterile caudate auricles, obtuse to sagittate.  
 3a. Involucre not calyculate.  
 4a. Capitula homogamous, discoid ..... 112. *Emilia*  
 4b. Capitula radiate.  
 5a. Leaves cauline, palmately veined; ray lamina variously colored (never yellow) ..... 113. *Pericallis*  
 5b. Leaves rosulate, pinnately veined; ray lamina white ..... 114. *Hainanecio*
- 3b. Involucre calyculate.  
 6a. Style branches erect, with long, subulate, papillose appendages ..... 111. *Gynura*  
 6b. Style branches recurved, without papillose appendages.  
 7a. Marginal female florets filiform ..... 110. *Erechtites*  
 7b. Marginal female florets radiate or absent.  
 8a. Apex of style branches without a central appendage of fused papillae ..... 108. *Senecio*  
 8b. Apex of style branches with a central appendage of fused papillae ..... 109. *Crassocephalum*

#### 106. SYNOTIS (C. B. Clarke) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 285. 1984.

合耳菊属 he er ju shu

Chen Yilin (陈艺林 Chen Yi-ling); Bertil Nordenstam, Charles Jeffrey

*Senecio* subg. *Synotis* C. B. Clarke, Compos. Ind. 177. 1876.

Subshrubs or perennial herbs, rhizomatous, erect or sometimes scrambling or ± scandent. Rhizomes woody. Stems usually leafless in lower part at anthesis, leafy above or with leaves subrosulate at base of synflorescence. Leaves simple, petiolate or sessile, broadly ovate-cordate to narrowly oblong-lanceolate, pinnately veined, rarely 3-veined from near base, base sometimes auriculate, margin usually not lobed, rarely deeply pinnately divided, usually mucronulate-serrate or dentate. Capitula few to very numerous, arranged in terminal or axillary and narrow to broad and abundant thyrses, heterogamous and radiate or disciform, or homogamous and discoid, erect or ascending, pedunculate or sometimes sessile. Involucre calyculate, campanulate or cylindrical; receptacle flat; phyllaries (2–)4 or 5 or 7 or 8 or 11–15, free, herbaceous to leathery, margin scarios. Ray florets or filiform female florets absent or 1–10(–20); lamina yellow, conspicuous or inconspicuous, sometimes minute, (1–)4(–6)-veined, apically not or (1–)3(–5)-denticulate. Disk florets 1 to many; corolla yellow, sometimes pale yellow or cream; limb funnellform, lobes 5. Anthers linear-oblong or linear, usually distinctly caudate, tail 0.3–2 × as long as antheropodium, rarely subcaudate with tail only ca. 0.25 × as long as antheropodium; antheropodium balusterform to subcylindrical, stout, basally hardly to rather distinctly dilated, with somewhat enlarged basal lateral cells; endothelial cell wall thickenings few to numerous, radial, cells usually short. Style branches truncate or convex, with short to long marginal papillae and often with a central tuft of sometimes longer papillae. Achenes cylindrical, ribbed, glabrous or less often pubescent. Pappus capillary-like, uniform, white, straw-colored, or rufescent.

About 54 species: endemic to the Sino-Himalayan region, except for *Synotis atractylidifolia*, which occurs in N China; 43 species (30 endemic) in China.

The genus is divisible into two well-marked sections and five series, which are not described here.

- 1a. Plants with leaves subsulate at base of synflorescence, herbaceous; lower part of stem when developed leafless; synflorescence terminal; leaves abaxially never white tomentose.
- 2a. Leaves basally cordate to rounded, abruptly narrowed into winged or not winged petiole.
- 3a. Ray florets 2–5, conspicuous; phyllaries 7 or 8.
- 4a. Ray florets 2, lamina ca. 2.5 mm; petioles broadly to narrowly winged ..... 14. *S. ainsliaefolia*
- 4b. Ray florets 4 or 5, lamina ca. 4 mm; petioles not winged ..... 11. *S. pseudoalata*
- 3b. Ray florets absent to 2, minute; phyllaries 4 or 5.
- 5a. Petiole not winged; phyllaries ± glabrous ..... 12. *S. wallichii*
- 5b. Petiole winged, rarely not; phyllaries setose ..... 13. *S. alata*
- 2b. Leaves basally cuneate, gradually attenuate into winged or not winged petioles.
- 6a. Capitula discoid.
- 7a. Involucres 3–4 mm; phyllaries 10–12; pappus scant, 2–3 mm ..... 8. *S. brevipappa*
- 7b. Involucres 6–7 mm; phyllaries 5; pappus abundant, 6–8 mm.
- 8a. Petioles narrowly winged to base; pappus pure white; calycular bracts to 6 mm ..... 9. *S. sciatrephes*
- 8b. Petioles not winged to base; pappus off-white, sordid; calycular bracts not more than 3 mm ..... 10. *S. nayongensis*
- 6b. Capitula radiate.
- 9a. Involucres 5–7 × 2–4 mm.
- 10a. Phyllaries 10–12; involucres 5–7 × 3–6 mm; ray lamina 9–10 mm ..... 1. *S. cavaleriei*
- 10b. Phyllaries 8; involucres ca. 5 × 2–3 mm; ray lamina ca. 5 mm ..... 2. *S. duclouxii*
- 9b. Involucres 10–11 × 5–6 mm.
- 11a. Ray lamina 6–11 mm; calycular bracts 4–6 mm.
- 12a. Phyllaries 13–15; leaves abaxially finely sparsely arachnoid-tomentose and glabrescent ..... 4. *S. fulvipes*
- 12b. Phyllaries ca. 10; leaves abaxially very sparsely setulose or glabrous ..... 6. *S. austroyunnanensis*
- 11b. Ray lamina 3.5–5 mm; calycular bracts to 3 mm.
- 13a. Stems sparsely arachnoid-tomentose; leaves narrowly elliptic, apically caudate-acuminate, abaxially adpressed pilose; calycular bracts 10; phyllaries 12, basally sparsely arachnoid ..... 7. *S. damiaoshanica*
- 13b. Stems densely fulvous tomentose; leaves obovate-spatulate or obovate-elliptic, apically obtuse or shortly acute, abaxially gray-white tomentose; calycular bracts 7 or 8; phyllaries 9–11, glabrous ..... 5. *S. changiana*
- 1b. Plants with leaves ± equally distributed on stems, herbaceous, scandent or suffrutescent; synflorescences terminal and axillary; leaves abaxially sometimes white tomentose.
- 14a. Stems weak, flexuous; plants scandent or subscandent; capitula heterogamous.
- 15a. Involucres 4–5.5 × 1–1.5 mm; leaves ovate, basally cordate or cuneate ..... 15. *S. tetrantha*
- 15b. Involucres 8–12 × 2–3 mm; leaves rounded at base ..... 16. *S. yui*
- 14b. Stems ± erect; plants not scandent, ± erect; capitula heterogamous or homogamous.
- 16a. Capitula few, in terminal or axillary groups of 1–5; involucres 8–11 × 2.2–7 mm; leaves abaxially sparsely setose or thinly arachnoid, never densely white tomentose.
- 17a. Calycular bracts conspicuous, to 6 mm; leaves membranous ..... 20. *S. chingiana*
- 17b. Calycular bracts inconspicuous, to 3 mm; leaves papery.
- 18a. Capitula discoid ..... 19. *S. sinica*
- 18b. Capitula radiate.
- 19a. Ray florets 7, lamina 9–10 mm; leaves elliptic or oblanceolate-elliptic ..... 17. *S. hieraciifolia*
- 19b. Ray florets 5, lamina ca. 3 mm; leaves oblanceolate-oblong ..... 18. *S. guizhouensis*
- 16b. Capitula numerous, in flat-topped terminal corymbs, rounded axillary terminal corymbs, or large terminal thyrses; involucres to 7 mm, if larger than leaves abaxially densely white tomentose.
- 20a. Synflorescences ± flat-topped terminal corymbs.
- 21a. Leaves shortly petiolate, abaxially glabrous; pappus straw-colored.
- 22a. Phyllaries 3 or 4, ca. 7 mm; ray floret 1, minutely radiate ..... 37. *S. acuminata*
- 22b. Phyllaries 5, ca. 5 mm; ray florets 2 or 3, conspicuously radiate ..... 38. *S. calocephala*
- 21b. Leaves sessile, abaxially tomentose, or if glabrous then pappus white.
- 23a. Capitula radiate.
- 24a. Leaves abaxially thinly arachnoid-tomentose; pappus straw-colored; achenes glabrous; ray lamina 5–7 mm ..... 41. *S. birmanica*

- 24b. Leaves abaxially glabrous; pappus white; achenes hairy; ray lamina 8–10 mm ..... 43. *S. atractylidifolia*
- 23b. Capitula discoid.
- 25a. Stem leaves 2 or 3, long petiolate, blade reniform or cordate-reniform, margin undulate-dentate; capitula solitary, racemose; phyllaries and florets 5 ..... 39. *S. reniformis*
- 25b. Stem leaves numerous, sessile or subsessile, blade narrowly oblong-elliptic to lanceolate; capitula numerous, arranged in dense corymbs; phyllaries 8; florets 8–11.
- 26a. Leaves abaxially thinly arachnoid-tomentose ..... 40. *S. lucorum*
- 26b. Leaves abaxially densely white tomentose ..... 42. *S. setchuenensis*
- 20b. Synflorescences ± rounded axillary and terminal corymbs, or terminal pyramidal thyrses.
- 27a. Capitula arranged in terminal thyrses; florets 1–4(or 5), all bisexual.
- 28a. Leaves divided.
- 29a. Leaves deeply pinnatifid; lateral lobes (2 or)3 or 4 pairs, narrowly lanceolate or oblong-lanceolate ..... 32. *S. vaniotii*
- 29b. Leaves 3–5-lobed or deeply palmatifid, lobes ovate-triangular or oblong-lanceolate.
- 30a. Leaves shallowly 3–5-lobed; involucre 6–7 mm; phyllaries and florets 5; achenes hairy ..... 30. *S. muliensis*
- 30b. Leaves deeply 5-palmatifid; phyllaries and florets 3; achenes glabrous ..... 31. *S. palmatisecta*
- 28b. Leaves undivided.
- 31a. Petiole expanded into an amplexicaul auricle, leaf blade triangular-ovate or triangular-hastate, both surfaces brown pubescent; phyllaries and florets 5; pappus purplish brown ..... 26. *S. otophylla*
- 31b. Petiole not expanded, without an auricle, leaf blade ovate-lanceolate or oblong-lanceolate, rarely cordate, abaxially pubescent to subglabrous; phyllaries and florets 2 or 3(or 4).
- 32a. Leaves cordate or ovate-cordate, subleathery, palmately veined, abaxially veins fulvous setulose; phyllaries and florets 3; pappus reddish ..... 28. *S. cordifolia*
- 32b. Leaves not cordate, papery or thinly papery, pinnately veined, abaxially veins shortly pubescent or subglabrous; phyllaries and florets 2–4; pappus pale reddish brown or sordid.
- 33a. Synflorescences broad, lax pyramidal thyrses; phyllaries and florets 2 or 3; achenes glabrous or hairy; pappus pale reddish brown or straw-colored ..... 29. *S. erythropappa*
- 33b. Synflorescences narrow, dense pyramidal thyrses; phyllaries 4 or 5, florets 3; achenes hairy; pappus white ..... 27. *S. solidaginea*
- 27b. Capitula arranged in axillary and terminal corymbs; florets 5–35, with at least 1 marginal filiform or radiate female floret present.
- 34a. Leaves abaxially white tomentose.
- 35a. Involucres 1.5–2 mm wide; florets 11–15.
- 36a. Lateral main veins of leaves with pale yellow-brown hairs ..... 21. *S. xantholeuca*
- 36b. Lateral main veins of leaves with conspicuous dark brown hairs ..... 22. *S. yakoensis*
- 35b. Involucres 2–4 mm wide; florets 19–35.
- 37a. Capitula disciform or minutely radiate ..... 25. *S. nagensium*
- 37b. Capitula conspicuously radiate.
- 38a. Synflorescences and phyllaries white arachnoid-tomentose, at most with some brown hairs intermixed; ray florets ca. 8 ..... 23. *S. cappa*
- 38b. Synflorescences and phyllaries conspicuously ferruginous tomentose; ray florets 14–20 ..... 24. *S. ionodasys*
- 34b. Leaves abaxially not white tomentose.
- 39a. Capitula conspicuously radiate, ray florets 8.
- 40a. Leaves pubescent or thinly tomentose; ray lamina ca. 3.5 mm ..... 23. *S. cappa*
- 40b. Leaves glabrous; ray lamina ca. 6 mm ..... 3. *S. longipes*
- 39b. Capitula minutely radiate, ray florets 2–5.
- 41a. Corymbs dense, glomeruliform, 2–4 cm ..... 33. *S. glomerata*

- 41b. Corymbs more lax, spreading, 4.5–10 cm.  
 42a. Capitula ca. 4 × 2.7 mm; phyllaries 8 ..... 36. *S. saluenensis*  
 42b. Capitula 3.5–4 × ca. 1.5 mm; phyllaries 4 or 5.  
 43a. Leaves ovate or elliptic, basally not auriculate; ray florets  
 3 or 4 ..... 34. *S. triligulata*  
 43b. Leaves narrowly elliptic or narrowly oblong-elliptic,  
 basally auriculate; ray florets 2 ..... 35. *S. auriculata*

**1. *Synotis cavalieriei*** (H. Léveillé) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 291. 1984.

昆明合耳菊 *kun ming he er ju*

*Senecio cavalieriei* H. Léveillé, Repert. Spec. Nov. Regni Veg. 12: 537. 1913.

Herbs, erect, rhizomatous, vegetatively subcaulescent. Rhizome short, swollen, irregularly tuberous, woody. Vegetative stem short, to 5 cm, densely fulvous lanate, especially around leaf bases. Flowering stems solitary or few, scapiform, leafless, branching from base or in upper part, 5–42 cm tall, finely fulvous tomentose, ± glabrescent. Leaves basal, subrosulate, subsessile or shortly petiolate; petiole 0.5–1 cm, sparsely to densely pubescent; blade obovate to oblanceolate or sometimes subpandurate, 4–20 × 2–8 cm, papery, abaxially sparsely finely arachnoid-pubescent, glabrescent and sometimes purple, adaxially sparsely setulose, pinnately veined, lateral veins 10–18, midvein prominent abaxially, base cuneate-attenuate, margin subentire to shallowly repand-dentate, apex sometimes shortly acuminate, obtuse. Capitula radiate, 1.5–2.5 cm in diam., few to numerous, arranged in often rather narrow and elongated compound corymbs; peduncles 1.5–5 cm, slender, basally bracteate, shortly ± tomentose, with 3–6 linear or linear-lanceolate, 5–12 mm, thinly pubescent bracteoles. Involucres narrowly campanulate, 5–7 × 3–6 mm, calyculate; bracts of calyculus 6–8, linear or linear-subulate; phyllaries 10–12, oblong, 1–2 mm wide, herbaceous, sometimes purplish, sparsely arachnoid-tomentose to subglabrous, margin scarious, apically acuminate and puberulent. Ray florets 8; corolla tube ca. 3 mm; lamina yellow, oblong or oblong-lanceolate, 9–10 × 2.5–3 mm, 4- or 5-veined, apically obtuse, 3-denticulate. Disk florets ca. 20; corolla yellow, 7–7.5 mm, with ca. 2.5 mm tube and funnel-form limb; lobes ovate-oblong, ca. 1.2 mm, apically acute. Anthers ca. 2.5 mm, anther tails ca. 0.75 × as long as to subequaling antheropodium; appendages ovate-oblong; antheropodium slightly dilated at base. Style branches ca. 1.2 mm, fringed with spreading papillae and with a prominent central tuft of long papillae. Achenes ca. 2.5 mm, glabrous. Pappus white, 7–7.5 mm. Fl. Oct–Nov.

• Rocky places, slopes, by streams and waterfalls; 1700–3000 m. Guizhou, Sichuan, Yunnan.

**2. *Synotis duclouxii*** (Dunn) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 293. 1984.

滇东合耳菊 *dian dong he er ju*

*Senecio duclouxii* Dunn, J. Linn. Soc., Bot. 35: 504. 1903; *S. cichoriifolius* H. Léveillé.

Herbs, erect, rhizomatous, woody at base. Vegetative stem solitary, 20–40 cm tall, somewhat tomentose especially in lower

part, ± glabrescent, leafless except at apex. Flowering stems several, scapiform, short, branching from base, 7–9 cm tall, fine arachnoid-pubescent, glabrescent. Leaves crowded in a rosette at base of synflorescence, shortly petiolate; petiole 0.5–2 cm, sparsely pubescent or glabrous; blade obovate-lanceolate or elliptic, 8–22 × 3–9 cm, papery, abaxially very thinly arachnoid at first and soon glabrous, adaxially glabrous, pinnately veined, lateral veins 18–20, arcuate-ascending, abaxially like midvein prominent, base cuneate, margin remotely shallowly to coarsely sinuate-denticulate especially in upper half, apex acuminate or acute. Capitula radiate, ca. 1 cm in diam., numerous, arranged in much branched corymbose clusters; peduncles 5–15 mm, basally bracteate, usually with 1 or 2 linear bracteoles, arachnoid-pubescent. Involucres narrowly campanulate, ca. 5 × 2–3 mm, calyculate; bracts of calyculus 3 or 4; phyllaries 8, oblong, ca. 1 mm wide, herbaceous, arachnoid-tomentose, ± glabrescent, margin broadly scarious, apically acute and puberulent. Ray florets 6–10; corolla tube ca. 4 mm, slender, glabrous; lamina yellow, oblong-lanceolate, 6–7 × 1.5–2 mm, 4-veined, apically obtuse, 3-denticulate. Disk florets ca. 8; corolla 8–9 mm, with ca. 3.5 mm tube and funnel-form limb; lobes ovate-oblong, ca. 2.7 mm, apically acute. Anthers ca. 4 mm; anther tails ca. 1.3 × as long as antheropodia; appendages ovate-oblong; antheropodia slightly dilated at base. Style branches ca. 1.5 mm, fringed with fine papillae and with a distinct central tuft of long papillae. Achenes 1.8–2 mm, glabrous. Pappus white, ca. 7 mm. Fl. Nov.

• Mixed forests; 700–2500 m. Yunnan.

**3. *Synotis longipes*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 294. 1984.

长柄合耳菊 *chang bing he er ju*

Herbs, basal parts unknown. Stems erect, ca. 60 cm tall, glabrous. Leaves on stem shortly petiolate; petiole 2–2.5 cm, narrowly winged, glabrous, somewhat expanded at base; blade oblanceolate, 12–28 × 3.5–5.5 cm, thickly papery, glabrous, pinnately veined, lateral veins 18–22, arcuate-ascending, base attenuate into petiole, margin coarsely sinuate-dentate, apex acute-acuminate. Uppermost leaves elliptic, smaller, margin mucronulate-serrulate, apex acute-acuminate. Capitula radiate, 1–1.5 cm in diam., numerous, arranged in abundant, long-stalked terminal and upper axillary compound corymbs; peduncles 6–10 mm, slender, sparsely arachnoid, bracteate at base, with a few minute subulate bracteoles. Involucres narrowly campanulate, 4–5 × 2–3 mm, calyculate; bracts of calyculus 2 or 3, subulate; phyllaries 8, oblong-lanceolate, 1–1.5 mm wide, herbaceous, sparsely arachnoid, margin broadly scarious, apex subacute and shortly barbellate. Ray florets 8; corolla tube ca. 3 mm; lamina yellow, oblong, ca. 6 × 1.5 mm, 4-veined, apically obtuse, ob-

scurely 3-denticulate. Disk florets ca. 10; corolla ca. 7 mm, with ca. 3.2 mm tube and funnellform limb; lobes oblong-lanceolate, ca. 3 mm, apically acute, papillose. Anthers ca. 3 mm; anther tails ca.  $0.8 \times$  as long as antheropodia; appendages ovate-lanceolate; antheropodia distinctly dilated at base. Style branches ca. 1.5 mm, fringed with obtuse papillae and with a longer central tuft. Achenes 1.5–2 mm, glabrous. Pappus dirty white, ca. 6 mm. Fl. Feb.

- Roadsides. Yunnan (Zhaotong).

**4. *Synotis fulvipes*** (Y. Ling) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 294. 1984.

褐柄合耳菊 he bing he er ju

*Senecio fulvipes* Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 5: 27. 1937; *S. handelianus* B. Nordenstam, nom. illeg. superfl.; *S. humanensis* Handel-Mazzetti (Nov 1937), not Y. Ling (Jan 1937), nom. illeg. superfl.

Herbs, erect, rhizomatous, vegetatively subcaulescent; rhizome short, woody, somewhat swollen. Vegetative stem short, to 10 cm, fulvous tomentose, densely so around leaf base. Flowering stem solitary, ascending-erect, scapiform, few branched, densely fulvous tomentose, 17–22 cm tall. Leaves subbasal, subsulate, subsessile, obovate-lanceolate, 6–13 × 2–5.5 cm, papery or subleathery, abaxially scattered setulose, adaxially finely sparsely arachnoid-tomentose and glabrescent, pinnately veined, lateral veins 8–10, arcuate-ascending, base cuneate-attenuate, margin rather remotely and coarsely mucronately sinuate-serrate or repand-dentate, apex obtusely acuminate-mucronate. Flowering stem leaves few, small, oblanceolate-spatulate, or reduced to narrow bracts. Capitula radiate, 1.5–2 cm in diam., terminal in 2- or 3-headed clusters, shortly pedunculate. Involucres campanulate, 8–10 × 5–8 mm, tomentose at base, calyculate; bracts of calyculus 10–12, linear or linear-lanceolate, subequal, ca.  $1/2$  as long as phyllaries; phyllaries 13–15, oblong-linear, 1–2 mm wide, herbaceous, sparsely pubescent to glabrous, margin scarious, apically acute to acute-acuminate and puberulent. Ray florets 6–10; corolla tube 5–6 mm; lamina yellow, elliptic-oblong, 6–11 × 2.5–2.7 mm, 4-veined, apically obtuse, 3-denticulate. Disk florets many (ca. 30); corolla yellow, 9–11 mm, with ca. 3.5 mm tube and narrowly funnellform limb; lobes oblong-lanceolate, ca. 1.5 mm. Anthers ca. 4 mm; anther tails slightly exceeding antheropodia; appendages ovate-oblong; antheropodia gradually expanded toward base. Style branches ca. 1.5 mm, obtuse, fringed with numerous long fine papillae and with slender terminal tuft of somewhat longer papillae. Achenes (immature) ca. 2.5 mm, glabrous. Pappus white, 8–9 mm. Fl. Aug–Oct.

- Dense valley forests; ca. 1100 m. Hunan, Jiangxi.

**5. *Synotis changiana*** Y. L. Chen, Acta Phytotax. Sin. 33: 78. 1995.

肇萼合耳菊 zhao qian he er ju

Herbs, erect, rhizomatous. Rhizome stout, ca. 2 cm in diam. Vegetative stem solitary, 40–50 cm tall, simple, 3–4 mm in diam. at base, lower part long naked, at first arachnoid, ± glabrescent, upper part fulvous tomentose. Leaves usually densely

crowded at middle part, rosulate or subsulate, shortly petiolate; petiole 1.5–2.5 cm, stout, densely tomentose; blade adaxially dark green, obovate-spatulate or elliptic-obovate, 8–14 × 4–7 cm, papery, abaxially gray-white arachnoid-tomentose, adaxially arachnoid, glabrescent, pinnately veined, lateral veins 14–18 pairs, arcuate-ascending, base broadly cuneate, margin irregularly mucronately sinuate-serrate, apex obtuse to subacute. Upper leaves sessile, bractlike, linear, small. Capitula radiate, usually 2–5 in terminal corymbs; synflorescence to 4 cm, densely fulvous tomentose, subsessile or shortly pedunculate, bracteate at base; bracts linear, 5–7 mm, apically acute. Involucres campanulate, 8–10 × 10–12 mm, base fulvous tomentose, with 7 or 8 linear-subulate equal bracteoles; phyllaries 9–11, oblong-lanceolate, 8–10 × 2.5–3 mm, herbaceous, glabrous, with broadly scarious margin, inconspicuously 3-veined, apically slightly acute or obtuse. Ray florets 5 or 6; corolla tube 3–3.5 mm, slender; lamina yellow, oblong, ca. 5 × 1–1.5 mm, 4- or 5-veined, apically 3-denticulate. Disk florets many; corolla yellow, 7–8 mm, with 2–3 mm tube and narrowly funnellform limb; lobes oblong-lanceolate, apically acute. Anthers linear, 3–4 mm, basally caudate, antheropodia slightly expanded. Style branches excurved, apically obtuse, papillose. Achenes ca. 2 mm, glabrous. Pappus white, 7–8 mm. Fl. Oct–Nov.

- Lax forests; 400–1000 m. Guangxi (Lingchuan, Yangshuo).

**6. *Synotis austroyunnanensis*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 296. 1984.

滇南合耳菊 dian nan he er ju

Herbs, erect, rhizomatous. Rhizome woody, branching. Vegetative stem solitary, 17–45 cm, sparsely fulvous villous, glabrescent, leafless except at apex. Flowering stem solitary, erect, scapiform, 10–25 cm tall, few branched, fulvous tomentose, glabrescent. Leaves crowded in a rosette at base of flowering stems, shortly petiolate; petiole 1.5–2 cm, stout, sparsely ferruginous pubescent; blade oblanceolate-elliptic or obovate, 7–17 × 2–5 cm, papery or subleathery, abaxially sparsely pilose to subglabrous and sometimes purple, adaxially very sparsely setulose or glabrous, pinnately veined, lateral veins 10–14, arcuately ascending, inconspicuous, base cuneate-attenuate into petiole, margin remotely and often coarsely mucronately sinuate-serrate or repand-dentate, apex acute-acuminate and mucronate. Flowering stem leaves few, much smaller, elliptic or lanceolate; uppermost leaves narrow, bractlike. Capitula radiate, 2–7 in terminal corymbose clusters; peduncles 0.5–2.5 mm, densely fulvous villous, bracteate, with 2 or 3 linear or linear-lanceolate, 8–15 mm, apically acute, sparsely villous bracteoles. Involucres narrowly campanulate, 8–11 × 5–7 mm, calyculate; bracts of calyculus 8–11, linear,  $1/3$ – $1/2$  as long as phyllaries, glabrous or sparsely villous, apically acute; phyllaries ca. 10, pale green, oblong-linear, 1.5–3 mm wide, herbaceous, glabrous, 3–5-veined, margin broadly scarious, apically acute, puberulent. Ray florets 6–9; corolla tube ca. 6 mm; lamina yellow, elliptic-oblong, 8–10 × 2–2.5 mm, apically obtuse, 3-denticulate. Disk florets many; corolla yellow, 9–9.5 mm, with 3–5 mm tube and narrowly funnellform limb; lobes oblong-lanceolate, ca. 1.5 mm, apically acute. Anthers ca. 4 mm, anther tails ca.  $1.25 \times$  as long as antheropodium; appendages ovate-lanceo-

late, antheropodia stout, basally broadly dilated. Style branches ca. 2 mm, apically obtuse, fringed with long, rather fine papillae, central tuft only slightly longer than others. Achenes ca. 2 mm, glabrous. Pappus white, 8–9 mm. Fl. Oct–Nov.

- Mixed forests, thickets; 1000–1700 m. Guizhou, S Yunnan.

**7. *Synotis damiaoshanica*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 298. 1984.

大苗山合耳菊 da miao shan he er ju

Herbs, erect, rhizomatous. Vegetative stem solitary, ca. 30 cm, thinly arachnoid-tomentose, glabrescent, leafless except in upper part. Flowering stem solitary, erect, scapiform, ca. 13 cm tall, arachnoid-tomentose. Leaves rather crowded at base of flowering stems, shortly petiolate; petiole 3–5 cm, stout, densely pubescent; blade narrowly elliptic, 7–11 × 1–3 cm, papery, abaxially shortly scattered pilose, thinly pubescent on veins and purple, adaxially scattered setulose, pinnately veined, lateral veins 10–14, arcuate-ascending, base cuneate, margin rather distantly apiculate-serrate, apex caudate-acuminate. Flowering stem leaves few, small; upper leaves bractlike. Capitula radiate, 3 or 4 in terminal corymbose clusters; peduncles ca. 10 mm, densely arachnoid-tomentose, bracteate, with 1–3 linear-lanceolate bracteoles. Involucre narrowly campanulate, 10–11 × ca. 7 mm, calyculate; bracts of calyculus 10, linear-lanceolate, to 1/4 as long as phyllaries; phyllaries ca. 12, oblong-lanceolate, 1.5–2 mm wide, herbaceous, margin broadly scarious, subglabrous or sparsely arachnoid at base, inconspicuously 3-veined, apically acute or acuminate and puberulent. Ray florets ca. 6; corolla tube 5–5.5 mm; lamina yellow, oblong, 3.5–4 × ca. 1 mm, 3- or 4-veined, 3-denticulate. Disk florets many; corolla yellow, ca. 8.5 mm, with ca. 2 mm tube and narrowly funnellform limb; lobes oblong-lanceolate, ca. 1.5 mm, apically acute. Anthers ca. 2.5 mm, anther tails 1.7–2 × as long as antheropodia; appendages ovate-lanceolate; antheropodia rather elongated, basally gradually dilated. Style branches ca. 1.5 mm, apically obtuse. Achenes 3.5–4 mm, glabrous. Pappus white, ca. 7.5 mm. Fl. Oct.

- Open forests; 1200–1500 m. Guangxi (Damiao Shan, Yuanbao Shan).

**8. *Synotis brevipappa*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 300. 1984.

短纓合耳菊 duan ying he er ju

Herbs, erect, rhizomatous. Rhizome short, woody, branching. Vegetative stems 1 or 2, erect or ascending, ca. 50 cm or more, thinly floccose-tomentose, and shortly fuscous pubescent, glabrescent, leafless except at apex. Flowering stem solitary, scapiform, few branched, thinly arachnoid, 10–40 cm tall, erect. Leaves crowded, subsulate at base of flowering stems, shortly petiolate; petiole 3–15 mm, arachnoid-tomentose; blade obovate-lanceolate or oblanceolate-elliptic, 12–25(–29) × 3–8 cm, papery, abaxially thinly arachnoid especially on veins and glabrescent, adaxially shortly scattered setulose, pinnately veined, lateral veins 18–22, arcuate-ascending, rather prominently reticulate abaxially, base cuneate or cuneate-attenuate, margin sharply antrorsely mucronate-serrate, apex acute-

acuminate and attenuate. Stem leaves few, sessile, smaller. Capitula discoid, moderately numerous, arranged in orbicular terminal corymbs; peduncles 2–10 mm, fulvous tomentose, bracteate; bracteoles 1 or 2, linear. Involucre subcylindric, 3–4 × 2–3 mm, calyculate; bracts of calyculus 4–6, linear, to 1/2 as long as phyllaries; phyllaries 10–12, oblong-lanceolate, ca. 1 mm wide, subleathery, margin narrowly scarious, subglabrescent, apically subacute or obtuse, puberulent and slightly spreading. Ray florets absent. Disk florets ca. 20; corolla pale yellow, ca. 7 mm, with ca. 2.7 mm tube and narrowly funnellform or tubular limb, much exserted from involucre, contracted at mouth; lobes erect, ovate-oblong, ca. 0.7 mm, apically acute, puberulent. Anthers ca. 3 mm, anther tails ca. 1.3 × as long as antheropodia; appendages ovate-oblong; antheropodia slightly dilated toward base. Style branches ca. 0.7 mm, fringed with long fine papillae; central tuft not markedly differentiated. Achenes ca. 1.5 mm, glabrous. Pappus 2–3 mm, shorter than corolla tube, setae few, easily deciduous. Fl. Aug.

- Open forests, dry slopes; 2400–2700 m. Xizang (Delei valley).

**9. *Synotis sciatrephe*** (W. W. Smith) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 300. 1984.

林荫合耳菊 lin yin he er ju

*Senecio sciatrephe* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 8: 118. 1913.

Herbs, erect, rhizomatous. Rhizome thick, woody, creeping, branching. Vegetative stem solitary, erect or ascending, 7–20 cm, glabrous, leafless except at apex. Flowering stem solitary, erect, scapiform, 20–50 cm tall, branching from near base or in upper part, arachnoid-tomentose, glabrescent. Leaves crowded, subsulate at base of flowering stems, sessile; blade oblanceolate-oblong or elliptic, 12–22 × 4–6 cm, papery, both surfaces sparsely floccose-tomentose and glabrescent, pinnately veined, lateral veins 10–12, arcuate-ascending, base cuneate or attenuate into a 4–10 cm, gradually attenuate, winged petiole, slightly amplexicaul, margin remotely shortly mucronately sinuate-serrate, apex acute-acuminate. Capitula discoid, numerous, arranged in rather dense orbicular 3–12-headed corymbs, terminal on usually rather short or strictly ascending synflorescence branches, whole forming a rather narrow paniculoid thyrse; peduncles short, ca. 2 mm, arachnoid-tomentose, bracteate, 1-bracteolate; bracts and bracteoles linear, to 10 mm, sparsely tomentose or subglabrous. Involucre cylindrical, ca. 6 × 1.5–2 mm, calyculate; bracts of calyculus 3–5, linear, ca. 1/2 as long as phyllaries; phyllaries 5, oblong-linear, triangular-acuminate, herbaceous, glabrous, margin scarious, apically subobtuse, shortly barbellate and purplish. Ray florets absent. Disk florets 5 or 6; corolla yellow, ca. 8 mm, with ca. 3.5 mm tube and narrowly funnellform limb, exserted from involucre; lobes ovate-oblong, 1–1.2 mm, apically acute. Anthers ca. 2.5 mm; anther tails ca. 0.75 × as long as antheropodia; appendages ovate-lanceolate; antheropodia rather long, robust, basally distinctly dilated. Style branches ca. 1 mm, fringed with abundant, moderately long papillae, those of central tuft somewhat exceeding laterals. Achenes (immature) 1.7–2 mm, glabrous. Pappus white, ca. 5.5 mm. Fl. Oct–Dec.

- Open and shaded thickets; 2400–3000 m. Yunnan.

**10. *Synotis nayongensis*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 302. 1984.

纳拥合耳菊 na yong he er ju

Herbs, erect, rhizomatous. Rhizome thick, woody, creeping. Vegetative stem solitary, erect, ca. 35 cm, sparsely pubescent, glabrescent to glabrous, leafless except at apex. Flowering stem solitary, erect, scapiform, 35–60 cm tall, shortly branching, thinly arachnoid-tomentose, glabrescent. Leaves crowded, subrosulate at base of flowering stems; petiole 1–2.5 cm, not winged, slightly expanded at base; blade oblanceolate-obovate, 10–20 × 3–6 cm, membranous, abaxially sparsely arachnoid, glabrescent to subglabrous, adaxially scattered setulose, pinnately veined, lateral veins 10–14, arcuate-ascending, base cuneate-attenuate into petiole, margin shallowly sinuate-apiculate or repand-apiculate, apex subacute-acuminate. Flowering stem leaves few, remote, much smaller. Capitula discoid, numerous, arranged in rather dense 3–7-headed corymbs, terminal on short synflorescence branches, whole forming a somewhat attenuate narrowly paniculoid thyrse; peduncles 3–5 mm, densely fulvous tomentose, 1- or 2-bracteolate; bracts linear. Involucres cylindric, ca. 6 × 2–2.5 mm, calyculate; bracts of calyculus 3–5, ovate or ovate-oblong, 1/4–1/3 as long as phyllaries; phyllaries 5, narrowly oblong, 1–1.5 mm wide, herbaceous, margin narrowly scarious, glabrous, conspicuously 3–5-veined, apically triangular, obtuse, puberulent and dark colored. Ray florets absent. Disk florets 4 or 5; corolla yellow, ca. 9 mm, with ca. 2.5 mm tube and narrowly funnelform limb, exerted from involucre; lobes oblong-lanceolate, ca. 1.5 mm, apically acute. Anthers ca. 3.5 mm, anther tails ca. equaling antheropodia; appendages ovate-lanceolate; antheropodia stout, basally dilated. Style branches ca. 1.5 mm, fringed with long papillae, terminal tuft not conspicuously longer. Achenes ca. 4 mm, glabrous. Pappus ca. 8.5 mm, fulvous. Fl. Jul.

• Shaded places among shrubs; ca. 2000 m. Guizhou (Nayong).

**11. *Synotis pseudoalata*** (C. C. Chang) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 303. 1984.

紫背合耳菊 zi bei he er ju

*Senecio pseudoalatus* C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 57. 1935.

Herbs, subcaulescent, rhizomatous. Rhizome thick, sub-tuberous, woody. Vegetative stem erect, subterranean part rooting at nodes, densely tomentose, leafless except at apex. Flowering stem solitary, arising from basal rosette, erect, scapiform, ca. 50 cm tall, ferruginous tomentose, somewhat glabrescent. Leaves in basal rosette, long petiolate; petiole 5–7 cm, not winged, densely ferruginous lanate; blade abaxially purple, ovate-oblong, 10–20 × 4–10 cm, papery, abaxially finely scattered villous, adaxially finely setulose, pinnately veined, lateral veins 10–14, arcuate-ascending, base cordate, margin shallowly repand-apiculate, apex shortly acute-acuminate. Flowering stem leaves few, sessile, lanceolate, bractlike. Capitula radiate, numerous, arranged in a rather slender compound thyrse terminating flowering stem; peduncles 2–3 mm, densely ferruginous tomentose, bracteate, few bracteolate; bracts and bracteoles linear, small. Involucres cylindric, 7–8 × ca. 3 mm, calyculate; bracts of calyculus 3–5, purplish, subulate, small; phyllaries 7

or 8, oblong, 1–1.5 mm wide, densely villous with purplish hairs, margin broadly scarious, apically obtuse to acute and puberulent, purple. Ray florets 4 or 5; corolla tube ca. 4.5 mm; lamina deep yellow, oblong, ca. 4 × 1.5 mm, 3-denticulate. Disk florets 10 or 11; corolla orange, ca. 8 mm, with ca. 3 mm tube and funnelform limb; lobes ovate-triangular, ca. 1 mm, apically acute, papillose. Anthers ca. 3 mm; anther tails ca. 0.75 × as long as antheropodia; appendages ovate-triangular; antheropodia stout, basally dilated. Style branches ca. 1 mm, fringed with moderately long papillae, central tuft longer, prominent. Achenes ca. 1.3 mm, glabrous. Pappus white, ca. 6.5 mm. Fl. Oct.

Cliff ledges, rocky slopes; ca. 2700 m. NW Yunnan [Myanmar].

**12. *Synotis wallichii*** (Candolle) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 305. 1984.

合耳菊 he er ju

*Senecio wallichii* Candolle, Prodr. 6: 364. 1838.

Herbs, subcaulescent, rhizomatous. Rhizome short, thick, woody. Vegetative stem erect or ascending, ± subterranean, 0.5–20 cm, leafless except at apex. Flowering stems 1–4, erect, scapiform, to 40 cm tall, slender, thinly arachnoid, glabrescent. Leaves subrosulate at base of flowering stems, long petiolate; petiole 3.5–8 cm, slender, not winged, densely to sparsely fulvous pubescent; blade broadly ovate or ovate, 3.5–13 × 2.5–11 cm, membranous, abaxially sparsely pubescent especially on veins to glabrous, adaxially sparsely scattered setulose, pinnately veined, lateral veins 8, arcuate-ascending, margin remotely, obscurely to coarsely sinuate-dentate with mucronulate teeth, apex shortly rather broadly acuminate. Capitula heterogamous, disciform or minutely radiate, few to numerous, arranged in rather dense compound thyrsoid corymbs; peduncles short, 2–5 mm, pubescent, 1- or 2-bracteolate; bracts 3–6, linear. Involucres cylindric, 6–8 × ca. 1.5 mm, calyculate; bracts of calyculus few, short; phyllaries 5, oblong, ca. 1 mm wide, herbaceous, glabrous, sparsely arachnoid, or rarely sparsely to densely setulose, margin narrowly scarious, apex obtuse to acute and puberulent. Female florets 2; corolla tube 7–7.5 mm, filiform and 5-denticulate or with minute inconspicuous apically 2-denticulate lamina. Bisexual florets 3; corolla yellow, ca. 8 mm, with ca. 3.5 mm tube and funnelform limb; lobes ovate-triangular, ca. 1 mm, apically acute. Anthers ca. 3 mm; anther tails just exceeding antheropodia; appendages oblong-ovate; antheropodia rather short and broad, basally slightly dilated. Style branches ca. 1.5 mm, fringed with long papillae; terminal tuft not clearly differentiated. Achenes ca. 2.2 mm, glabrous. Pappus white, ca. 7 mm. Fl. Sep.

Mixed forests; ca. 2700 m. Xizang (Yadong) [Bhutan, India (Sikkim), Nepal].

**13. *Synotis alata*** (Wallich ex Candolle) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 306. 1984.

翅柄合耳菊 chi bing he er ju

*Senecio alatus* Wallich ex Candolle, Prodr. 6: 368. 1838; *S. alatus* var. *oligocephalus* Y. L. Chen & K. Y. Pan; *S. cymatocephalis* Diels.

Herbs, rhizomatous. Rhizome thick, woody, branching. Vegetative stem creeping, ascending, or erect, 30–50 cm, leafless in lower part, leafy in upper part or at apex only, fulvous tomentose or villous. Flowering stem solitary, erect,  $\pm$  subscapiform, 20–60 cm tall, tomentose or villous. Leaves at base of flowering stems petiolate, subrosulate or somewhat distant; petiole 5–10 cm, broadly to narrowly winged, at least toward base, obscurely to distinctly auriculate; auricle subamplexicaul, sparsely dentate or entire; blade broadly ovate to lanceolate, 9–22  $\times$  4.5–12 cm, membranous, abaxially pubescent or shortly villous especially on veins, adaxially sparsely to densely finely setulose, pinnately veined, lateral veins 10–12, arcuate-ascending, base cordate, truncate, or broadly cuneate, margin obscurely sinuate and minutely mucronulate-denticulate to distinctly mucronulate-serrate or coarsely and irregularly mucronulate-dentate, apically acute-acuminate. Flowering stem leaves usually few, smaller, sessile, ovate-oblong or elliptic to oblanceolate-oblong or lanceolate-oblong; upper leaves often apically attenuate, basally subamplexicaul. Capitula heterogamous, disciform, or minutely radiate, rather few to very numerous, arranged in narrowly to broadly pyramidal thyrsoid corymbs or branched thyrsoid panicles; peduncles 1–3 mm, densely setose or tomentose, minutely bracteate, 1- or 2-bracteolate. Involucres cylindrical, 5–7  $\times$  ca. 1.5 mm, very shortly calyculate; bracts of calyculus few; phyllaries 4 or 5, oblong-linear, 0.5–1 mm wide, herbaceous, usually densely setulose, margin narrowly scarious, apically obtuse. Ray florets 2; corolla 2–3.5 mm, truncate or minutely radiate, shorter than style. Disk florets 2 or 3 (or 4); corolla yellow, 7–7.5 mm, with 2.5–3 mm tube and funnelform limb; lobes ovate-oblong, 1–1.2 mm, apically acute. Anthers ca. 3 mm; anther tails 0.3–0.75  $\times$  as long as antheropodia; appendages ovate-oblong; antheropodia somewhat elongated, stout, basally dilated. Style branches ca. 1 mm, fringed with rather short papillae and with a rather short and scant terminal tuft. Achenes ca. 1.5 mm, puberulent or glabrous. Pappus white, 5–6 mm. Fl. Aug–Nov.

Forests, thickets; 1900–4000 m. Guizhou, Xizang, Yunnan [Bhutan, NE India, Myanmar, Nepal].

**14. *Synotis ainsliaefolia*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 307. 1984.

宽翅合耳菊 kuan chi he er ju

Herbs, probably rhizomatous, 30–200 cm tall; basal part not seen. Vegetative stems densely brown villous. Flowering stems solitary, erect, subscapiform, densely ferruginous pubescent. Leaves mostly subrosulate at base of flowering stems; petiole 4–9 cm, broadly to narrowly winged, base expanded and subamplexicaul, adaxially densely brown villous on midvein; blade ovate or ovate-oblong, 15–26  $\times$  8–14 cm, papery, abaxially pubescent or shortly brownish villous especially on veins, adaxially hirtellous, pinnately veined, lateral veins 8–10, arcuate-ascending, base subtruncate or cordate, margin irregularly dentate or dentate-lacerate with mucronulate teeth, apex acuminate. Flowering stem leaves few, rapidly diminishing in size upward, shortly petiolate or sessile, ovate to lanceolate. Capitula heterogamous, minutely radiate, numerous, arranged in narrow to spreading paniculoid thyrse; peduncles 1–2 mm, densely pubescent, 1- or 2-bracteolate; bracts and bracteoles

small. Involucres cylindrical, 5–6  $\times$  2–2.5 mm, very shortly calyculate; bracts of calyculus few; phyllaries 8, linear-lanceolate, 1–1.5 mm, herbaceous, densely setulose, margin broadly scarious, densely setulose, apically obtuse or acute. Ray florets 2; corolla yellow, 5–5.5 mm; corolla tube ca. 3 mm; lamina oblong-elliptic, ca. 2.5  $\times$  1 mm, 4-veined, obscurely 3-denticulate. Disk florets 8 or 9; corolla dull yellow, ca. 7 mm, with ca. 3 mm tube and funnelform limb; lobes ovate-lanceolate, 1–1.2 mm, apically acute, papillose. Anthers ca. 2 mm, anther tails slightly exceeding antheropodia, appendages lanceolate; antheropodia somewhat elongated, rather stout, basally dilated. Style branches ca. 0.7 mm, fringed with moderately long papillae, terminal tuft lax, slightly longer than lateral ones. Achenes (immature) ca. 1.5 mm, glabrous. Pappus white, 5–6 mm. Fl. Sep.

• Open places in forests; ca. 2700 m. Xizang (Delei valley).

**15. *Synotis tetrantha*** (Candolle) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 308. 1984.

四花合耳菊 si hua he er ju

*Senecio tetranthus* Candolle, Prodr. 6: 370. 1838.

Herbs, scandent. Stems terete, sparsely pubescent or subglabrous, branching, leafy. Leaves rather distant, petiolate; blade ovate or ovate-lanceolate, 5.5–12  $\times$  3.5–9 cm, membranous, abaxially sparsely pubescent especially on veins to glabrous, adaxially scattered setulose, pinnately veined, lateral veins 10, arcuate-ascending, base cordate, truncate, or rounded, margin mucronately irregularly sinuate-serrate or dentate, apex acutely long acuminate. Capitula heterogamous, minutely radiate, numerous, arranged in terminal and axillary paniculoid thyrse, shortly pedunculate or subsessile; peduncles densely pubescent, linear-bracteate. Involucres narrowly cylindrical, 4–5.5  $\times$  1–1.5 mm, shortly calyculate; bracts of calyculus few; phyllaries 4 or 5, oblong, herbaceous, sparsely pubescent, margin scarious, apically obtuse. Ray florets 2; corolla yellow, ca. 5 mm, with ca. 2.5 mm tube and oblong-linear, minutely 3-denticulate lamina, usually shorter than style. Disk florets 2 (or 3); corolla yellow, long exserted, ca. 7.5 mm, with ca. 2.5 mm tube and funnelform limb; lobes erect, oblong-lanceolate, ca. 1.5 mm, apically acute. Anthers ca. 2 mm, anther tails ca. equaling antheropodia; appendages ovate-lanceolate; antheropodia distinctly dilated at base. Style branches ca. 0.8 mm, fringed with rather short papillae. Achenes ca. 2.5 mm, sparsely puberulent. Pappus white or pale reddish, ca. 5 mm. Fl. Aug–Sep.

Mixed woods, forests; 2300–2700 m. Xizang (Cona, Nyalam) [Bhutan, NE India, Nepal].

**16. *Synotis yui*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 308. 1984.

蔓生合耳菊 man sheng he er ju

Herbs, rhizomatous. Rhizome woody, creeping. Stem solitary, subscandent, flexuous, 35–45 cm, slender, pubescent with brownish multicellular hairs, glabrescent, leafy. Leaves shortly petiolate; petiole 0.5–0.8 cm,  $\pm$  pubescent; blade abaxially purple, adaxially deep green, ovate or ovate-lanceolate, 4–10  $\times$  1.5–2.5 cm, papery, abaxially sparsely pubescent on veins to

glabrous, adaxially scattered setulose to glabrous, triplinerved from base, base rounded,  $\pm$  falcate in upper part, margin remotely sinuate-denticulate to rather distantly coarsely serrate with mucronate teeth, apex acuminate or caudate-acuminate; uppermost leaves similar but smaller and narrower. Capitula heterogamous, disciform, in lax terminal and upper axillary 3–7-headed corymbs; peduncles 6–18 mm, slender, linear-bracteate at base, with 1 or 2 linear bracteoles in upper part, sparsely shortly fulvous pubescent. Involucres cylindric, 8–12  $\times$  2–3 mm, obscurely calyculate; bracts of calyculus 1–3, unequal; phyllaries 5, oblong-linear, 1–1.5 mm wide, herbaceous, glabrous, 3-veined, margin narrowly scarious, apically obtuse and pubescent. Marginal female florets 2; corolla yellow, ca. 5 mm, filiform, not radiate, shorter than style. Disk florets 3 or 4; corolla yellow, ca. 13 mm, with ca. 4 mm tube and narrowly funnelliform limb; lobes oblong-lanceolate, ca. 1.5 mm, apically acute, puberulent. Anthers long exerted, ca. 5 mm, anther tails 0.5–0.75  $\times$  as long as antheropodia; appendages ovate-oblong; antheropodia long, stout, basally distinctly dilated. Style branches ca. 2 mm, fringed with stout papillae, terminal tuft much longer than lateral ones. Achenes ca. 3.5 mm, glabrous. Pappus white, ca. 9 mm. Fl. and fr. Aug–Sep.

Moss forests; 2700–2900 m. Xizang (Médog), Yunnan [Myanmar].

**17. *Synotis hieraciifolia*** (H. Léveillé) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 310. 1984.

毛叶合耳菊 mao ye he er ju

*Gynura hieraciifolia* H. Léveillé, Bull. Géogr. Bot. 24: 284. 1914; *G. esquirolii* H. Léveillé; ?*Senecio hui* C. C. Chang; *S. lonchophyllus* Handel-Mazzetti.

Herbs, perennial; basal part not seen. Stems glabrous, leafy. Leaves shortly petiolate; petiole 1–2.5 cm, sparsely fulvous arachnoid, glabrescent to glabrous; blade elliptic or oblanceolate-elliptic, 8–12  $\times$  1.5–4 cm, thickly papery, abaxially sparsely fulvous arachnoid, adaxially glabrous, pinnately veined, lateral veins 10–14, inconspicuous, base cuneate, margin remotely mucronulate-serrate, apex acuminate; uppermost leaves similar but smaller. Capitula radiate in lax few-headed terminal and upper axillary corymbs or thyrses; peduncles 1.5–3 cm, slender, sparsely to densely fulvous tomentose, glabrescent, basally linear-bracteate; bracteoles 3–5, linear-subulate, 3–5 mm, apically acute. Involucres campanulate, 8–10  $\times$  4–7 mm, calyculate; bracts of calyculus 5 or 6, linear-subulate, 2–3 mm; phyllaries 13, oblong-lanceolate, 1–1.2 mm, herbaceous, glabrous except at base, margin broadly scarious, apically acute or acute-acuminate and puberulent. Ray florets 7; corolla tube 8–8.5 mm; lamina yellow, oblong, 9–10  $\times$  ca. 3 mm, 4-veined, 3-denticulate. Disk florets to 25; corolla 12–13 mm, with ca. 7.5 mm tube and funnelliform limb; lobes lanceolate, ca. 2.5 mm, apically acute, papillose. Anthers ca. 4 mm, anther tails shorter than antheropodia; appendages ovate-lanceolate; antheropodia dilated at base. Style branches ca. 3 mm, fringed with long stout papillae, terminal tuft not markedly longer than laterals. Achenes 3–3.5 mm, glabrous. Pappus white, 9–10 mm. Fl. Feb–Mar.

• Riversides, forest margins, on rocks; 800–2200 m. Guizhou (Guanling), Yunnan (Wenshan).

**18. *Synotis guizhouensis*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 313. 1984.

黔合耳菊 qian he er ju

Herbs, rhizomatous. Rhizome woody, to 5 mm in diam., erect or ascending. Stem solitary, erect, ca. 130 cm tall, leafless in lower part, rather densely leafy above, simple, white arachnoid, glabrescent. Leaves shortly petiolate; petiole ca. 1 cm, fulvous pubescent and thinly arachnoid; blade oblanceolate-oblong, 8–15  $\times$  1.5–2.5 cm, papery, abaxially thinly arachnoid, adaxially white arachnoid on midvein, pinnately veined, lateral veins 14–18, base attenuate, margin remotely shallowly to coarsely sinuate-dentate, with mucronulate teeth, apex acute or acute-acuminate. Upper leaves smaller; uppermost leaves sessile, linear, bractlike, 12–20  $\times$  1–3 mm. Capitula radiate, solitary in axils of bractlike uppermost leaves, forming a narrow terminal raceme; peduncles 8–10 mm, densely arachnoid-tomentose; bracteoles 4 or 5, 3–5 mm. Involucres tubular, 6–7  $\times$  2–3 mm, calyculate; bracts of calyculus 3 or 4, subulate, short; phyllaries 8–10, oblong, 1–1.5 mm wide, triangular-spreading, apically obtuse, and densely puberulent, subleathery, thinly arachnoid, margin broadly scarious. Ray florets 5; corolla tube ca. 7 mm; lamina yellow, oblong, ca. 3  $\times$  1–1.5 mm, 6-veined, 4-denticulate. Disk florets 18 or 19; corolla ca. 10 mm, with ca. 2.5 mm tube and funnelliform limb; lobes oblong-lanceolate, apically acute, papillose. Anthers ca. 4.5 mm; antheropodia stout, basally somewhat dilated; appendages ovate-lanceolate; anther tails ca. 2  $\times$  as long as antheropodia. Style branches ca. 2 mm, fringed with papillae, terminal tuft not evidently longer than laterals. Achenes ca. 3 mm, glabrous. Pappus pale straw-colored, ca. 11 mm. Fl. Sep.

• Montane forests; ca. 1600 m. Guizhou.

**19. *Synotis sinica*** (Diels) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 313. 1984.

华合耳菊 hua he er ju

*Gynura sinica* Diels, Bot. Jahrb. Syst. 29: 618. 1901; *Senecio sinicus* (Diels) C. C. Chang.

Herbs, rhizomatous. Stem solitary, erect, 50–80 cm tall, leafless in lower part, rather densely leafy above, simple or branching in synflorescence only, fulvous arachnoid, glabrescent. Leaves shortly petiolate; petiole 0.5–1.5 cm, densely fulvous pubescent; upper leaves subsessile or sessile, gradually smaller; leaf blade narrowly oblanceolate-elliptic or oblanceolate, 10–16  $\times$  2–3 cm, papery, abaxially sparsely shortly setulose and sometimes purplish, adaxially thinly fulvous arachnoid on midvein, pinnately veined, lateral veins 10–14, base attenuate, margin rather remotely shallowly sinuate-dentate with mucronulate teeth, apex acute-acuminate. Capitula discoid, not very numerous, arranged in narrow terminal thyrses, solitary in axils of upper leaves in lower part of synflorescence, in small axillary and terminal corymbs toward apex of synflorescence; peduncles 5–10 mm, bracteate, densely fulvous arachnoid, with 3 or 4 linear-subulate bracteoles. Involucres cylindric or nar-

rowly campanulate, 7–9 × 2–3 mm, calyculate; bracts of calyculus 3–5, short; phyllaries 8, linear-lanceolate, 1.5–2 mm wide, herbaceous, sparsely to densely arachnoid, margin narrowly scarios, apically obtusely triangular-acuminate and puberulent, somewhat spreading. Ray florets absent. Disk florets ca. 14 or 15; corolla yellow, ca. 10 mm, with ca. 3 mm tube and funnellform limb; lobes oblong-lanceolate, ca. 1.7 mm, apically acute. Anthers 4 or 5; anther tails equaling antheropodia; appendages ovate-oblong; antheropodia rather short and broad, basally slightly dilated. Style branches ca. 1.8 mm, fringed with long papillae, terminal tuft not longer than laterals. Achenes 3–4 mm, glabrous. Pappus white, 7–9 mm. Fl. Jul–Sep.

• Montane forests; 1300–2200 m. Chongqing (Nanchuan), Guizhou.

**20. *Synotis chingiana*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 315. 1984.

子农合耳菊 *zi nong he er ju*

Herbs, rhizomatous. Rhizome thick, woody. Stem solitary, erect, to 80 cm tall, leafless in lower part, leafy above, branching in synflorescence, fulvous arachnoid-tomentose, glabrescent. Leaf petiole 1–3 cm, arachnoid-tomentose; leaf blade elliptic-oblong or oblong-lanceolate, to 22 × 6 cm, membranous, abaxially thinly floccose-arachnoid-tomentose and ± glabrescent, adaxially green and sparsely shortly setulose, pinnately veined, lateral veins 16–20, arcuate-ascending and intramarginally uniting, base cuneate, margin minutely mucronulate-dentate, apex acute-acuminate. Upper leaves and leaves of branches shortly petiolate, oblong-lanceolate, smaller. Capitula disciform, moderately numerous, arranged in lax 2–7-flowered terminal and upper axillary thyrsoid corymbs; peduncles 1.5–2.5 cm, fulvous tomentose, basally bracteate; bracteoles 3–5, linear, 5–7 mm, sparsely pubescent, apically acuminate. Involucres campanulate-cylindric, 10–12 × 4–5 mm, prominently calyculate; bracts of calyculus 10–12, linear, ca. 1/3 as long as phyllaries, phyllaries 8 or 9, oblong-lanceolate, 1–1.5 mm wide, herbaceous, sparsely pubescent or subglabrous, obscurely 3–5-veined, margin broadly scarios, apically acute, puberulent and purplish. Female florets 6; corollas filiform, ca. 9 mm, with ca. 3.5 mm tube and subcylindric, 5-denticulate limb. Disk florets 19 or 20; corolla ca. 10 mm, with ca. 4 mm tube and funnellform limb; lobes ovate-oblong, ca. 1.5 mm, apically acute. Anthers ca. 3 mm; anther tails ca. equaling antheropodia; appendages ovate-lanceolate; antheropodia long, robust, basally distinctly dilated. Style branches ca. 1.5 mm, fringed with rather short papillae, terminal tuft distinct, ca. equaling laterals. Achenes ca. 3 mm, glabrous. Pappus white, ca. 10 mm. Fl. and fr. Oct.

• Broad-leaved and mixed forests; ca. 3000 m. NW Yunnan (Yangbi).

**21. *Synotis xantholeuca*** (Handel-Mazzetti) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 316. 1984.

黄白合耳菊 *huang bai he er ju*

*Senecio xantholeucus* Handel-Mazzetti, Symb. Sin. 7: 1127. 1936.

Herbs, rhizomatous. Rhizome thick, woody. Stem solitary, erect, 70–150 cm tall, leafless in lower part, leafy above, branching in synflorescence, densely white tomentose, subglabrescent. Leaf petiole 1–3.5 cm, stout, densely white tomentose and brownish setulose; blade ovate-lanceolate or lanceolate, to 23 × 7.5 cm, membranous, abaxially densely white tomentose, adaxially minutely fulvous pubescent especially on veins and sometimes at first also thinly floccose-tomentose, pinnately veined, lateral veins 16–24, arcuate-ascending and intramarginally uniting, base rounded to obtuse, margin rather closely to remotely apiculate-dentate, apex long acuminate, apiculate. Upper leaves and leaves of branches shortly petiolate, gradually smaller. Capitula minutely radiate, rather numerous, arranged in rounded 2–13-headed rather dense to lax axillary and terminal corymbs; peduncles 0.5–2 cm, densely tomentose, basally bracteate, with a few linear or linear-filiform 4–8 mm bracteoles. Involucres cylindric-campanulate, 6–8 × 2.5–3.5 mm, calyculate; bracts of calyculus 3 or 4, purplish, linear, to 1/2 as long as phyllaries; phyllaries 5 or 8, oblong-lanceolate, 1–1.5 mm wide, herbaceous, sparsely arachnoid-tomentose, margin broadly scarios, apically acute to subobtusely-acuminate, puberulent and usually purplish. Ray florets 5; corolla tube ca. 4 mm; lamina yellow, ovate-oblong, small, usually shorter than style, apically 3-denticulate. Disk florets 5–10; corolla yellow, 9–10 mm, with ca. 3 mm tube and narrowly funnellform limb; lobes lanceolate, ca. 1 mm, apically acute. Anthers ca. 2.5 mm; anther tails exceeding antheropodia; appendages lanceolate; antheropodia slightly dilated at base. Style branches ca. 0.7 mm, fringed with rather short papillae, apical tuft distinct, much longer than laterals. Achenes ca. 2.5 mm, glabrous. Pappus white, 9–10 mm. Fl. and fr. Sep–Dec.

• Mixed forests, wet places; 2200–2700 m. NW Yunnan.

**22. *Synotis yakoensis*** (Jeffrey) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 318. 1984.

丫口合耳菊 *ya kou he er ju*

*Senecio yakoensis* Jeffrey, Notes Roy. Bot. Gard. Edinburgh 5: 195. 1912.

Herbs, robust, somewhat shrubby. Stems erect, ca. 90 cm tall, branching in synflorescence, densely white tomentose, setulose with reddish brown multicellular hairs. Leaf petiole 1–1.5 cm, densely white tomentose and brown setulose; blade lanceolate or elliptic-lanceolate, 7–16 × 4–5.5 cm, papery, abaxially densely white tomentose and ferruginous setuliferous especially on veins, adaxially shortly fulvous pubescent especially on veins, pinnately veined, lateral veins 18–20, arcuate-ascending and intramarginally uniting, base rounded, margin apiculate-dentate, apically acuminate-attenuate or acuminate. Upper leaves and leaves of branches shortly petiolate, lanceolate or narrowly lanceolate, gradually smaller, apically attenuate. Capitula minutely radiate, numerous, arranged in globose, rather dense, axillary and terminal corymbs; peduncles 5–10 mm, densely tomentose and brownish setulose, basally bracteate, with a few linear, densely tomentose bracteoles. Involucres cylindric, 6–7 × 2–2.5 mm, calyculate; bracts of calyculus 4 or 5, to 1/2 as long as phyllaries; phyllaries 5, oblong-linear, ca. 1

mm wide, herbaceous, thinly arachnoid-tomentose, margin narrowly scarious, apically obtuse or obtuse-acuminate, puberulent and dark colored. Ray florets 4; corolla tube ca. 4 mm; lamina yellow, ca. 3.5 mm, usually shorter than style, 3-denticulate. Disk florets 7–9; corolla yellow, ca. 8 mm, with ca. 3.5 mm tube and funnellform limb; lobes ovate-triangular, ca. 1 mm, apically acute, puberulent. Anthers ca. 2.5 mm; anther tails ca. 0.3 × as long as antheropodia; appendages ovate-lanceolate; antheropodia slightly dilated at base. Style branches ca. 1 mm, fringed with short papillae, terminal tuft distinct but hardly longer than laterals. Achenes ca. 5 mm, glabrous. Pappus white, ca. 7 mm. Fl. Oct–Nov.

- Open montane slopes and forests; ca. 2000 m. NW Yunnan.

**23. *Synotis cappa*** (Buchanan-Hamilton ex D. Don) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 319. 1984.

密花合耳菊 mi hua he er ju

*Senecio cappa* Buchanan-Hamilton ex D. Don, Prodr. Fl. Nepal. 179. 1825; *S. densiflorus* Wallich ex Candolle; *S. densiflorus* var. *lobbii* J. D. Hooker; *S. nagensium* C. B. Clarke var. *lobbii* (J. D. Hooker) Craib; *S. tsoongianus* Y. Ling.

Subshrubs or shrubby herbs, rhizomatous. Stems erect, to 150 cm tall, often flexuous, densely lanate or arachnoid-tomentose, ± glabrescent when old, simple or usually branching above in synflorescences, leafless in lower part at anthesis. Leaves petiolate or sometimes subsessile; petiole to 10 mm, stout, densely tomentose, base often auriculate; blade broadly to narrowly obovate-oblong or oblong-elliptic, 10–28 × 4–8 cm, papery, abaxially densely to sparsely fulvous pubescent on veins and densely to sparsely whitish tomentose, sometimes ± glabrescent, adaxially shortly densely to sparsely pubescent and sometimes thinly white arachnoid to subglabrous, pinnately veined, lateral veins 12–28, arcuate-ascending, base attenuate, margin finely to coarsely mucronulate-serrate, apically acuminate. Upper leaves and leaves of branches lanceolate or linear-lanceolate, gradually smaller. Capitula radiate, usually numerous, arranged in terminal and axillary usually 10–20-headed dense compound corymbs or thyrses; peduncles 5–10 mm, densely tomentose, with a few linear or linear-subulate bracts. Involucres narrowly campanulate, 5–7 × 2–4 mm, calyculate; bracts of calyculus ca. 8, linear-lanceolate, 3–5 mm, apically acuminate; phyllaries 8–13, linear-lanceolate, ca. 1 mm wide, herbaceous, densely tomentose, margin narrowly scarious, apically obtuse to acute and puberulent. Ray florets ca. 8; corolla tube ca. 2.5 mm; lamina yellow, ca. 3.5 × 1 mm, 4-veined, 3-denticulate. Disk florets 11–17; corolla yellow, ca. 5 mm, with ca. 1.5 mm tube and funnellform limb; lobes ovate-oblong, ca. 1.5 mm, apically acute. Anthers ca. 2.5 mm; anther tails slightly exceeding antheropodia; appendages ovate-oblong; antheropodia rather slender, basally slightly dilated. Style branches ca. 1 mm, fringed with short papillae, terminal tuft not evident. Achenes ca. 2 mm, glabrous. Pappus white, ca. 5 mm. Fl. Oct–Jan.

Forest margins, thickets, streamsides, meadows; 1500–2300 m. Guangxi, Sichuan, Xizang, Yunnan [Bhutan, NE India, Myanmar, Nepal, N Thailand].

**24. *Synotis ionodasys*** (Handel-Mazzetti) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 320. 1984.

紫毛合耳菊 zi mao he er ju

*Senecio ionodasys* Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 637. 1937.

Subshrubs or herbs, rhizomatous. Stem solitary, erect, flexuous, to 100 cm tall, when young with dense rusty brown tomentum, glabrescent, leafless in lower part at anthesis. Leaf petiole 3–3.5 cm, prominently purplish brown setulose, basally slightly expanded, not auriculate; blade adaxially green, oblanceolate, obovate-oblong, or elliptic, 8–23 × 2.5–8 cm, papery, abaxially densely whitish tomentose and brownish setulose on veins, adaxially thinly arachnoid with fugacious tomentum and sparsely scattered setulose especially on veins, pinnately veined, lateral veins 14–22, arcuate-ascending, furcate distally and excurrent in teeth, prominent abaxially, base cuneate-attenuate, margin sharply apiculate-serrate, apex shortly acuminate. Upper leaves shortly petiolate, gradually smaller. Capitula radiate, numerous, arranged in axillary and terminal compound corymbs; peduncles 5–15 mm, fulvous tomentose and purplish setulose. Involucres campanulate, 7–8 × 4–6 mm, calyculate; bracts of calyculus several, unequal, longest equaling phyllaries; phyllaries ca. 13, linear-lanceolate, ca. 1 mm wide, herbaceous, densely fulvous tomentose and often also purplish setulose, margin narrowly scarious, apically acute. Ray florets 14–20; corolla tube ca. 3.5 mm; lamina yellow, oblong, ca. 6 × 1.5 mm, 4- or 5-veined, 3-denticulate. Disk florets ca. 12; corolla yellow, ca. 7 mm, with ca. 3 mm tube and narrowly funnellform limb; lobes ovate-oblong, ca. 1 mm, apically acute. Anthers ca. 3 mm; anther tails ca. 1.5 × as long as antheropodia, appendages lanceolate; antheropodia elongated, basally dilated. Style branches ca. 1 mm, fringed with short papillae, terminal tuft barely differentiated. Achenes ca. 1.5 mm, glabrous or sparsely pubescent. Pappus white, ca. 6.5 mm. Fl. Feb–Oct.

- Forests, streamsides; 1200–2500 m. S Yunnan.

**25. *Synotis nagensium*** (C. B. Clarke) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 321. 1984.

锯叶合耳菊 ju ye he er ju

*Senecio nagensium* C. B. Clarke, J. Linn. Soc., Bot. 25: 39. 1889; *Inula vernoniiformis* H. Léveillé; *Pulicaria kouyangensis* Vaniot; *S. densiflorus* Wallich ex Candolle var. *fargesii* (Franchet) Handel-Mazzetti; *S. densiflorus* var. *mishmiensis* J. D. Hooker; *S. hugonis* S. Moore; *S. prionophyllus* Franchet; *Vernonia fargesii* Franchet.

Subshrubs or herbs, rhizomatous. Stem erect, to 150 cm tall, densely whitish tomentose or fulvous tomentose, branching in synflorescence, leafless in lower part at anthesis. Leaves shortly petiolate; petiole 5–25 mm, densely tomentose and often also setulose with reddish brown hairs; blade adaxially green, obovate-elliptic, oblanceolate-elliptic, or elliptic, 7–23 × 2.5–8.5 cm, papery, abaxially densely whitish tomentose or fulvous tomentose and brownish setulose especially on veins, adaxially sparsely arachnoid-tomentose and shortly scattered pubescent, pinnately veined, lateral veins 20–26(–30), arcuate-ascending, prominent adaxially, base cuneate or cuneate-attenuate, margin

finely to coarsely mucronulate-serrate or biserrate, apex shortly acuminate; upper and branch leaves smaller, shortly petiolate, narrowly elliptic or lanceolate. Capitula heterogamous, disciform or minutely radiate, numerous, arranged in narrow, simple, to spreading, compound, terminal and upper axillary paniculoid thyrses; peduncles 5–12 mm, densely tomentose and sometimes also ferruginous setulose, linear-bracteate. Involucres obconic-campanulate, 7–8 × 4–6 mm, calyculate; bracts of calyculus ca. 8, usually linear, equaling phyllaries, sometimes leaflike and much exceeding phyllaries; phyllaries 13–15, linear, 1–1.5 mm wide, herbaceous, very densely tomentose, margin narrowly scarious, apically acute. Female florets 12 or 13; corolla yellow, filiform, or minutely radiate, ca. 6 mm, minutely 3-denticulate. Disk florets 12–20; corolla yellow, ca. 6 mm, with ca. 3 mm tube and funnellform limb; lobes ovate-lanceolate, ca. 1.5 mm, apically acute. Anthers ca. 3 mm; anther tails ca. 0.75–2 × as long as antheropodia; appendages ovate-oblong; antheropodia rather long and narrow, basally hardly dilated. Style branches ca. 1.5 mm, fringed with short papillae, terminal tuft indistinct. Achenes ca. 1.7 mm, sparsely pubescent. Pappus white, ca. 5 mm. Fl. Aug–Mar.

Woods, thickets, meadows; 100–2000 m. Gansu, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Sichuan, Xizang, Yunnan [NE India, N Myanmar, N Thailand].

**26. *Synotis otophylla*** Y. L. Chen, Acta Phytotax. Sin. 33: 81. 1995.

耳柄合耳菊 er bing he er ju

Herbs, rhizomatous. Rhizome woody, ascending. Stems erect, striate, purplish, 60–65 cm tall, branching in upper part, 3–4 mm in diam. at base, minutely setulose. Leaves long petiolate, basal leaves withered at anthesis; blade papery, lower leaf petiole 4–5 cm, sparsely puberulent, basally leaflike-expanded, auriculate-amplexicaul, with mucronulate teeth margins; blade abaxially purplish, adaxially green, triangular-ovate or triangular-hastate, 8–10 × 8–9 cm, palmately 5-veined, both surfaces adpressed fulvous pubescent, base deeply cordate or subhastate, margin irregularly dentate, with mucronulate teeth, apex acute or acuminate. Upper leaf petiole 1.5–3.5 cm, fulvous puberulent, basally leaflike-expanded auriculate, amplexicaul; blade smaller, ovate or broadly ovate, 4–5 × 4–4.5 cm, both surfaces fulvous setulose, base subcordate or truncate, margin irregularly dentate with mucronulate teeth, apex acute or acute-acuminate. Uppermost leaves shortly petiolate or subsessile, lanceolate or linear, very small, 1–1.5 cm, margin entire or 2- or 3-denticulate. Capitula discoid, numerous, arranged in terminal corymbose thyrses; peduncles 1–2 mm, densely pubescent, with 1 or 2 scalelike bracts. Involucres cylindric, 1.5–2 × 1.5–2 mm, with 1–3 subulate bracteoles at base; phyllaries 5, oblong, 1–1.5 mm wide, subleathery, sparsely puberulent or subglabrous, obscurely 1–3-veined, margin narrowly scarious, apically obtuse, purplish. Disk florets 5, distinctly exerted beyond phyllaries; corolla yellow-purplish, ca. 5 mm, with 2–2.5 mm tube and narrowly campanulate limb; lobes ovate-lanceolate, apically acute, papillose. Anthers linear, ca. 3 mm; anther tails long; antheropodium stout, basally slightly dilated. Style branches obtuse, fringed with rather short fine papillae. Achenes ca. 2.5 mm, glabrous. Pappus purplish brown. Fl. Sep.

• *Picea* forests; ca. 3300 m. S Xizang (Gyirong).

**27. *Synotis solidaginea*** (Handel-Mazzetti) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 323. 1984.

川西合耳菊 chuan xi he er ju

*Senecio solidagineus* Handel-Mazzetti, Acta Horti Gothob. 12: 285. 1938; *S. paucinervis* Dunn var. *brachylepis* C. Marquand & Airy Shaw.

Herbs, rhizomatous, forming large clumps. Rhizome woody, creeping. Stems 1–3, erect, 30–70 cm tall, simple or few branched in upper part, densely to sparsely arachnoid and ± glabrescent, leafless in lower part at anthesis. Leaves rather crowded; petiole 0.5–2 cm, sparsely arachnoid; blade ovate-lanceolate, lanceolate, or elliptic-oblong, 6–12 × 2–4.5 cm, papery, both surfaces at first sparsely arachnoid, glabrescent, pinnately veined, lateral veins (6–)8–10, arcuate, strongly ascending, prominent abaxially, base cuneate to rounded and often unequal, margin regularly and closely acutely serrate or sometimes subduplicate-serrate, apex acutely shortly acuminate. Upper leaves shortly petiolate, gradually smaller upward. Capitula homogamous, discoid, very numerous, arranged in dense terminal and upper axillary usually narrowly pyramidal compound thyrses, shortly pedunculate or subsessile; peduncles 1–2 mm, densely white tomentose; bracts subulate, small. Involucres narrowly cylindric, ca. 3 × 1–1.5 mm, calyculate; bracts of calyculus few, scalelike, very short; phyllaries 4 or 5, green with darker apices, broadly oblong, ca. 1 mm wide, subleathery, arachnoid, glabrescent, margin scarious, apically obtuse or rounded and shortly ciliate. Ray florets absent. Disk florets 3; corolla pale yellow or cream, ca. 6 mm, with ca. 1.5 mm tube and long-exserted funnellform limb; lobes oblong-lanceolate, ca. 1.5 mm, apically acute. Anthers ca. 2.5 mm; anther tails ca. 0.5 × as long as antheropodia; appendages oblong-lanceolate; antheropodia elongated, narrow, basally slightly dilated. Style branches ca. 1.5 mm, fringed with short papillae, terminal tuft not distinctive. Achenes ca. 2.5 mm, pubescent. Pappus white or pale straw-colored, 4.5–5 mm. Fl. Jul–Oct.

• Open sunny places; 2900–3900 m. Sichuan, Xizang, Yunnan.

**28. *Synotis cordifolia*** Y. L. Chen, Acta Phytotax. Sin. 33: 79. 1995.

心叶合耳菊 xin ye he er ju

Herbs, rhizomatous. Rhizomes not seen. Stems erect, 40–70 cm, striate, flexuous, simple, gray-white pubescent or subglabrous. Leaves long petiolate; petiole 4–8.5 cm, sparsely puberulent, basally slightly expanded; blade adaxially green, ovate-cordate or cordate, 9–13 × 6–10 cm, subleathery, palmately 5-veined, abaxially fulvous setulose on veins, adaxially glabrous, margin irregularly coarsely dentate, with mucronate broadly triangular teeth or subrepand-dentate, apically acuminate or acute. Capitula discoid, numerous, arranged in terminal and axillary in upper part pyramidal thyrses or corymbose panicles; peduncles 3–6 mm, densely fulvous pubescent. Involucres cylindric, 1.5–2 mm wide; phyllaries 3, subleathery, oblong, 1.5–2 mm wide, glabrous, sometimes slightly 3–6-veined, apically obtuse. Ray florets absent. Disk florets 3; corolla yellow, 5–6 mm, with 2.5–3 mm tube and funnellform limb; lobes ob-

long-lanceolate, apically acute, fringed with papillae. Anthers linear, 2–3 mm, basally caudate; antheropodia stout, basally slightly expanded. Style branches excurved, apically obtuse, papillose. Achenes 3–4 mm, glabrous, ribbed. Pappus rubescent, 5–6 mm. Fl. and fr. Oct.

- Mixed forests; ca. 3000 m. Yunnan (Dongchuan).

**29. *Synotis erythropappa*** (Bureau & Franchet) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 324. 1984.

红纓合耳菊 hong ying he er ju

*Senecio erythropappus* Bureau & Franchet, J. Bot. (Morot) 5: 73. 1891; *Cacalia diantha* (Franchet) Handel-Mazzetti; *S. dianthus* Franchet; *S. glumaceus* Dunn; *S. paucinervis* Dunn; *S. talongensis* Franchet; *S. viridiflavus* Handel-Mazzetti; *Vernonia mairei* H. Léveillé.

Herbs, rhizomatous. Rhizome woody. Stems solitary or several, erect or rarely decumbent, to 100 cm tall, usually branching in synflorescence, leafless in lower part at anthesis, fulvous pubescent, arachnoid-pubescent, or subglabrous, glabrescent. Leaves long petiolate; petiole 2–6 cm, sparsely pubescent, subglabrescent; blade ovate, ovate-lanceolate, or oblong-lanceolate, 10–20 × 2.5–7 cm, papery or thinly so, abaxially pubescent especially on veins to subglabrous, adaxially sparsely pubescent to glabrous, pinnately veined, lateral veins 6–10, arcuate-ascending, prominent abaxially, base cordate, subtruncate, rounded, or cuneate, margin regularly and closely to coarsely and unequally shallowly to deeply serrate or dentate, apex acuminate or caudate-acuminate. Upper and branch leaves smaller, shortly petiolate, narrowly lanceolate. Capitula homogramous, discoid, very numerous, arranged in terminal and upper axillary, usually abundant, broadly pyramidal compound thyrses, shortly pedunculate or subsessile; peduncles very short, usually with 1 linear bract. Involucre narrowly cylindrical, 4–5 × 1–1.5 mm, calyculate; bracts of calyculus 3 or 4, minute; phyllaries 2 or 3 (or 4), linear-oblong, herbaceous, sometimes white tomentose or pubescent, especially at base, or glabrous, margin broadly scarios, apically obtuse and puberulent. Ray florets absent. Disk florets (1 or 2) or 3 (or 4); corolla pale yellow, 7.5–8 mm, with 2–3 mm tube and long-exserted funnellform limb; lobes oblong-lanceolate, 1.5–2 mm, apically acute. Anthers ca. 3.5 mm; anther tails ca. 0.5 × as long as antheropodia; appendages ovate-lanceolate; antheropodia robust, basally dilated. Style branches 1.5–2 mm, fringed with rather long fine papillae, terminal tuft not distinctive. Achenes 3–3.5 mm, sparsely pubescent. Pappus dirty white to pale reddish brown, ca. 6 mm. Fl. Jul–Oct.

- Forests, thicket margins, open grassy places; 1500–3900 m. W Hubei, Sichuan, SE Xizang, Yunnan.

**30. *Synotis muliensis*** Y. L. Chen, Acta Phytotax. Sin. 26: 54. 1988.

木里合耳菊 mu li he er ju

Herbs, rhizomatous. Rhizomes not seen. Stems erect, ca. 20 cm tall, branching in upper part, adpressed shortly pubescent or subglabrous. Leaf petiole 3–4 cm, fulvous puberulent, basally expanded; blade adaxially green, triangular-ovate or ovate-

lanceolate, 8–10 × 5–7.5 cm, papery, abaxially sparsely shortly pubescent, adaxially sparsely fulvous setulose, palmately 3–5-veined, base broadly cuneate or cordate, terminal lobe large, triangular to lanceolate, margin irregularly triangular-dentate, apex acuminate or long acuminate; lateral lobes ovate-triangular or ovate-oblong, margin entire or 2- or 3-denticulate, apex acute. Upper leaves smaller, shortly petiolate, triangular-lanceolate to lanceolate, 3-lobed; lobes denticulate or entire. Capitula discoid, numerous, in terminal and upper axillary pyramidal thyrses, pedunculate or subsessile; peduncles densely lanate, with 2 or 3 triangular bracteoles. Involucre cylindrical, 6–7 × 2–3 mm, calyculate; bracts of calyculus 2 or 3, subulate; phyllaries 5, glabrous, margin scarios, apically puberulent. Ray florets absent. Disk florets 5, conspicuously exceeding phyllaries, corolla yellow, 6–7 mm, with 3–3.5 mm tube and funnellform limb; lobes oblong-lanceolate, apically puberulent. Anthers linear, 3–3.5 mm, anther tails long; antheropodia slightly dilated at base. Style branches obtuse, fringed with papillae. Achenes ca. 3 mm, sparsely puberulent. Pappus white, ca. 6 mm. Fl. and fr. Aug.

- Forest margins, rocky places; 2400–2700 m. Sichuan (Muli).

**31. *Synotis palmatisecta*** Y. L. Chen & J. D. Liu, Acta Phytotax. Sin. 26: 55. 1988.

掌裂合耳菊 zhang lie he er ju

Herbs, rhizomatous. Rhizomes robust, woody, 8–10 mm in diam. Stem solitary, erect, striate, 35–40 cm tall, flexuous, simple, glabrous. Leaves long petiolate, basal leaves withered at anthesis. Median leaf petiole 3.5–4 cm, basally not expanded; blade abaxially pale green, adaxially green, ovate-triangular, 4–8 × 2.5–6.5 cm, abaxially glabrous, adaxially shortly pubescent on veins, palmately veined, veins prominent abaxially, base cordate, margin deeply palmately 5-sect; terminal lobe broader, oblong-lanceolate, 2.5–3 cm wide, coarsely dentate or lobed, apex acuminate, lateral lobes narrow, 2- or 3-denticulate. Upper leaves similar to median leaves, smaller; uppermost leaves shortly petiolate or subsessile, lanceolate, 3-lobed or entire. Capitula discoid, numerous, arranged in terminal and upper leaf axils, corymbose-paniculate; peduncles 4–5 mm, sparsely puberulent, with 1 or 2 scalelike bracteoles. Involucre cylindrical, 4–5 × 1.5–2 mm, calyculate; bracts of calyculus 1 or 2, scalelike; phyllaries 3, broadly oblong, ca. 2 mm wide, subleathery, glabrous, margin broadly scarios, apically obtuse and ciliate. Florets 3, distinctly exceeding phyllaries, corolla yellow, 6–7 mm, with ca. 3 mm tube and funnellform limb; lobes ovate-lanceolate, apically acute, puberulent. Anthers linear, 2.5–3 mm, basally long caudate; antheropodia slightly dilated at base. Style branches excurved, apically obtuse, fringed with papillae. Achenes 3–3.5 mm, glabrous, ribbed. Pappus reddish, 6–7 mm. Fl. May.

- Guizhou (Guiyang).

**32. *Synotis vaniotii*** (H. Léveillé) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 326. 1984.

羽裂合耳菊 yu lie he er ju

*Senecio vaniotii* H. Léveillé, Repert. Spec. Nov. Regni Veg. 13: 345. 1914.

Herbs, basal parts not seen. Stems erect, to 110 cm tall, branching in upper part, white puberulent, glabrescent. Leaf petiole 1–1.5 cm, slender, sparsely puberulent; blade ovate-lanceolate, 3.5–5 × 3–4 cm, papery, both surfaces sparsely and shortly ± white tomentose on main veins, glabrescent, very deeply pinnatifid, with lanceolate, attenuate, pinnately basally few dentate or lobulate terminal lobe and (4–)6–8 narrowly lanceolate or oblong-lanceolate, coarsely few dentate lateral lobes. Upper and branch leaves smaller, with shorter and fewer lateral lobes, shortly petiolate. Capitula homogamous, discoid, numerous and glomerulate in abundant, pyramidal leafy terminal thyrses, shortly pedunculate or sessile; peduncles densely shortly tomentose, 1- or 2-bracteolate. Involucres cylindric, 3–4 × 1–2 mm, calyculate; bracts of calyculus 2 or 3, minute; phyllaries 3, oblong or obovate-oblong, 1.5–2 mm wide, subleathery, glabrescent to glabrous, margin broadly scarious, apically obtuse to rounded and puberulent. Ray florets absent. Disk florets 3; corolla pale yellow, 6–7 mm, with ca. 2.5 mm tube and long-exserted funnelform limb; lobes oblong-lanceolate, ca. 2 mm, apically acute, papillose. Anthers ca. 3.5 mm; anther tails ca. equaling antheropodia; appendages ovate-lanceolate; antheropodia stout, broad, basally slightly dilated. Style branches ca. 1.5 mm, fringed with fine papillae, terminal tuft indistinct, shorter. Achenes ca. 3 mm, glabrous. Pappus somewhat rubescent, 6–6.5 mm. Fl. Sep.

- Rocky places; 2800–3100 m. Yunnan.

**33. *Synotis glomerata*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 327. 1984.

聚花合耳菊 ju hua he er ju

*Senecio glomeratus* Jeffrey, Notes Roy. Bot. Gard. Edinburgh 9: 126. 1916, not Desfontaines ex Poir (1817).

Herbs, basal parts not seen. Stem solitary, erect, to 120 cm tall, flexuous, shortly branching in synflorescence, fulvous tomentose, glabrescent. Leaves shortly petiolate; petiole 1–2 cm, sparsely fulvous tomentose, glabrescent; blade elliptic or oblong-lanceolate-elliptic, 6–22 × 1.5–6 cm, membranous, abaxially sparsely arachnoid and glabrescent, adaxially sparsely shortly scattered setulose, pinnately veined, lateral veins 16–18, arcuate-ascending, conspicuous abaxially, base cuneate or attenuate, margin mucronulate-serrulate, apex long acuminate. Capitula heterogamous, disciform, numerous, 20–25 in dense rounded axillary and terminal glomeruliform corymbs; peduncles short, ca. 5 mm, fulvous tomentose, basally bracteate, 1- or 2-bracteolate; bracts and bracteoles linear. Involucres cylindric, ca. 3 × 1.5 mm, calyculate; bracts of calyculus 5, linear-subulate, to 1/2 as long as phyllaries; phyllaries 5, oblong, ca. 1.5 mm wide, subleathery, sparsely puberulent, glabrescent, margin broadly scarious, apically obtuse or sometimes acute and puberulent. Marginal female florets 2; corolla filiform, 4.5–5 mm, apically minutely 5-denticulate. Disk florets 3 or 4; corolla yellow, ca. 7 mm, with 2–2.5 mm tube and long-exserted funnelform limb; lobes ovate-oblong, ca. 1.3 mm, apically acute. Anthers ca. 3 mm; anther tails slightly exceeding antheropodia; appendages oblong-lanceolate; antheropodia rather narrow, basally slightly dilated. Style branches ca. 0.8 mm, fringed with short papillae, central tuft prominent, much longer than laterals. Achenes ca. 1.5 mm, glabrous. Pappus white, ca. 5.5 mm. Fl. Aug–Sep.

Forest and thicket margins, rocky slopes; 2500–3300 m. W Yunnan (Fugong, Tengchong) [N Myanmar].

**34. *Synotis triligulata*** (Buchanan-Hamilton ex D. Don) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 329. 1984.

三舌合耳菊 san she he er ju

*Senecio triligulatus* Buchanan-Hamilton ex D. Don, Prodr. Fl. Nepal. 178. 1825; *S. acuminatus* Wallich ex Candolle f. *breviligulatus* Handel-Mazzetti; *S. pentanthus* Merrill.

Subshrubs or shrubby herbs, erect or sometimes scrambling, to 150 cm tall. Stems flexuous, slender, branching, sparsely pubescent, glabrescent. Leaves shortly petiolate; petiole 1–2 cm, glabrous, not auriculate; blade elliptic-lanceolate to broadly oblong-elliptic, 10–15 × 4–6.5 cm, membranous or thinly papery, adaxially nitid, glabrous, pinnately veined, lateral veins 10–14, arcuate-ascending and intramarginally uniting, prominent abaxially, base rounded or broadly cuneate and sometimes unequal, margin finely to coarsely and irregularly mucronate-serrate, apex long acuminate or acuminate-caudate; leaves of synflorescence branches smaller, otherwise similar. Capitula minutely radiate, very numerous, arranged in lax axillary and terminal rounded compound corymbs; peduncles 5–6 mm, slender, sparsely puberulent; bracts linear-subulate, minute. Involucres cylindric, 3–4 × ca. 1 mm, minutely calyculate; bracts of calyculus 1–3, subulate; phyllaries 5, linear-oblong, ca. 1 mm wide, glabrous, margin broadly scarious, apically obtuse or subacute and puberulent. Ray florets 3 or 4; corolla yellow, 4–5 mm, with ca. 2 mm tube and minute, to 2.5 mm lamina, usually shorter than style. Disk florets 3 or 4; corolla yellow, ca. 5 mm, with ca. 2 mm tube and exserted funnelform limb; lobes oblong-lanceolate, ca. 2.5 mm, apically acute. Anthers ca. 2.5 mm; anther tails ca. 1.5 × as long as antheropodia, basally slightly dilated. Style branches ca. 1.2 mm, fringed with short rounded papillae, terminal tuft small, short. Achenes ca. 1.5 mm, glabrous. Pappus white, ca. 5 mm. Fl. Oct–May.

Forests, among scrub vegetation; 1200–2100 m. Xizang, NW Yunnan [Bhutan, NE India, Myanmar, Nepal, N Thailand].

**35. *Synotis auriculata*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 330. 1984.

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Subshrubs or shrubby herbs, to 180 cm tall. Stems slender, branching, glandular pubescent. Leaves shortly petiolate; petiole ca. 5 mm, sparsely pubescent, basally auriculate; auricle subcircular, small; blade narrowly elliptic or oblong-elliptic, ca. 17 × 2.5 cm, papery, abaxially sparsely shortly pubescent, adaxially sparsely shortly scattered setulose, pinnately veined, lateral veins 16–18, arcuate-ascending, somewhat prominent abaxially, base narrowly cuneate, margin prominently mucronate-serrate, apex acute-acuminate; uppermost and branch leaves smaller. Capitula minutely radiate, very numerous, arranged in lax axillary and terminal rounded compound corymbs; peduncles 1–3 mm, glandular pubescent, 1- or 2-bracteate and/or bracteolate. Involucres cylindric, 3–3.5 × ca. 1 mm, calyculate; bracts of calyculus 2 or 3, minute; phyllaries 5, oblong-linear, ca. 0.8 mm wide, subglabrous, margin scarious,

apically obtuse and pubescent. Ray florets 2; corolla ca. 4.5 mm, tube ca. 2 mm; lamina yellow, oblong, ca.  $2.5 \times 0.7$  mm, 2- or 3-veined, 3-denticulate. Disk florets 3; corolla yellow, 5–5.5 mm, with ca. 1.5 mm tube and exerted narrowly funnel-form limb; lobes ovate-oblong, ca. 1 mm. Anthers ca. 2 mm; anther tails  $0.3\text{--}0.7 \times$  as long as antheropodia; appendages ovate; antheropodia distinctly dilated at base. Style branches 1–1.2 mm, fringed with short papillae, terminal tuft not distinctive. Achenes ca. 1.5 mm, sparsely pubescent. Pappus white, ca. 4 mm. Fl. Nov.

• Mixed forests; 2100–2400 m. Xizang.

**36. *Synotis saluenensis*** (Diels) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 330. 1984.

腺毛合耳菊 xian mao he er ju

*Senecio saluenensis* Diels, Notes Roy. Bot. Gard. Edinburgh 5: 193. 1912.

Subshrubs or shrubby herbs, scrambling, to 3 m tall. Stems branching in synflorescence, densely glandular fulvous pubescent, glabrescent. Leaves shortly petiolate; petiole 6–10 mm, pubescent, basally not auriculate; blade elliptic or elliptic-lanceolate,  $10\text{--}22 \times 4.5\text{--}6.5$  cm, papery, abaxially sparsely to densely glandular fulvous pubescent especially on veins, adaxially glabrous or nearly so, pinnately veined, lateral veins 10–14, arcuate-ascending, prominent abaxially, base broadly cuneate to subrounded, margin finely to rather coarsely and irregularly mucronate-serrate, apex acuminate; leaves of synflorescence branches smaller. Capitula heterogamous, disciform, very numerous, arranged in lax to rather dense axillary and terminal rounded compound corymbs; peduncles to 5 mm, glandular fulvous pubescent, bracteate, few bracteolate; bracts and bracteoles linear or linear-subulate, 2–3 mm. Involucres narrowly campanulate, ca.  $4 \times 2\text{--}2.5$  mm, calyculate; bracts of calyculus 4 or 5, minute; phyllaries 8, linear-lanceolate, 1–1.2 mm wide, herbaceous, sparsely glandular puberulent or subglabrous, margin narrowly to broadly scarious, apically acute or subacute and puberulent. Female florets 5; corolla yellow, filiform, ca. 3 mm, shorter than style, apically minutely 2- or 3-fid. Disk florets 5 or 6; corolla yellow, with ca. 2 mm tube and funnel-form limb; lobes ovate-oblong, apically acute. Anthers ca. 2 mm; anther tails slightly longer than antheropodia; appendages ovate-lanceolate; antheropodia rather short and broad, basally slightly expanded. Style branches ca. 1.5 mm, fringed with short papillae, terminal tuft not distinctive. Achenes ca. 2.5 mm, glabrous. Pappus white, ca. 4 mm. Fl. Oct–Feb.

Forests, forest and thicket margins; 1000–3000 m. Xizang, Yunnan [Myanmar, Vietnam].

*Synotis saluenensis* is distinguished from *S. triligulata* in having leaves glandular pubescent abaxially and large disciform capitula with 8 phyllaries and 10 or 11 florets.

**37. *Synotis acuminata*** (Wallich ex Candolle) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 332. 1984.

尾尖合耳菊 wei jian he er ju

*Senecio acuminatus* Wallich ex Candolle, Prodr. 6: 368. 1838.

Herbs, perennial. Stems erect, 40–120 cm tall, usually corymbosely branched in upper part, fulvous pubescent, glabrescent to glabrous. Leaves shortly petiolate; petiole 3–5 mm, glabrous or sparsely puberulent, not auriculate; blade narrowly elliptic or lanceolate,  $8\text{--}18 \times 1.5\text{--}3.5$  cm, papery, nitid, abaxially glabrous or sparsely puberulent on veins, adaxially glabrous, pinnately veined, lateral veins 10–12, arcuate-ascending, prominent abaxially, base cuneate or attenuate and often unequal, margin rather remotely mucronate-serrulate or mucronate-serrate, apex acutely long acuminate or caudate-acuminate and sometimes falcate; upper leaves smaller. Capitula minutely radiate, numerous, arranged in terminal compound corymbs; peduncles 1–2 mm, fulvous puberulent, usually 1- or 2-bracteate and or bracteolate. Involucres narrowly cylindrical,  $5\text{--}6 \times 1\text{--}1.5$  mm, calyculate; bracts of calyculus 2 or 3, linear, ca. 2 mm, puberulent; phyllaries 3 or 4, linear-oblong, glabrous, margin scarious, apically obtuse and puberulent. Ray floret 1; corolla yellow, 5–7 mm, with 3–3.5 mm tube and linear ca. 3 mm lamina. Disk florets 2 or 3; corolla yellow, ca. 7 mm, with ca. 2.5 mm tube and funnel-form limb; lobes oblong-lanceolate, ca. 1.5 mm, apically acute. Anthers ca. 3.2 mm, anther tails ca.  $0.5 \times$  as long as antheropodia; appendages ovate-oblong; antheropodia long, basally somewhat dilated. Style branches ca. 1 mm, fringed with short papillae, terminal tuft indistinct. Achenes ca. 3.5 mm, glabrous. Pappus straw-colored, 4–4.5 mm. Fl. Aug–Sep.

Forest margins, streamsides; 2600–3400 m. Xizang [Bhutan, India (Sikkim), Nepal].

**38. *Synotis calocephala*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 334. 1984.

美头合耳菊 mei tou he er ju

*Senecio calocephalus* C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 48. 1935, not Poeppig (1845), nor Hemsley (1881).

Subshrubs or shrubby herbs. Stems erect, to 150 cm tall, simple or corymbosely branched in upper part, fulvous pubescent, glabrescent. Leaves shortly petiolate; petiole 1–2 cm, sparsely pubescent; blade elliptic or lanceolate-elliptic,  $14\text{--}17 \times 4.5\text{--}7$  cm, papery, abaxially dull and sparsely shortly pubescent especially on veins and glabrescent, adaxially nitid and sparsely fulvous pubescent especially on midvein, pinnately veined, lateral veins 12–14, arcuate-ascending, veins prominent abaxially, base cuneate, margin apiculate-denticulate or serrulate, apex acuminate; upper leaves smaller. Capitula radiate, numerous, arranged in terminal rather dense compound corymbs; peduncles 1–2 mm, fulvous pubescent, 1- or 2-bracteate and/or bracteolate; bract and bracteoles linear. Involucres cylindrical, ca.  $4 \times 1.5\text{--}2$  mm, calyculate; bracts of calyculus several, linear,  $2.5\text{--}3.5$  mm; phyllaries 5, linear, ca. 1.5 mm wide, sparsely puberulent, margin scarious, apically obtuse to acute, dark colored and puberulent. Ray florets 2 or 3; corolla tube ca. 2.5 mm; lamina yellow, linear,  $8.5\text{--}10 \times$  ca. 1.5 mm, 2- or 3-denticulate, 4-veined; style long exerted. Disk florets 3; corolla yellow, ca. 8 mm, with 2–2.5 mm tube and funnel-form limb; lobes linear,  $2.5\text{--}3$  mm, apically acute. Anthers ca. 3.5 mm; anther tails  $0.5\text{--}0.8 \times$  as long as antheropodia; appendages ovate-lanceolate; an-

theropodia robust, basally slightly dilated. Style branches ca. 1.5 mm, fringed with short papillae, terminal tuft not differentiated. Achenes ca. 2 mm, glabrous. Pappus straw-colored, ca. 7 mm. Fl. Aug–Sep.

Thicket margins; 2100–2700 m. Yunnan (Longchuan Jiang–Nu Jiang divide) [Myanmar].

*Synotis calocephala* differs from *S. acuminata* by its thinner textured, relatively broader, and less deeply denticulate leaves and its conspicuously radiate capitula with 5 phyllaries, 2 or 3 ray florets, and 8–10 mm long ray floret laminae.

**39. *Synotis reniformis*** Y. L. Chen, Acta Phytotax. Sin. 34: 648. 1996.

肾叶合耳菊 shen ye he er ju

Herbs, rhizomatous. Rhizomes not seen. Stem solitary, erect or basally curved, striate, slender, sparsely shortly pubescent or ± glabrescent. Basal and lower leaves withered at anthesis, with 1 or 2 scalelike persistent petioles; median leaves 2 or 3, long petiolate; petiole 3.5–5 cm, not winged, sparsely arachnoid and shortly pubescent, basally slightly expanded and subamplexicaul; blade abaxially gray-green, adaxially green, reniform or cordate-reniform, 3–4 × 5–6.5 cm, papery, abaxially arachnoid, adaxially adpressed setulose, 3–5-veined from base, lateral veins divaricate, and uniting and netted, base rounded or cordate and attenuate into petiole, margin shallowly repandentate with mucronulate teeth. Upper leaves similar to median leaves but smaller, shortly petiolate. Uppermost leaves reduced and bractlike, linear or linear-lanceolate, 5–10 × 1–1.5 mm, apically acute. Capitula homogamous, discoid, solitary in bracts of uppermost part, racemose; peduncles 1–2 mm, densely tomentose. Involucres narrowly campanulate, 4–5 × 3–4 mm, calyculate; bracts of calyculus 3 or 4, linear, ca. 1/2 as long as phyllaries, apically acute, phyllaries 5, oblong or oblong-lanceolate, 3–4 × 1.5–2 mm, subleathery, glabrous, margin narrowly scarios, apically slightly acute or obtuse. Florets 5, exserted from involucres; corolla yellow ca. 7 mm, with ca. 3 mm tube and campanulate limb; lobes ovate-lanceolate, 1.5–2 mm, apically acute. Anthers ca. 4 mm, basally obtuse-auriculate; antheropodia rather short, basally slightly dilated. Style branches obtuse or truncate, shortly fringed. Achenes 2–3 mm, glabrous. Pappus white, 4–5 mm. Fl. Jul, fr. Aug.

• Wet places along riversides in valleys; ca. 3000 m. Yunnan.

**40. *Synotis lucorum*** (Franchet) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 334. 1984.

丽江合耳菊 li jiang he er ju

*Senecio lucorum* Franchet, J. Bot. (Morot) 10: 415. 1896; *S. bulleyanus* Diels.

Herbs, rhizomatous. Rhizomes thick, woody. Stems 1–3, erect, 30–60 cm tall, at first sparsely arachnoid and fulvous pubescent, usually ± glabrescent, simple or branching in synflorescence, leafless or with only small scalelike leaves in lower part at anthesis. Leaves sessile or rarely subpetiolate; blade adaxially green, narrowly oblong-elliptic to lanceolate, 7–12 × 1.2–2.5 cm, papery, abaxially pallid and thinly arachnoid, adaxially sparsely arachnoid, sparsely fulvous pubescent and gla-

brescent, pinnately veined, lateral veins 10–14, arcuate-ascending, base attenuate, sometimes dilated and subamplexicaul, margin minutely denticulate to coarsely sinuate-dentate with mucronulate teeth, apex acute-acuminate. Upper leaves smaller, lanceolate. Capitula homogamous, discoid, numerous, usually 20–25 in rather dense terminal corymbs on synflorescence branches; peduncles 5–15 mm, densely fulvous pubescent and at first also white arachnoid, with a linear bract or bracteole. Involucres narrowly campanulate, 5–6 × 2–3.5 mm, calyculate; bracts of calyculus 4 or 5, linear, equaling or exceeding phyllaries, apically acute; phyllaries 8, oblong-lanceolate, 1–1.5 mm wide, subleathery, thinly arachnoid, glabrescent, margin narrowly scarios, apically acute and shortly ciliate. Ray florets absent. Disk florets 9–11; corolla yellow, ca. 9 mm, with ca. 3 mm tube and funnelform limb; lobes oblong-lanceolate, apically acute. Anthers ca. 3.3 mm, anther tails ca. 0.5 × as long as antheropodia; appendages ovate-oblong; antheropodia robust, basally somewhat dilated. Style branches ca. 2 mm, fringed with short papillae, terminal tuft not evident. Achenes ca. 3 mm, glabrous. Pappus straw-colored, ca. 6 mm. Fl. Jul–Aug.

• Forests, thickets, open slopes; 2800–4000 m. NW Yunnan.

**41. *Synotis birmanica*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 335. 1984.

缅甸合耳菊 mian dian he er ju

Herbs, rhizomatous. Rhizomes thick, woody. Stems 1–3, erect, 30–60 cm tall, at first sparsely arachnoid and densely fulvous pubescent, usually ± glabrescent, shortly branching in synflorescence, leafless or with only small scalelike leaves in lower part at anthesis. Leaves sessile or subpetiolate; blade adaxially green, elliptic to oblanceolate, 4–8 × 1–1.7 cm, papery, abaxially pallid and thinly arachnoid, adaxially sparsely arachnoid, sparsely pubescent and glabrescent, pinnately veined, lateral veins 10, arcuate-ascending, base cuneate to attenuate, sometimes subamplexicaul at attachment to stem, margin rather remotely denticulate with mucronulate teeth, apex shortly acuminate. Upper leaves smaller, otherwise similar. Capitula radiate, usually 3–8 in rather dense terminal corymbs on synflorescence branches; peduncles 5–15 mm, white arachnoid and shortly fulvous pubescent, with a linear bract or bracteole. Involucres narrowly campanulate, 3–4 × ca. 3 mm, calyculate; bracts of calyculus 3–5, linear, equaling or exceeding phyllaries, apically acute; phyllaries 8, oblong, ca. 1 mm, subleathery, laxly white arachnoid and sparsely puberulent, margin narrowly scarios, apically acute and puberulent. Ray florets 5 or 6; corolla tube ca. 2.5 mm; lamina yellow, oblong, 5–7 × ca. 1.5 mm, 4-veined, 3-denticulate. Disk florets ca. 15; corolla yellow, ca. 7 mm, with ca. 2.5 mm tube and funnelform limb; lobes oblong-lanceolate, ca. 2 mm, apically acute. Anthers ca. 2.7 mm, obtusely long auriculate or subcaudate; anther tails only ca. 0.25 × as long as antheropodia; appendages ovate-oblong; antheropodium stout, basally hardly dilated. Style branches ca. 2 mm, fringed with short papillae, terminal tuft not evident. Pappus straw-colored, ca. 4.5 mm. Fl. Sep.

Alpine meadows; 3000–3300 m. NW Yunnan (Gaoligong Shan) [W Myanmar].

**42. *Synotis setchuensis*** (Franchet) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 336. 1984.

四川合耳菊 si chuan he er ju

*Senecio setchuensis* Franchet, Bull. Annuel Soc. Philom. Paris, sér. 8, 3: 145. 1891.

Herbs, rhizomatous. Rhizomes thick, woody, creeping. Stem usually solitary, erect, 45–60 cm tall, sparsely arachnoid, not branched below synflorescence, leafless in lower part at anthesis. Leaves subpetiolate or sessile; petiole 3–5 mm, narrowly winged; blade adaxially green, lanceolate or narrowly elliptic, 7–15 × 1.5–3 cm, papery, abaxially densely and except for midvein persistently white tomentose, adaxially sparsely arachnoid, scattered puberulent and glabrescent, pinnately veined, lateral veins 10–14, arcuate-ascending, base attenuate, not auriculate, margin remotely and minutely mucronulate-denticulate, apex shortly acuminate. Upper leaves smaller; uppermost leaves linear-lanceolate to linear, bractiform. Capitula discoid, numerous (15–17) in rather dense terminal compound corymbs; peduncles 5–15 mm, apex acute. Involucres narrowly campanulate, 5–6 × ca. 3 mm, calyculate; bracts of calyculus 2–4, linear, equaling phyllaries; phyllaries 8, oblong, 1.5–2 mm wide, subleathery and somewhat carinate, white arachnoid-tomentose, margin narrowly scarious, apically acute and ciliate. Ray florets absent. Disk florets 8 or 9; corolla yellow, 8–9 mm, with ca. 3.2 mm tube and funnelliform limb; lobes oblong-lanceolate, ca. 2 mm, apically acute. Anthers ca. 3.5 mm; anther tails ca. 0.75 × as long as antheropodia; appendages ovate-lanceolate; antheropodia slightly dilated at base. Style branches ca. 1.5 mm, fringed with short papillae, terminal tuft short. Achenes 3–3.5 mm, glabrous. Pappus dirty white or pale straw-colored, 7–8 mm. Fl. Aug–Sep.

• Thickets, streamsides, roadsides; 2500–3200 m. W Sichuan (Kangding).

*Synotis setchuensis* is characterized by its phyllaries subleathery

and carinate and leaves densely white tomentose abaxially. It superficially resembles *Senecio densiserratus*, which differs by having densely serrate leaf margins and anthers not caudate.

**43. *Synotis atractylidifolia*** (Y. Ling) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 338. 1984.

术叶合耳菊 shu ye he er ju

*Senecio atractylidifolius* Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 5: 24. 1937.

Subshrubs, with thick, woody, branching, procumbent or ascending rhizomes. Aerial stems several, erect, 20–60 cm tall, glabrous, not branched below synflorescence, leafy except toward base. Leaves very shortly petiolate or sessile; blade lanceolate, sometimes slightly falcate, 5–10 × 0.5–1.5 cm, subleathery, glabrous or nearly so, pinnately veined, lateral veins 10–14, strongly ascending, inconspicuous, base cuneate, margin regularly and closely mucronulate-serrate, apically shortly obtusely acuminate-apiculate; upper leaves smaller. Capitula radiate, numerous, arranged in terminal compound corymbs, ca. 1.5 cm in diam.; peduncles 1–2 cm, slender, slightly dilated and white arachnoid in upper part, with 1–3 narrowly oblanceolate bracts or bracteoles at or near base. Involucres subcampanulate, 3–4 × 2.5–3 mm, laxly calyculate; bracts of calyculus 4 or 5, narrowly oblanceolate or linear; phyllaries 8; oblong-linear, ca. 1.5 mm wide, apically triangular-obtuse or subacute and ciliate. Ray florets: corolla tube ca. 3 mm; lamina yellow, oblong-elliptic, 8–10 × 2–3 mm, 4-veined, 3-denticulate. Disk florets ca. 10; corolla yellow, ca. 6.5 mm, with 2.5–3 mm tube and funnelliform limb; lobes ovate-lanceolate, ca. 2 mm, apically acute. Anthers ca. 3 mm; anther tails ca. 1.25 × as long as antheropodia; appendages ovate-oblong; antheropodia stout, broad, basally slightly expanded. Style branches fringed with short obtuse papillae, terminal tuft not evident. Achenes ca. 4 mm, sparsely pubescent. Pappus white, 4–5 mm. Fl. Aug.

• Rocky places, wet valleys; 1500–2300 m. Nei Mongol, Ningxia (A-qi-Baqi, Helan Shan).

## 107. CISSAMPELOPSIS (Candolle) Miquel, Fl. Ned. Ind. 2: 102. 1856.

藤菊属 teng ju shu

Chen Yilin (陈艺林 Chen Yi-ling); Bertil Nordenstam, Charles Jeffrey

*Cacalia* sect. *Cissampelopsis* Candolle, Prodr. 6: 331. 1838.

Subshrubs or perennial herbs, large, scandent, climbing by means of prehensile petioles. Stems much branched, woody when old. Leaves simple, alternate; petiole prehensile, with thickened persistent bases, not auriculate; blade broadly ovate, ovate, or triangular, base cordate, unlobed, palmately 3–7-veined from near base, central vein with 1 or 2 pairs of ascending laterals. Capitula numerous, in upper axillary and terminal cymes, compounded into divaricately branching, pyramidal or paniculoid thyrses, heterogamous and radiate or homogamous and discoid, pedunculate. Involucres calyculate, cylindric or narrowly campanulate; receptacle flat; phyllaries 8 or 13, free, herbaceous, margin scarious. Ray florets absent, 5, 6, or 8; lamina yellow, spreading, 4- or 5-veined, apically usually 3-denticulate. Disk florets 8–20; corolla white, pinkish, or yellow; anthers distinctly caudate, with tail 0.5–2 × as long as antheropodia; antheropodia subcylindric or somewhat balusterform, basally hardly to slightly dilated, with somewhat enlarged basal lateral cells; endothelial cell wall thickenings comparatively few, polar and radial, cells rather short; style branches truncate or convex, with short to rather long marginal papillae and with or without a prominent central tuft of much longer papillae. Achenes cylindric, ribbed, glabrous, epidermal cells striate or smooth. Pappus capillary-like, uniform, present in all florets, white, dirty white, or rufoescent.

Ten species: tropical Asia; six species (three endemic) in China.

The genus is divisible into two well-marked sections (not described here), characterized by discoid and radiate capitula, respectively.

- 1a. Capitula radiate; corolla truly yellow.  
 2a. Phyllaries 5 or 8; ray florets 5 or 6, lamina 3–5 mm; pappus whitish ..... 5. *C. buimalia*  
 2b. Phyllaries 13; ray florets 8, lamina ca. 10 mm; pappus reddish ..... 6. *C. erythrochaeta*
- 1b. Capitula discoid; corolla pale yellow, white, or pinkish.  
 3a. Leaves leathery, margin callose-denticulate, both surfaces glabrous; phyllaries glabrous ..... 1. *C. corifolia*  
 3b. Leaves papery to subleathery, margin repand-dentate or denticulate, abaxially tomentose, arachnoid-tomentose, or glandular pubescent; phyllaries hairy.  
 4a. Florets 15–17; leaves abaxially with dense persistent yellowish white tomentum, peduncles and phyllaries densely tomentose ..... 4. *C. spelaicola*  
 4b. Florets 8–10; leaves, stems, peduncles, and phyllaries arachnoid-tomentose or glandular pubescent.  
 5a. Leaves at least when young abaxially grayish arachnoid-tomentose; peduncles and phyllaries sparsely arachnoid-tomentose ..... 2. *C. volubilis*  
 5b. Leaves abaxially fulvous glandular pubescent; peduncles and phyllaries glandular pubescent ..... 3. *C. glandulosa*

**1. *Cissampelopsis corifolia*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 342. 1984.

革叶藤菊 ge ye teng ju

Subshrubs or herbs, large, scandent, to 3–7 m. Stem becoming woody, glabrous or nearly so. Petiole 3–6 cm, glabrous; leaf blade ovate or broadly ovate, 8–14 × 4.5–10.5 cm, leathery or subleathery, glabrous, palmately 5–7-veined from base, veins prominent abaxially, base cordate or sometimes subtruncate, margin minutely to sometimes coarsely callose-denticulate, apex acuminate. Upper and synflorescence leaves smaller, ovate or ovate-lanceolate, basally subcordate, rounded, or truncate. Capitula discoid, numerous, arranged in usually dense terminal and upper axillary compound corymbs, forming large divaricately branching paniculoid thyrses; synflorescence branches exceeding leaves, sparsely or densely glandular pubescent; peduncles (3–)8–15 mm, slender, glandular pubescent, basally bracteolate; bracts and bracteoles linear-lanceolate, 1–2 mm, apically acute. Involucres cylindric, 5–6 × 2–3 mm, calyculate; bracts of calyculus 4 or 5, linear-lanceolate, 1–2 mm; phyllaries 8, linear-oblong, 1–1.5 mm wide, subleathery, glabrous, margin broadly scarious, glabrous, apically acute or subobtusate and puberulent. Ray florets absent. Disk florets ca. 10; corolla pale yellow, cream, or pinkish white, 8–9 mm, with ca. 3.5 mm tube and narrowly funnellform limb; lobes oblong-lanceolate, ca. 2 mm, apically acute. Anthers ca. 3.5 mm; anther tails ca. equaling or slightly exceeding antheropodia; appendages oblong-lanceolate; antheropodia hardly dilated toward base. Style branches ca. 2 mm, fringed with short papillae, terminal tuft rather short, longer than laterals. Achenes cylindric, 2.5–3 mm, glabrous. Pappus white, 8–8.5 mm. Fl. Sep–Jan of next year.

Climbing on trees and shrubs in mixed forests and thickets; 1500–2800 m. Xizang, Yunnan [Bhutan, India, Myanmar, Thailand].

**2. *Cissampelopsis volubilis*** (Blume) Miquel, Fl. Ned. Ind. 2: 102. 1856.

藤菊 teng ju

*Cacalia volubilis* Blume, Bijdr. 908. 1826; *Senecio ara-*

*neosus* Candolle; *S. blumei* Candolle; *S. cacaliifolius* Schultz Bipontinus var. *araneosus* (Candolle) Franchet; *S. hoi* Dunn; *S. ligularia* J. D. Hooker var. *araneosus* (Candolle) H. Léveillé; *Vernonia esquirolii* Vaniot.

Subshrubs or herbs, large, scandent, to 3 m or more. Stems becoming woody, ± white arachnoid-tomentose and sometimes also sparsely brown setulose, ± glabrescent. Petiole 3–6 cm, stout, ± tomentose and sometimes sparsely brown setulose; leaf blade adaxially green, ovate or broadly ovate, to 15 × 12 cm, subleathery, abaxially grayish with dense to sparse arachnoid-floccose tomentum and sometimes also brownish setulose on veins, adaxially sparsely arachnoid, glabrescent and sometimes shortly scarious-setulose, palmately 5–7-veined from base, base cordate or sometimes hastate, margin rather remotely minutely to coarsely repand-dentate with mucronulate teeth, apically acute-acuminate-apiculate. Upper and synflorescence leaves smaller, basally cordate to rounded. Capitula discoid, numerous, arranged in rather lax to dense terminal and upper axillary compound corymbs, divaricately branching; branches sparsely to densely white tomentose and sometimes also with brownish glandular hairs; peduncles 5–15 mm, slender, arachnoid-tomentose, basally bracteate, 3–5-bracteolate; bracts and bracteoles linear, 3–4 mm, pubescent. Involucres cylindric, 7–8 × 2–3 mm, calyculate; bracts of calyculus 4 or 5, small; phyllaries ca. 8, linear-oblong, 1.5–2 mm wide, herbaceous, sparsely arachnoid, puberulent, or glabrous, margin broadly scarious, apically acute. Ray florets absent. Disk florets 8–10; corolla white, pale yellow, or purplish, 9–10 mm, with 4–4.5 mm tube and narrowly funnellform limb; lobes oblong-lanceolate, ca. 2 mm, apically acute. Anthers ca. 3.5 mm, anther tails 0.75–0.8 × as long as antheropodia; appendages ovate-lanceolate; antheropodia elongated, narrow, basally only slightly dilated. Style branches ca. 3.7 mm, fringed with rather short papillae, terminal tuft prominent, much longer than laterals. Achenes cylindric, ca. 4 mm, glabrous. Pappus white, 8–9 mm. Fl. Oct–Jan.

Climbing on trees and shrubs in forests and thickets; 800–2000 m. Guangdong, Guangxi, Guizhou, Hainan, Yunnan [NE India, Malesia, Myanmar, Thailand, Vietnam].

**3. *Cissampelopsis glandulosa*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 345. 1984.

腺毛藤菊 xian mao teng ju

Subshrubs or herbs, large, scandent. Stems becoming woody, glandular pubescent. Leaves adaxially green, ovate or broadly ovate, 7–14 × 5–10 cm, papery, abaxially densely glandular fulvous pubescent, adaxially thinly arachnoid and glabrescent to subglabrous, base cordate, margin repand-denticulate or dentate with apiculate teeth, apex acute-acuminate. Upper and synflorescence leaves smaller, ovate, basally subtruncate. Capitula discoid, numerous, arranged in dense terminal and upper axillary compound corymbs, forming narrow thyrse; synflorescence branches mostly shorter than leaves, densely glandular pubescent; peduncles 4–10 mm, slender; bracts and/or bracteoles 2 or 3, linear-subulate, 2–3 mm, glandular pubescent. Involucres broadly cylindrical, 7–8 × 2.5–3.5 mm, calyculate; bracts of calyculus 3–5, linear-subulate, ca. 2 mm; phyllaries 8, linear-oblong, 1.5–2 mm wide, herbaceous, sparsely finely pubescent, margin broadly scarious, sparsely finely pubescent, apically acute. Ray florets absent. Disk florets ca. 10; corolla white, ca. 12 mm, with 5–5.5 mm tube and narrowly funnelform limb; lobes oblong-lanceolate, ca. 3.2 mm, apically acute. Anthers ca. 4.5 mm; anther tails ca. 0.5 × as long as antheropodium; appendages oblong-lanceolate; antheropodia stout, basally somewhat dilated. Style branches ca. 3 mm, fringed with short papillae, central tuft much longer, stout, conspicuous. Achenes cylindrical, 4.5–5 mm, glabrous. Pappus white or dirty white, ca. 11 mm. Fl. Jan.

- Climbing in ravines; 2300–2400 m. Yunnan.

**4. *Cissampelopsis spelaicola*** (Vaniot) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 346. 1984.

岩穴藤菊 yan xue teng ju

*Vernonia spelaicola* Vaniot, Bull. Acad. Int. Géogr. Bot. 12: 123. 1903; *Senecio spelaicola* (Vaniot) Gagnepain; *S. yalungensis* Handel-Mazzetti.

Subshrubs or herbs, large, scandent, to 5 m or more. Stems becoming woody, at first white arachnoid-tomentose, ± glabrescent. Petiole 3–6 mm, stout, densely tomentose; leaf blade abaxially yellowish white, adaxially green, ovate or broadly ovate, 4–11 × 4–8 cm, papery, abaxially densely arachnoid, adaxially at first sparsely arachnoid and glabrescent, palmately 3–5-veined from base, base cordate, margin repand-denticulate, apex acute-acuminate-apiculate. Upper and synflorescence leaves smaller, ovate or ovate-lanceolate, basally cordate to cuneate. Capitula discoid, numerous, arranged in 7–10-headed terminal and upper axillary compound corymbs; synflorescence branches divaricate, densely tomentose; peduncles short, 3–5 mm, densely tomentose, usually basally bracteate; bract linear. Involucres cylindrical, 6–7 × 2.5–4 mm, calyculate; bracts of calyculus 6–8, linear, unequal, densely tomentose; phyllaries 8, linear-oblong, 1.5–2 mm, herbaceous, densely tomentose, margin broadly scarious, densely tomentose, apically acutely triangular and puberulent. Ray florets absent. Disk florets 15–17; corolla white, 9–10 mm, with ca. 4 mm tube and narrowly fun-

nelform limb; lobes oblong-lanceolate, ca. 1.8 mm, apically acute. Anthers ca. 4 mm; anther tails slightly shorter than to ca. 2 × as long as antheropodia; appendages oblong-lanceolate, antheropodia somewhat dilated toward base. Style branches 3–3.5 mm, fringed with rather long papillae, terminal tuft stout, distinct, much exceeding laterals. Achenes cylindrical, ca. 5 mm, glabrous. Pappus white or dirty white, ca. 9 mm. Fl. Nov–Dec.

- Climbing on trees and shrubs in mixed forests; 1000–2000 m. Guangxi, Guizhou, Sichuan, Yunnan.

**5. *Cissampelopsis buimalia*** (Buchanan-Hamilton ex D. Don) C. Jeffrey & Y. L. Chen, Kew Bull. 41: 937. 1986.

尼泊尔藤菊 ni bo er teng ju

*Senecio buimalia* Buchanan-Hamilton ex D. Don, Prodr. Fl. Nepal. 178. 1825.

Subshrubs or herbs, large, scandent, to 3–5 m. Stems becoming woody, white tomentose. Petiole 3–5 cm, densely to sparsely arachnoid, sometimes also fulvous hairy; leaf blade abaxially grayish white, adaxially deep green, ovate or ovate-triangular, 5–10 × 3.5–7 cm, thinly papery, abaxially arachnoid, adaxially at first sparsely arachnoid, glabrescent, palmately 3–5-veined, base cordate, margin ± sinuate-denticulate with mucronulate teeth, apex acute-acuminate-apiculate. Upper and synflorescence leaves smaller, ovate to lanceolate, basally cordate to cuneate. Capitula radiate, 8–12 mm in diam., numerous, arranged in usually 3–5-headed terminal and upper axillary compound corymbs, forming rather lax divaricately branching thyrsoid clusters; peduncles 10–15 mm, slender, densely gray tomentose, with 1 or 2 linear-subulate bracts or bracteoles. Involucres cylindrical to narrowly campanulate, 8–12 × 4–6 mm, calyculate; bracts of calyculus 5, linear-subulate, unequal, much shorter than phyllaries; phyllaries 5 or 8, oblong-lanceolate, 2.5–3 mm wide, herbaceous, densely to sparsely arachnoid-tomentose, margin broadly scarious, apically obtuse to acute and puberulent. Ray florets 5 or 6; corolla tube 7–8 mm; lamina yellow, oblong-linear, 3–5 × 1–1.5 mm, 4- or 5-veined, apex entire or 3-denticulate. Disk florets 10–12; corolla yellow, 13–14 mm, with ca. 7.5 mm tube and funnelform limb; lobes oblong-lanceolate, ca. 2 mm, apically acute. Anthers 3.5–4 mm; anther tails shorter than antheropodia; appendages ovate-lanceolate; antheropodia dilated toward base. Style branches ca. 2.5 mm, fringed with short papillae, terminal tuft absent. Achenes cylindrical, ca. 5.5 mm, glabrous. Pappus white or dirty white, yellowish at base, 11–12 mm. Fl. Feb.

- Climbing in scrub; ca. 2100 m. Yunnan [Bhutan, India (Sikkim), Nepal].

**6. *Cissampelopsis erythrochaeta*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 349. 1984.

赤纓藤菊 chi ying teng ju

*Senecio buimalia* Buchanan-Hamilton ex D. Don var. *bambusetorum* Handel-Mazzetti.

Subshrubs or herbs, large, scandent. Stems becoming woody, at first white arachnoid, glabrescent. Petiole 3–7 cm,

abaxially sparsely arachnoid or subglabrescent; leaf blade abaxially grayish, adaxially green, ovate or triangular, 7–13 × 4–12 cm, papery or submembranous, abaxially arachnoid, adaxially sparsely arachnoid and glabrescent, palmately 3–7-veined from base, base cordate, margin repand or sinuate-denticulate with mucronulate teeth, apex acutely shortly acuminate-apiculate. Upper and synflorescence leaves smaller, basally cordate or truncate. Capitula radiate, 2.5–3 cm in diam., numerous, arranged in usually 5–10-headed terminal and upper axillary compound corymbs, forming pyramidal, divaricately branched paniculoid thyrses; peduncles 1–2 cm, stout, sparsely arachnoid and shortly glandular pubescent, with 1 or 2 linear-subulate bracts or bracteoles. Involucres narrowly campanulate, 8–10 × 6–8 mm, calyculate; bracts of calyculus 7 or 8, linear-subulate, 4–6

mm, pubescent, spreading or reflexed; phyllaries 13, linear-subulate, 1–2 mm wide, herbaceous, sparsely arachnoid, margin scarious, apically acute and puberulent. Ray florets 8; corolla tube 5–5.5 mm; lamina yellow, oblong, ca. 10 × 2–2.5 mm, 4-veined, 3-denticulate. Disk florets ca. 20; corolla yellow, 10–11 mm, with 3–3.5 mm tube and narrowly funnelliform limb; lobes oblong-lanceolate, ca. 2 mm, apically acute. Anthers ca. 4.5 mm; anther tails ca. equaling antheropodium; appendages ovate-oblong; antheropodia hardly expanded toward base. Style branches ca. 4 mm, fringed with very short papillae, terminal tuft absent. Achenes cylindrical, ca. 4 mm, glabrous. Pappus reddish, 9–10 mm. Fl. Sep–Oct.

• Climbing on bamboos and shrubs; 900–1200 m. Hunan (Wu-gang).

### 108. *SENECIO* Linnaeus, Sp. Pl. 2: 866. 1753.

千里光属 qian li guang shu

Chen Yilin (陈艺林 Chen Yi-ling); Bertil Nordenstam, Charles Jeffrey, Leszek Vincent

Herbs perennial or annual, erect, rarely stoloniferous, decumbent, or rarely scandent, rhizomatous. Stems usually leafy, rarely subscapiform. Leaves simple; radical leaves usually petiolate, not auriculate, deltoid, lyrate or pinnately divided; stem leaves usually sessile, pinnately veined, basally often auriculate, lyrate or pinnately lobed, rarely unlobed, ± dentate. Capitula rarely solitary, axillary, usually few to numerous, arranged in terminal simple or compound corymbs or thyrses, heterogamous and radiate or homogamous and discoid, erect or nodding, usually pedunculate. Involucres calyculate, hemispheric, campanulate, or cylindrical; receptacle flat; phyllaries 5–22, usually free, rarely connate to middle or above, herbaceous or leathery, margin scarious or membranous. Ray florets absent or 1–17(–24); lamina yellow, usually conspicuous, sometimes minute, 2–9-veined, apically usually 3-denticulate. Disk florets 3 to many; corolla yellow; limb funnelliform or cylindrical; lobes 5. Anthers oblong to linear, usually shortly obtuse-auriculate, rarely ± caudate with tail to 0.25 × as long as antheropodium; antheropodia balusterform, basally slightly to markedly dilated, with enlarged basal lateral cells; endothelial cell wall thickenings numerous, radial (inner anticlinal), cells often elongated. Style branches truncate or less often convex, with rather obtuse semicircle of marginal papillae, not appendiculate and devoid of a central tuft of longer papillae. Achenes cylindrical, ribbed, glabrous or pubescent, epidermal cells smooth or papillose. Pappus capillary-like, uniform or sometimes dimorphic by presence of apically fluked hairs, white, straw-colored, or reddish brown, sometimes absent from ray florets or rarely from all florets.

At least 1,200 species: worldwide (except Antarctica) in the sense adopted here, but generic limits in some areas still uncertain; 65 species (39 endemic) in China.

The generic concept provided here is considered to cover *Senecio* s.s. plus a fringe of taxa that can be considered peripheral to *Senecio* s.s. but not extending to *Senecio* s.l. (fide Vincent).

A recent molecular taxonomic study (Pelser et al., Taxon 56: 1077–1104. 2007) suggests that certain elements should be removed from *Senecio*, namely, *S.* ser. *Extremorientales* and *S.* ser. *Erucifolii* (to genus *Jacobaea* Miller), *S.* sect. *Madaractis* (to genus *Madaractis*), and *S.* sect. *Flexicaules* (to a new, as yet undescribed genus), while confirming the reference to *Senecio* s.s. of *S.* ser. *Arnicoidei*, *S.* ser. *Nemorenses*, *S.* ser. *Monticolarum*, and *S.* sect. *Senecio*. However, the study included no representatives of *S.* sect. *Pinnati*, nor of *S.* ser. *Densiserrati*, *S.* ser. *Coriaceisquamis*, *S.* ser. *Stenoglossi*, *S.* ser. *Cernui*, *S.* ser. *Purpureolobati*, *S.* ser. *Malacophylli*, *S.* ser. *Subscaposi*, and *S.* ser. *Asperifolii*; therefore, their disposition remains in doubt. For this reason, *Senecio* is treated here in a broad sense, although its paraphyly (and perhaps polyphyly) as so circumscribed is acknowledged.

The following three taxa, described or reported from China, are of uncertain identity:

*Senecio pelleifolius* King ex J. R. Drummond (Bull. Misc. Inform. Kew 1911: 271. 1911). One of us (Jeffrey) notes that this is a name of uncertain application, perhaps an older synonym of *Parasenecio palmatisectus*.

*Senecio campestris* (Retzius) Candolle var. *oliganthus* Franchet (Nouv. Arch. Mus. Hist. Nat., sér. 2, 6: 54. 1883). One of us (Jeffrey) indicates that this belongs to a species of *Tephrosieris*, either *T. subdentata* or *T. kirilowii*, and another of us (Nordenstam) concurs.

*Senecio lancifer* J. R. Drummond (Bull. Misc. Inform. Kew 1911: 270. 1911; *Ligularia lancifera* (J. R. Drummond) R. C. Srivastava & C. Jeffrey). One of us (Jeffrey) treats this as a *Ligularia* species, while another of the Asteraceae coauthors (Illarionova) has not seen any material of this species and does not know to which genus it belongs—according to the description, *S. lancifer* is unlike any species of *Ligularia* distributed in Xizang.

1a. Plants annual.

2a. Capitula discoid, without marginal radiate female florets.

3a. Phyllaries 18–22; calyculus bracts 7–11, long blackish tipped; synflorescences compact, peduncles

0.5–2 cm ..... 62. *S. vulgaris*

- 3b. Phyllaries ca. 15; calyculus bracts 4 or 5, without or sometimes with short blackish tip; synflorescences lax, peduncles 1.5–4 cm ..... 61. *S. dubitabilis*
- 2b. Capitula radiate, with at least a few, though sometimes inconspicuous, marginal radiate female florets.
  - 4a. Capitula solitary, axillary; achenes glabrous, pappus hairs few, unequal, ca. 1.5 mm ..... 65. *S. yungningensis*
  - 4b. Capitula cymose; achenes pubescent, pappus hairs numerous, 3–6 mm.
    - 5a. Laminae of marginal female florets conspicuous, ca. 6 mm, much exceeding involucre.
      - 6a. Leaves undivided, broadly linear to oblong, marginally few toothed or subentire; phyllaries 13, with 2–5 green calyculus bracts; ray florets 7 or 8 ..... 58. *S. subdentatus*
      - 6b. Leaves pinnatifid, leaf lobes oblong or linear-oblong, marginally entire or 1- or 2-denticulate; phyllaries 15–20, with 8–10 blackish tipped calyculus bracts; ray florets 8–12 ..... 59. *S. desfontainei*
    - 5b. Laminae of marginal female florets very short, scarcely exceeding involucre.
      - 7a. Phyllaries united in lower 1/3–3/4; pappus hairs fasciculately connate, persistent; achenes sparsely puberulent ..... 64. *S. oryzetorum*
      - 7b. Phyllaries free; pappus hairs free, deciduous; achenes densely pubescent.
        - 8a. Leaves pinnatifid; leaf lobes broad, oblong-lanceolate, marginally entire or remotely denticulate; ray florets ca. 12; pappus hairs ca. 3 mm ..... 63. *S. exul*
        - 8b. Leaves pinnatifid; leaf lobes narrowly linear; ray florets 4–7; pappus hairs ca. 5.5 mm ..... 60. *S. krascheninnikovii*
- 1b. Plants perennial.
  - 9a. Capitula discoid, without marginal radiate female florets.
    - 10a. Phyllaries 12–22, usually 13, 18, or 21.
      - 11a. Basal and lower stem leaves deltoid; phyllaries leathery.
        - 12a. Upper stem leaves without winged petioles; auricles inconspicuous or absent ..... 15. *S. tricuspis*
        - 12b. Upper stem leaves with broadly winged petioles; auricles conspicuous, toothed ..... 18. *S. nigrocinctus*
      - 11b. Basal and lower stem leaves pinnatifid or pinnatifid.
        - 13a. Median stem leaves pinnatifid; phyllaries broadly lanceolate, marginally fimbriate ..... 31. *S. saussureoides*
        - 13b. Median stem leaves lyrate-pinnatifid; phyllaries lanceolate, marginally entire ..... 32. *S. muliensis*
    - 10b. Phyllaries 5–10, usually 5 or 8.
      - 14a. Leaves abaxially densely white tomentose ..... 1. *S. kumaonensis*
      - 14b. Leaves abaxially green, not densely tomentose.
        - 15a. Basal and lower stem leaves lyrate-pinnatifid or runcinate.
          - 16a. Achenes pubescent ..... 40. *S. diversipinnus*
          - 16b. Achenes glabrous.
            - 17a. Involucres 8–10 mm, phyllaries 8; median stem leaves with up to 10 lateral lobes ..... 8. *S. pseudomairei*
            - 17b. Involucres ca. 6 mm, phyllaries 5; median stem leaves with 14–20 lateral lobes ..... 11. *S. acutipinnus*
    - 15b. Basal and lower stem leaves deltoid.
      - 18a. Phyllaries 5, florets 5 or 6 ..... 16. *S. humbertii*
      - 18b. Phyllaries 8–10, florets 10–26.
        - 19a. Upper stem leaves with broadly winged petioles; phyllaries leathery, apically and on upper margin dark ..... 18. *S. nigrocinctus*
        - 19b. Upper stem leaves with unwinged or with narrowly winged petioles; phyllaries herbaceous, apically and marginally puberulent or fimbriate-hairy.
          - 20a. Capitula numerous, arranged in terminal corymb, ca. 7 × 3 mm; florets ca. 10 ..... 17. *S. liangshanensis*
          - 20b. Capitula solitary or rarely paired in axils of uppermost leaves, forming a terminal racemose cyme, 8–10 × 5–8 mm; florets 15–18 ..... 14. *S. lijiangensis*
- 9b. Capitula radiate, with at least a few, though sometimes inconspicuous, marginal radiate female florets.
  - 21a. Laminae of marginal female florets minute, inconspicuous, shorter than style ..... 9. *S. graciliflorus*
  - 21b. Laminae of marginal female florets obvious, at least 4 mm, longer than style.
    - 22a. Achenes, at least of disk florets, pubescent, or at least with few hairs.
      - 23a. Plants subscapose; stem leaves small and bractlike in comparison to radical leaves.
        - 24a. Basal leaves long petiolate ..... 44. *S. analogus*
        - 24b. Basal leaves sessile.
          - 25a. Involucres 3–4 × 2–4 mm ..... 42. *S. obtusatus*
          - 25b. Involucres 5–7 × 5–8 mm.
            - 26a. Leaves elliptic, oblanceolate, or spatulate, margin with repand-denticulate teeth, adaxially glabrous ..... 41. *S. spathiphyllus*
            - 26b. Leaves oblong-lanceolate, margin pinnatifid or subpinnatifid, thinly arachnoid-tomentose ..... 48. *S. nudicaulis*
  - 23b. Plants with leafy stems; stem leaves well developed.

- 27a. Stems scandent or subscandent.
- 28a. Leaves petiolate; plants truly scandent; synflorescence branches and peduncles widely divaricate .. 57. *S. scandens*
- 28b. Leaves sessile, subamplexicaul; plants scrambling; synflorescence branches and peduncles ascending.
- 29a. Leaves pinnately lobed ..... 55. *S. fukienensis*
- 29b. Leaves all or mostly subentire or dentate.
- 30a. Leaf blade ovate-lanceolate to narrowly oblong-lanceolate, laxly pilose or glabrous ..... 54. *S. stauntonii*
- 30b. Leaf blade lanceolate to linear, asperulous or hispid, especially abaxially ..... 52. *S. asperifolius*
- 27b. Stems erect.
- 31a. Phyllaries 5 or 6; ray florets 2 ..... 35. *S. biligulatus*
- 31b. Phyllaries at least 8, usually 12–22; ray florets 5 or more.
- 32a. Leaves all or mostly unlobed, subentire, or dentate.
- 33a. Lower and median stem leaves long petiolate.
- 34a. Phyllaries leathery; ray lamina ca. 8 mm ..... 19. *S. coriaceisquamis*
- 34b. Phyllaries herbaceous; ray lamina 10–12 mm ..... 56. *S. tarokoensis*
- 33b. Lower and median stem leaves shortly petiolate or sessile.
- 35a. Leaves auriculate, subamplexicaul ..... 54. *S. stauntonii*
- 35b. Leaves not auriculate.
- 36a. Leaves papery, asperulous, margin remotely dentate or subentire and revolute; capitula arranged in elongate thyrsoid cymes; involucre 7–9 mm ..... 52. *S. asperifolius*
- 36b. Leaves membranous, sparsely finely pubescent, margin closely dentate and flat; capitula arranged in spreading compound cymes; involucre 4.5–6 mm ..... 6. *S. morrisonensis*
- 32b. Leaves bipinnately, pinnately, or lyrate lobed.
- 37a. Stems weak, subscandent; median stem leaves 3–5 cm, lobes entire ..... 55. *S. fukienensis*
- 37b. Stems stout, erect; median stem leaves 6–30 cm, lobes dentate.
- 38a. Stem leaves basally not auriculate, not subamplexicaul.
- 39a. Ray florets 8–12; lower and median stem leaves petiolate, petioles 3–8 cm ..... 56. *S. tarokoensis*
- 39b. Ray florets 5(or 6); lower and median stem leaves sessile, or if petiolate then petioles not exceeding 2 cm.
- 40a. Involucre 4.5–6 mm; stem leaves serrate to serrate-lobulate or deeply pinnately lobed ..... 6. *S. morrisonensis*
- 40b. Involucre 8–10 mm; stem leaves very deeply and narrowly bipinnately or tripinnately lobed ..... 7. *S. kuanshanensis*
- 38b. Stem leaves basally with dentate or lacinate subamplexicaul auricles.
- 41a. Ray florets absent or 5; phyllaries 8 or 9 ..... 40. *S. diversipinnis*
- 41b. Ray florets 10–15; phyllaries 10–15, rarely 8.
- 42a. Involucre 3–4 × 3–4 mm; pappus straw-colored or pale brownish ..... 44. *S. analogus*
- 42b. Involucre 5–8 × 5–10 mm; pappus white.
- 43a. Ray lamina ca. 12 mm; involucre 7–8 × 6–10 mm; pappus persistent in all florets ... 49. *S. ambraceus*
- 43b. Ray lamina 8–10 mm; involucre 5–6 × 5–7 mm, pappus deciduous in ray florets ..... 51. *S. jacobaea*
- 22b. Achenes all glabrous.
- 44a. Capitula pendulous, peduncles cernuous.
- 45a. Leaves abaxially white tomentose.
- 46a. Involucre 5–6 × 3–5 mm; ray florets 6–8 ..... 24. *S. drukensis*
- 46b. Involucre 7–8 × 10–15 mm; ray florets 18–21 ..... 23. *S. nodiflorus*
- 45b. Leaves abaxially green, both surfaces glabrous.
- 47a. Basal and lower leaves present at anthesis, leaf blade flat, with 5 pairs of lateral veins; phyllaries 17, fulvous pubescent; ray florets 18 ..... 22. *S. atrofuscus*
- 47b. Basal and lower leaves withered at anthesis, leaf blade revolute when dry, with 2 or 3 pairs of lateral veins; phyllaries 15, glabrous; ray florets 8–11 ..... 25. *S. daochengensis*
- 44b. Capitula and peduncles erect or ascending.
- 48a. Basal and lower stem leaves basally cordate or hastate, margin not pinnately lobed, present at anthesis.
- 49a. Ray lamina 15–22 × ca. 1 mm.
- 50a. Involucre 6–7 × 2–3 mm; phyllaries 8; ray florets 3, lamina ca. 15 mm ..... 21. *S. lingianus*
- 50b. Involucre 8–10 × 3–5 mm; phyllaries 10–13; ray florets 4, lamina 20–22 mm ..... 20. *S. arachnanthus*
- 49b. Ray lamina shorter and comparatively broader, 4–10 mm.
- 51a. Plants 10–25 cm tall; capitula 3–5; phyllaries 15–18, with dark margins ..... 33. *S. dodrans*
- 51b. Plants 40–100 cm tall; capitula numerous; phyllaries 6–8 or 10–13, without dark margins.

- 52a. Lower stem leaves triangular, basally deeply cordate; ray florets 3, lamina ca. 4 mm ..... 34. *S. actinotus*
- 52b. Lower stem leaves ovate or ovate-oblong, basally weakly cordate; ray florets 10–13, lamina ca. 6.5 mm ..... 44. *S. analogus*
- 48b. Basal and lower stem leaves basally broadly cuneate to attenuate, margin unlobed or pinnatisect, lyrate-pinnatifid, or runcinate, present or withered at anthesis.
- 53a. Pappus absent in ray florets.
- 54a. Disk florets without a pappus ..... 47. *S. echaetus*
- 54b. Disk florets with a pappus.
- 55a. Stem leaves undivided, serrate-dentate, 5–10 cm ..... 53. *S. wightii*
- 55b. Stem leaves lyrate-pinnatisect or lyrate-pinnatifid, median ones 10–22 cm.
- 56a. Involucres 5–7 × 4–10 mm; ray lamina ca. 8 mm, pappus reddish brown ..... 46. *S. raphanifolius*
- 56b. Involucres 3–4 × 3–4 mm; ray lamina ca. 6.5 mm; pappus straw-colored or pale brownish ... 44. *S. analogus*
- 53b. Pappus present in ray florets.
- 57a. Peduncles hollow and expanded below capitula; achenes 7–8 mm ..... 2. *S. pseudoarnica*
- 57b. Peduncles slender; achenes 2–5 mm.
- 58a. Leaves lanceolate, closely regularly denticulate, abaxially densely white tomentose ..... 4. *S. densiserratus*
- 58b. Leaves not as above.
- 59a. Plants subscapose; stem leaves small and bractlike in comparison to basal ones.
- 60a. Median stem leaves linear-lanceolate to linear, basally expanded, glabrous ..... 41. *S. spathiphyllus*
- 60b. Median stem leaves oblong or oblong-lanceolate, lyrate-pinnatifid, basally auriculate-amplexicaul with toothed or lobed auricles, ± tomentose.
- 61a. Capitula numerous; involucres 3–4 mm; ray florets 10–13, lamina ca. 6.5 mm ..... 44. *S. analogus*
- 61b. Capitula 2–6; involucres ca. 8 mm; ray florets 16–21, lamina 10–11 mm ..... 45. *S. tibeticus*
- 59b. Plants with leafy stems; stem leaves well developed.
- 62a. Shoots dwarf, 2–20 cm tall; capitula 1–10 in each synflorescence; median stem leaves 2.5–4 cm; upper stem leaves with small entire auricles or not auriculate.
- 63a. Capitula large, solitary at apex; involucres 15–20 mm wide, basally 10–13-calyculate; phyllaries 21–23; ray florets 10–13 ..... 28. *S. megalanthus*
- 63b. Capitula smaller, few corymbose; involucres less than 10 mm wide, basally 4–8-calyculate; ray florets fewer than 10.
- 64a. Phyllaries 13; involucres 4–8 × 3–6 mm.
- 65a. Involucres 4–5 × 3–4 mm; ray florets 5 or 6, lamina ca. 4 mm ..... 30. *S. kongboensis*
- 65b. Involucres 6–8 × 5–6 mm; ray florets ca. 10, lamina 5–6 mm ..... 27. *S. thianschanicus*
- 64b. Phyllaries 18–21; involucres 8–10 × 6–8 mm.
- 66a. Plants 2–6 cm tall; ray lamina ca. 7.5 mm ..... 29. *S. lhasaensis*
- 66b. Plants 8–20 cm tall; ray lamina 10–12 mm ..... 26. *S. albopurpureus*
- 62b. Shoots more robust, 30–150 cm tall; capitula numerous in each synflorescence, or if plant shorter and with few capitula per synflorescence then upper stem leaves with coarsely dentate auricles.
- 67a. Stem leaves unlobed, dentate.
- 68a. Leaf petioles basally with small to minute auricles; pappus straw-colored ..... 3. *S. cannabifolius*
- 68b. Leaf petioles without auricles; pappus white.
- 69a. Ray florets 8–10, lamina 11–13 mm; involucres 6–7 × 4–5 mm ..... 5. *S. nemorensis*
- 69b. Ray florets 5 or 6, lamina 8–9 mm; involucres 4.5–6 × 2–4 mm ..... 6. *S. morrisonensis*
- 67b. Stem leaves at least lower ones bipinnately, pinnately, or runcinately lobed.
- 70a. Phyllaries 5–10, usually 5–8.
- 71a. Leaf blade of lower and median stem leaves basally cuneate, narrowly decurrent to petiole, 11–30 × 4–15 cm, with 2 or 3 ascending, oblong-lanceolate, serrulate lateral lobes on each side ..... 3. *S. cannabifolius*
- 71b. Leaf blade and lateral lobes of lower and median stem leaves not as above.
- 72a. Median stem leaves runcinate, with large terminal lobe, 1 or 2 pairs of lateral lobes, and largest lateral lobes uppermost; involucres 1.5–2 mm wide; ray florets 3 or 4 ..... 36. *S. faberi*
- 72b. Median stem leaves pinnatisect, with small terminal lobe, 3–12 pairs of lateral lobes, and largest lateral lobes at or below middle, or if leaves ± lyrate with large terminal lobe then involucre 3–4 mm wide and ray florets 8–13.
- 73a. Lateral lobes of median and upper stem leaves 8–12 on each side.
- 74a. Involucres 6–9 mm; ray lamina ca. 7 mm ..... 10. *S. multilobus*
- 74b. Involucres 3–4 mm; ray lamina ca. 4.5 mm ..... 38. *S. pteridophyllus*

- 73b. Lateral lobes of median and upper stem leaves 3–6 on each side.  
 75a. Involucres 7–8 mm; ray lamina ca. 6 mm; pappus ca. 6 mm ..... 12. *S. cinarifolius*  
 75b. Involucres 3–5 mm; pappus 4–4.5 mm.  
 76a. Involucres campanulate; pappus straw-colored or pale brownish; median stem leaves lyrate-pinnatifid; ray lamina ca. 6.5 mm; roots not tomentose .... 44. *S. analogus*  
 76b. Involucres narrowly campanulate-cylindric; pappus white; median stem leaves pinnatifid; ray lamina ca. 4 mm; roots tomentose ..... 13. *S. royleanus*  
 70b. Phyllaries 12–22, usually 13 or 21.  
 77a. Plants with elongated, well-developed stolons ..... 37. *S. filifer*  
 77b. Plants not stoloniferous.  
 78a. Stem leaves petiolate, not auriculate ..... 6. *S. morrisonensis*  
 78b. Stem leaves sessile, with basal dentate or lacinate auricles.  
 79a. Capitula large, involucres 5–7 × 8–15 mm; ray lamina 9–12 mm.  
 80a. Pappus reddish brown, scant in ray florets, 4–5 mm ..... 46. *S. raphanifolius*  
 80b. Pappus white, abundant on all florets, ca. 6 mm.  
 81a. Bracts of calyculus 10–12; ray lamina ca. 9 mm ..... 43. *S. multibracteolatus*  
 81b. Bracts of calyculus 2–6; ray lamina ca. 12 mm ..... 49. *S. ambraceus*  
 79b. Capitula small, involucres 3–6 × 3–7 mm; ray lamina 4.5–9 mm.  
 82a. Basal and lower stem leaves lyrate, with comparatively large, broad, dentate terminal lobes ..... 44. *S. analogus*  
 82b. Basal and lower stem leaves pinnatisect, with small, narrow terminal lobes.  
 83a. Involucres 5–6 × 6–7 mm; ray florets 10–13, lamina 8–9 mm ..... 50. *S. argunensis*  
 83b. Involucres 3–5 × 3–6 mm; ray florets 5–8, lamina 4–8 mm.  
 84a. Ray lamina ca. 4.5 mm; pappus ca. 4 mm ..... 38. *S. pteridophyllus*  
 84b. Ray lamina ca. 8 mm; pappus ca. 5.5 mm ..... 39. *S. chungtienensis*

1. *Senecio* sect. *Pinnati* (H. Koyama) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 357. 1984.

羽脉千里光组 yu mai qian li guang zu

*Cacalia* ser. *Pinnatae* H. Koyama, Mem. Fac. Sci. Kyoto Univ., Ser. Biol. 2(2): 180. 1969.

Herbs, perennial, erect, rather woody at base. Stems leafy. Leaves ovate or ovate-oblong, abaxially densely white arachnoid, base cordate or rounded-subtruncate. Capitula discoid, pendulous. Anthers basally shortly, rather obtusely, sagittate; antheropodia short, broad. Achenes with epidermal cells not papillose, cuticle thick; mechanical tissue in 10 closely approximate tracts, bi-allantoid (shaped like 2 sausages joined) in cross section.

One species: Bhutan, China, N India, Nepal.

1. *Senecio kumaonensis* Duthie ex C. Jeffrey & Y. L. Chen, Kew Bull. 39: 357. 1984.

须弥千里光 xu mi qian li guang

*Cacalia penninervis* H. Koyama; *Koyamacalia penninervis* (H. Koyama) H. Robinson & Brettell.

Herbs, perennial, with thick woody rhizome. Stem solitary or few fasciculate, erect, 50–90 cm tall, rather woody at base, sparsely arachnoid and shortly crisped-pubescent, not branched below synflorescence. Radical and lower stem leaves withered and shed by anthesis; median stem leaves long petiolate; petiole 3–6 cm, not winged; blade ovate or ovate-oblong, 10–13 × 4–5.5 cm, papery, abaxially densely white arachnoid-tomentose, adaxially at first sparsely arachnoid and shortly crisped-pubescent, pinnately veined with 14–18 arcuate lateral veins, base

weakly cordate, margin mucronulate-dentate, apex acute to obtuse, ± acuminate, mucronulate. Upper leaves smaller and narrower upward, lanceolate, base cuneate. Capitula discoid, pendulous, numerous, arranged in narrow terminal and upper axillary panicles; peduncles 3–8 cm, shortly crisped-pubescent. Involucres cylindric, 7–8 × 2–3 mm, calyculate; bracts of calyculus ca. 3, linear; phyllaries 5(or 6), narrowly oblong, 6–7 × ca. 1 mm, herbaceous, sparsely puberulent, inconspicuously 3-veined, apically obtuse and puberulent. Florets 5–7; corolla yellow, ca. 6 mm, with ca. 2 mm tube and funnelform limb; lobes ovate-oblong, ca. 1 mm, apically acute. Anthers ca. 2.2 mm, basally obtuse-auriculate, appendages ovate-lanceolate. Style branches ca. 1 mm. Achenes cylindric, 2–3 mm, glabrous. Pappus dirty white, 4–5 mm. Fl. Jun–Aug.

Shaded slopes; 3600–4500 m. S Xizang (Gyirong) [Bhutan, N India, Nepal].

2. *Senecio* sect. *Crociseris* (Reichenbach) Hallier & Wohlfarth, Syn. Deut. Schweiz. Fl., ed. 3, 1486. 1897.

番红菊组 fan hong ju zu

*Cineraria* sect. *Crociseris* Reichenbach, Fl. Germ. Excurs. 2423. 1831.

Herbs, perennial, erect, with leafy stems. Leaves cuneate to attenuate at base. Capitula radiate, erect. Anthers obtuse to rounded at base. Achenes epidermal cells not papillose, cuticle thin; mechanical tissue in 9 or 10 contiguous tracts, forming a complete cylinder.

Maybe ca. 100 species: temperate to tropical Africa, Asia, Europe; 51 species (34 endemic) in China.

**1. *Senecio* ser. *Arnicoidei*** Schischkin ex C. Jeffrey & Y. L. Chen, Kew Bull. 39: 358. 1984.

拟阿尾菊系 ni a wei ju xi

Leaves sessile, subamplexicaul. Peduncles robust, dilated toward apex. Capitula and achenes large.

One species: Aleutian Islands, China, Japan, Russia (Far East), North America.

**2. *Senecio pseudoarnica*** Lessing, Linnaea 6: 240. 1831 [*"Pseudo-Arnica"*].

多肉千里光 duo rou qian li guang

*Arnica maritima* Linnaeus, Sp. Pl. 2: 884. 1753; *Senecio maritimus* (Linnaeus) Koidzumi (1910), not Linnaeus f. (1782).

Herbs, perennial, with short, thick rhizomes. Stem solitary, erect or ascending, 35–70 cm tall, hollow, simple, sparsely arachnoid, puberulent. Radical and lower stem leaves soon withering; median stem leaves sessile, ovate-oblong, oblong, elliptic, or obovate-oblong, 12–20 × 4.5–5.5 cm, thickly papery, abaxially paler and sparsely arachnoid, adaxially glabrous, pinnately veined, with 10–14 arcuate lateral veins, base cuneate-attenuate and subamplexicaul, margin coarsely mucronulate-dentate, apex obtuse. Upper leaves smaller, basally more rounded. Capitula 3.5–4.5 cm in diam., 2–20 in lax terminal corymbs; peduncles 1.5–3.5 cm, thick, usually dilated at apex,

sparsely arachnoid and pubescent, bracteolate; bracteoles linear or linear-filiform, 5–15 mm. Involucres broadly campanulate or subhemispheric, 10–15 × 12–17 mm, calyculate; bracts of calyculus 8, narrowly linear, ca. equaling phyllaries; phyllaries 20 or 21, oblong or narrowly oblong, 10–15 × ca. 3 mm, herbaceous, sparsely puberulent, margin broadly scarious, apically acuminate and ciliate. Ray florets 15–17(–24); corolla tube 5–6.5 mm; lamina yellow, elliptic-oblong, 13–15 × 3–5 mm, 9-veined, apically obtuse, 3-denticulate. Disk florets many; corolla yellow, ca. 8 mm, with ca. 4 mm tube and funnelform limb; lobes ovate-oblong, ca. 1.7 mm, apically acute, papillose. Anthers ca. 2.5 mm, basally shortly obtuse-auriculate; appendages ovate; antheropodia short, broad. Style branches ca. 1.5 mm. Achenes cylindric, 7–8 mm, glabrous. Pappus dirty white, fulvous tinged at base, ca. 8 mm. Fl. Aug–Sep.  $2n = 40$ .

Seashores; sea level. Heilongjiang [N Japan, Russia (Far East); Aleutian archipelago, subarctic North America].

**2. *Senecio* ser. *Extremiorientales*** (Schischkin) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 359. 1984.

麻叶千里光系 ma ye qian li guang xi

*Senecio* sect. *Extremiorientales* Schischkin, Fl. URSS 26: 883. 1961.

Leaves petiolate, basally often auriculate, pinnately lobed or unlobed. Peduncles slender. Capitula numerous, small. Achenes small. Pappus yellowish.

One species: Aleutian Islands, China, Japan, Korea, Mongolia, Russia (Far East, E Siberia).

**3. *Senecio cannabifolius*** Lessing, Linnaea 6: 242. 1831.

麻叶千里光 ma ye qian li guang

Herbs, perennial, rhizomatous. Stem solitary, erect, 1–2 m tall. Radical and lower stem leaves withered by anthesis. Median stem leaf petioles short, base auriculate; auricles circular or semicircular, small; blade abaxially pale green, adaxially dark green, oblong-lanceolate, 11–30 × 4–15 cm, margin undivided or pinnately divided into 5–7 lobes, papery, abaxially crisped-puberulent, adaxially glabrous, base cuneate, margin serrate, apex acuminate; terminal lobe large, oblong-lanceolate, apex acute-acuminate; upper leaves 3-partite or undivided, gradually smaller upward. Capitula radiate, numerous, arranged in broad terminal compound corymbs; peduncles 10–20 mm, slender; bracteoles 2 or 3, linear, 2–3 mm, sparsely puberulent. Involucres cylindric, 5–6 × 2–3 mm, calyculate; bracts of calyculus 3 or 4, linear; phyllaries 8–10, oblong-lanceolate, ca. 5 × 1.5 mm, herbaceous, sparsely puberulent or subglabrous, margin broadly scarious, apically acute and puberulent. Ray florets 8–

10; corolla tube ca. 3 mm; lamina yellow, ca. 10 × 2.5 mm, 4-veined, 3-denticulate. Disk florets ca. 21; corolla yellow, ca. 8 mm, with ca. 4 mm tube and funnelform limb; lobes ovate-lanceolate, ca. 1.5 mm, apically acute, papillose. Anthers 2–3 mm, basally shortly, rather obtusely, sagittate; appendages ovate-lanceolate; antheropodia rather long and narrow, basally dilated. Style branches ca. 1.5 mm. Achenes cylindric, 3.5–4 mm, glabrous. Pappus straw-colored, ca. 6 mm. Fl. Jul.  $2n = 40$ .

Meadows, forests. Hebei, Heilongjiang, Jilin, Nei Mongol [Japan, Korea, Mongolia, Russia (Far East, E Siberia); Aleutian archipelago].

- 1a. Leaves pinnately lobed ..... 3a. var. *cannabifolius*
- 1b. Leaves unlobed, oblong-lanceolate .... 3b. var. *integrifolius*

**3a. *Senecio cannabifolius* var. *cannabifolius***

麻叶千里光(原变种) ma ye qian li guang (yuan bian zhong)

*Jacobaea cannabifolia* (Lessing) E. Wiebe; *J. palmata* (Pallas) Sennikov; *Senecio cannabifolius* f. *pubinervis* Kita-

gawa; *S. palmatus* (Pallas) Ledebour (1845), not Lapeyrouse (1818); *Solidago palmata* Pallas.

Leaves pinnately lobed.

Meadows. Hebei, Heilongjiang, Jilin, Nei Mongol [Japan, Korea, Russia (Far East, E Siberia); Aleutian archipelago].

**3b. *Senecio cannabinifolius* var. *integrifolius*** (Koidzumi) Kitamura, Acta Phytotax. Geobot. 6: 275. 1937.

全叶千里光 *quan ye qian li guang*

*Senecio palmatus* var. *integrifolius* Koidzumi, Bot. Mag. (Tokyo) 30: 77. 1916; *S. litvinovii* Schischkin; *S. otophorus* Maximowicz.

Leaves unlobed, oblong-lanceolate.

Meadows, forests. Jilin (Changbai Shan) [Japan, Russia (Far East)].

### 3. *Senecio* ser. *Densiserrati* C. Jeffrey & Y. L. Chen, Kew Bull. 39: 361. 1984.

密齿千里光系 *mi chi qian li guang xi*

Herbs, tall, with leafy stem. Leaves unlobed, narrowly lanceolate or linear-lanceolate, densely denticulate, abaxially white tomentose. Capitula radiate, erect; phyllaries 8, herbaceous. Ray florets 5; disk florets 7–9. Anthers shortly obtuse-auriculate at base; antheropodia rather elongated, somewhat dilated below middle.

• One species: China.

**4. *Senecio densiserratus*** C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 56. 1935.

密齿千里光 *mi chi qian li guang*

Herbs, perennial, rhizomatous. Stem solitary, erect, 70–120 cm tall, simple below synflorescence, sparsely arachnoid-tomentose, glabrescent. Basal and lower stem leaves withered by anthesis; median stem leaves numerous, shortly petiolate; blade adaxially green, narrowly lanceolate or linear-lanceolate, 7–16 × 1–2 cm, papery, abaxially white tomentose except for midvein, adaxially adpressed pubescent, pinnately veined, lateral veins 18–22, obscure, base cuneately attenuate into petiole, margin densely denticulate, apex acute-acuminate-attenuate. Upper leaves smaller; uppermost leaves linear, small. Capitula radiate, numerous, arranged in terminal and upper axillary compound corymbs; peduncles 3–5 mm, slender, densely puber-

ulent, with 2 or 3 filiform bracteoles. Involucres cylindric-campanulate, ca. 5 × 1.5–2.5 mm, calyculate; bracts of calyculus ca. 3, filiform, 1–2 mm; phyllaries 8, linear, ca. 5 × 0.5–0.8 mm, herbaceous, pubescent, margin narrowly scarious, apically acute, puberulent and sometimes purplish. Ray florets 5; corolla tube ca. 3 mm; lamina oblong, ca. 4 × 0.7 mm, 4-veined, 3-denticulate. Disk florets 7–9; corolla yellow, ca. 6 mm, with ca. 3 mm tube and funnellform limb; lobes ovate-triangular, ca. 1 mm, apically acute, papillose. Anthers ca. 1.5 mm, basally shortly obtuse-auriculate, appendages ovate-lanceolate, apically obtuse; antheropodia rather elongate, somewhat dilated in lower half. Style branches ca. 1 mm. Achenes cylindric, ca. 3 mm, glabrous. Pappus white, ca. 5 mm. Fl. Aug–Sep.

• Upland valleys; 2400–3000 m. Gansu, ?Shaanxi, Sichuan (Guanxian, Heishui).

### 4. *Senecio* ser. *Nemorenses* Gagnidze, Bot.-Geogr. Anal. Florotz. Kompl. Subalp. Vysokotrav. Kavkaza, 16. 1974.

林荫千里光系 *lin yin qian li guang xi*

Herbs tall, with leafy stems. Roots tomentose. Leaves unlobed or pinnately lobed, abaxially not tomentose. Capitula radiate or discoid, usually erect; phyllaries 5, 8, 9, or 12–18, usually herbaceous. Ray florets absent, or 1 or 2 or 4–10. Disk florets 3–16. Anthers shortly obtuse-auriculate at base; antheropodia rather short to rather elongated, basally hardly or somewhat dilated but not markedly so.

About 15 species: Asia, Europe; nine species (six endemic) in China.

**5. *Senecio nemorensis*** Linnaeus, Sp. Pl. 2: 870. 1753.

林荫千里光 *lin yin qian li guang*

*Senecio ganpinensis* Vaniot; *S. kematogensis* Vaniot; *S. nemorensis* var. *octoglossus* (Candolle) Ledebour; *S. nemorensis* var. *subinteger* H. Hara; *S. nemorensis* var. *taiwanensis* (Hayata) Yamamoto; *S. octoglossus* Candolle; *S. octoglossus* var. *macer* Candolle; *S. sarracenicus* Linnaeus, p.p.; *S. taiwanensis* Hayata; *S. tozanensis* Hayata.

Herbs, perennial, rhizomatous. Stems solitary or sometimes several, erect, to 1 m tall, not branched below synflorescence, sparsely pubescent or subglabrous. Basal and lower stem leaves withered by anthesis; median stem leaves numerous, subsessile, lanceolate or oblong-lanceolate, 10–18 × 2.5–4 cm,

papery, both surfaces sparsely puberulent or subglabrous, pinnately veined, lateral veins 14–18, base cuneately attenuate and ± subamplexicaul, margin densely serrate, rarely coarsely dentate, apex acute-acuminate or acuminate; upper leaves somewhat smaller. Capitula radiate, numerous, arranged in terminal and upper axillary compound corymbs; peduncles 1.5–3 cm, slender; bracteoles 3 or 4, linear, 5–10 mm, sparsely pubescent. Involucres subcylindric, 6–7 × 4–5 mm, calyculate; bracts of calyculus 4 or 5, linear, shorter than involucre; phyllaries 12–18, oblong, 6–7 × 1–2 mm, herbaceous, puberulent, margin broadly scarious, puberulent, apically triangular-acuminate and brown puberulent. Ray florets 8–10; corolla tube ca. 5 mm; lamina yellow, linear-oblong, 11–13 × 2.5–3 mm, 4-veined, 3-denticulate. Disk florets 15 or 16; corolla yellow, 8–9 mm wide, with 3.5–4 mm tube and funnellform limb; lobes ovate-trian-

gular, ca. 1 mm, apically acute, papillose. Anthers ca. 3 mm, basally auriculate, appendages ovate-lanceolate; antheropodium rather short. Achenes cylindrical, 4–5 mm, glabrous. Pappus white, 7–8 mm. Fl. Jun–Dec.  $2n = 40$ .

Open places in forests, meadows, streamsides; 700–3000 m. Anhui, Fujian, Gansu, Guizhou, Hebei, Henan, Hubei, Jilin, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Zhejiang [Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Russia (Far East, Siberia); Europe].

**6. *Senecio morrisonensis*** Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 155. 1911.

玉山千里光 *yu shan qian li guang*

Herbs, perennial, rhizomatous. Stem solitary, erect, 30–60 cm tall, not branched below synflorescence or branching from near base, glabrous. Basal and often also lower stem leaves withered by anthesis; stem leaves numerous, subsessile or shortly petiolate; leaf blade broadly lanceolate to oblong-lanceolate, 7–14 × 1.3–3.5 cm, papery, glabrous, base cuneate-attenuate, margin unlobed and rarely serrate or usually coarsely serrate-lobulate or coarsely dentate, or deeply pinnately lobed, with 8–10 oblong, irregularly mucronulate-lobulate lateral lobes, apex acute-acuminate or acuminate-attenuate; upper leaves smaller. Capitula radiate, numerous, arranged in terminal or terminal and upper axillary corymbs; peduncles 1–2 cm; bracteoles 2 or 3, linear, 2–3 mm, sparsely pubescent or subglabrous. Involucres subcylindrical, 4.5–6 × 2–4 mm, calyculate; bracts of calyculus 4 or 5, linear, ca. 1.5 mm; phyllaries usually 13, oblong, 0.5–1 mm wide, herbaceous, glabrous, margin narrowly scarious, apically triangular-acuminate, subobtuse, purplish and puberulent. Ray florets 5 or 6; corolla tube ca. 4.5 mm; lamina yellow, 8–9 × ca. 1.5 mm, 4-veined, 3-denticulate. Disk florets 14 or 15; corolla yellow, 6–6.5 mm, with 3.5–4 mm tube and funnelform limb; lobes oblong-lanceolate, ca. 1.5 mm, apically acute, papillose. Anthers ca. 2.5 mm, basally shortly obtuse-auriculate, appendages ovate-lanceolate; antheropodia rather broad, basally gradually dilated. Achenes cylindrical, ca. 3 mm, sparsely hirtellous to subglabrous. Fl. Jun–Oct.

• Forests, forest margins, mountain slopes, rocky riverbeds; 1600–3300 m. Taiwan.

- 1a. Leaves pinnatifid to pinnatipartite into narrow often coarsely lobulate lobes ..... 6a. var. *morrisonensis*
- 1b. Leaves lanceolate, marginally unlobed, serrate, coarsely serrate, or serrate-lobulate ..... 6b. var. *dentatus*

**6a. *Senecio morrisonensis* var. *morrisonensis***

玉山千里光(原变种) *yu shan qian li guang* (*yuan bian zhong*)

*Senecio taitungensis* S. S. Ying.

Leaves pinnatifid to pinnatipartite into narrow often coarsely lobulate lobes.

• Forests, rocky riverbeds; 2000–3300 m. Taiwan.

*Senecio taitungensis* represents a subscape variant of *S. mor-*

*risonensis* var. *morrisonensis* (into which it intergrades), inhabiting exposed places at 2000–3000 m.

**6b. *Senecio morrisonensis* var. *dentatus*** Kitamura, Acta Phytotax. Geobot. 6: 274. 1937.

齿叶玉山千里光 *chi ye yu shan qian li guang*

*Senecio angustifolius* Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 154. 1911, not (Thunberg) Willdenow (1803), nor Candolle (1838); *S. nemorensis* Linnaeus var. *dentatus* (Kitamura) H. Koyama.

Leaves lanceolate, marginally unlobed, serrate, coarsely serrate, or serrate-lobulate.

• Open forests, forest margins, mountain slopes; 1600–3300 m. Taiwan.

**7. *Senecio kuanshanensis*** C. I. Peng & S. W. Chung, Bot. Bull. Acad. Sin. 43: 155. 2002.

关山千里光 *guan shan qian li guang*

Herbs, perennial, rhizomatous. Stems solitary, erect, 32–44 cm tall, branching in upper part, glabrous. Basal and lower stem leaves withered by anthesis; stem leaves numerous, shortly petiolate; petiole 1–2 cm; median stem leaf blade broadly lanceolate, 11–13 × 3.5–5 cm, papery, glabrous, very deeply and narrowly bipinnately or tripinnately lobed, lobes spreading, lanceolate to linear, margin coarsely dentate or incised, apex attenuate, acute; upper leaves smaller, linear-lanceolate to linear, remotely dentate. Capitula radiate, numerous, in lax terminal corymbs; peduncles 3–7 cm, slender, sparsely pubescent or glabrous; bracteoles 1–3, linear, 2–3 mm, sparsely pubescent or subglabrous. Involucres subcylindrical, 8–10 × 4–6 mm, calyculate; phyllaries usually 13, linear, 0.5–1 mm wide, herbaceous, glabrous, margin narrowly scarious, apex acute to subobtuse, puberulent. Ray florets 5 (or 6); corolla tube ca. 8.5 mm; lamina yellow, 9–14 × ca. 3.5 mm, 4-veined, 3-denticulate. Disk florets 14 or 15; corolla yellow, 7–8 mm, with 4–5 mm tube and funnelform limb; lobes oblong-lanceolate, 1–1.5 mm, apically acute, papillose. Anthers ca. 2.5 mm, basally shortly auriculate, appendages ovate-lanceolate. Achenes cylindrical, 2–3 mm, sparsely hirtellous on ribs. Pappus white, ca. 7.5 mm. Fl. Aug–Oct.

• Forests, bamboo thickets; 2500–3300 m. Taiwan.

**8. *Senecio pseudomairei*** H. Léveillé, Repert. Spec. Nov. Regni Veg. 13: 345. 1914.

西南千里光 *xi nan qian li guang*

*Senecio beauverdianus* H. Léveillé.

Herbs, perennial, rhizomatous. Stems somewhat flexuous, erect, to 120 cm tall, simple or branched in upper part, puberulent when young. Basal and lower leaves withered by anthesis; median stem leaf petioles 2–3 cm, not winged, basally somewhat expanded; blade ovate-oblong or oblong-lanceolate, 15–20 × 4–6 cm, papery, sparsely shortly adpressed pubescent abaxially and on veins abaxially, midvein and veins prominent abaxially, pinnately partite into a lanceolate, acute, acuminate, or attenuate terminal lobe and ca. 10 oblong-lanceolate to subrhombic, irregularly dentate-mucronulate or lacerate-mucronulate lateral lobes, basally ± cuneate. Upper leaves smaller, with

fewer lateral lobes. Uppermost leaves shortly petiolate or sessile; blade linear or linear-lanceolate, margin sharply serrate, apically acuminate-attenuate. Capitula discoid, few to many in lax terminal and upper axillary thyrsoid corymbs; peduncles 3–5 mm, densely fulvous puberulent; bracteoles 2 or 3, subulate. Involucres cylindric or narrowly campanulate, 8–10 × 2–4 mm, calyculate; bracts of calyculus 3 or 4, subulate; phyllaries 8, purplish, linear or linear-lanceolate, ca. 1 mm wide, subleathery, sparsely puberulent, margin narrowly scarious, apically obtuse, purplish and sparsely puberulent. Disk florets 10–12; corolla red or purple, ca. 10 mm, with 4–5 mm tube and funnellform limb; lobes ovate-triangular, ca. 1.2 mm, apically acute, papillose. Anthers yellow, ca. 3 mm, basally shortly obtuse-auriculate, appendages ovate-lanceolate; antheropodia rather short, somewhat dilated in lower half. Style branches ca. 1 mm. Achenes (immature) ca. 2.5 mm, glabrous. Pappus white, 6–7 mm. Fl. Aug–Sep.

• Montane slopes, shaded places in valleys, among bamboos; 1700–3200 m. Guizhou, Sichuan, Yunnan.

**9. *Senecio graciliflorus*** Candolle, Prodr. 6: 365. 1838.

纤花千里光 xian hua qian li guang

*Senecio graciliflorus* var. *pleopterus* (Diels) Handel-Mazzetti; *S. mairei* H. Léveillé; *S. pleopterus* Diels.

Herbs, perennial, rhizomatous. Stem solitary, erect, 50–120 cm tall, branching in upper part, sparsely pubescent when young, glabrescent. Leaves petiolate, radical and lower stem leaves withered by anthesis; median stem leaf petiole 2–4.5 cm, slender, basally somewhat dilated but not auriculate; blade ovate or ovate-oblong, 10–25 × 6–12 cm, pinnatifid into an oblong-lanceolate, acuminate or acuminate-caudate terminal lobe and 8–10 oblong-lanceolate, long acuminate, coarsely serrate lateral lobes, papery, sparsely shortly adpressed pubescent adaxially and especially on main veins abaxially. Upper leaves smaller, less deeply divided and with fewer lateral lobes. Capitula obscurely radiate, numerous, arranged in terminal and upper axillary compound corymbs; peduncles 3–5 mm, slender, linear-bracteolate, densely fulvous puberulent. Involucres narrowly cylindric, 8–9 × 1.5–2 mm, calyculate; bracts of calyculus 4 or 5, linear-subulate, 2–3 mm, puberulent; phyllaries 5, linear, ca. 8 × 1 mm, herbaceous, sparsely minutely puberulent, obscurely 3-veined, margin narrowly scarious, apically obtuse and puberulent. Ray florets 1 or 2; corolla yellow, filiform, apically truncate or with a minute lamina much shorter than style branches. Disk florets 3; corolla yellow, ca. 8 mm, with ca. 3.5 mm tube and funnellform limb; lobes ovate-triangular, ca. 1 mm, apically acute, papillose. Anthers ca. 2.2 mm, basally obtuse-auriculate or sagittate, appendages ovate-lanceolate; antheropodia rather broad, basally slightly dilated. Style branches ca. 1.8 mm. Achenes cylindric, ca. 2.5 mm, glabrous. Pappus white, 4–5 mm. Fl. May–Oct.  $2n = 40$ .

Open places in forests, forest margins, grassy slopes, streamsides; 2000–4100 m. Guizhou, Sichuan, Xizang, Yunnan [India (Sikkim), Kashmir, W Malaysia].

**10. *Senecio multilobus*** C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 53. 1935.

多裂千里光 duo lie qian li guang

Herbs, perennial. Stem solitary, erect, to 150 cm tall, fistulose, sparsely puberulent, glabrescent, not branched below, much branched into synflorescence in upper part. Basal and lower stem leaves petiolate; blade abaxially pale green, adaxially dark green, oblong-lanceolate, 10–15 × 5–6 cm, abaxially sparsely minutely pilose on veins, adaxially sparsely puberulent, pinnatifid into small, linear-lanceolate, acuminate, entire or obscurely denticulate terminal lobe and 20–26 opposite or subopposite, narrowly oblong or oblong-lanceolate, 2–3 × 0.5–0.8 cm, spreading, acute, acutely few serrulate lateral lobes; upper leaves similar but smaller. Capitula radiate, very numerous, arranged in terminal and upper axillary compound corymbs; peduncles 5–12 mm, slender, puberulent; bracteoles 1 or 2, filiform, 1–2 mm, puberulent. Involucres cylindric, 6–7 × 2.5–3 mm, calyculate; bracts of calyculus 5 or 6, filiform; phyllaries 8 or 9, linear, 6–7 × ca. 0.8 mm, subleathery, glabrous, margin narrowly scarious, apically obtuse and puberulent. Ray florets 5; corolla tube ca. 4 mm; lamina orange-yellow, oblong, ca. 7 × 1–1.2 mm, 4-veined, 3-denticulate. Disk florets 10; corolla orange-yellow, ca. 8.5 mm, with ca. 3.5 mm tube and funnellform limb; lobes oblong-lanceolate, ca. 1 mm, apically acute, papillose. Anthers ca. 2.7 mm, basally shortly obtuse-auriculate, appendages ovate-lanceolate; antheropodium rather elongated, basally slightly expanded. Style branches ca. 1.5 mm. Achenes cylindric, ca. 2.5 mm, glabrous. Pappus white, ca. 7 mm. Fl. Sep–Nov.

• Forest and thicket margins; 2700–3000 m. Yunnan (Longchuan Jiang–Nu Jiang divide).

**11. *Senecio acutipinnus*** Handel-Mazzetti, Symb. Sin. 7: 1127. 1936.

尖羽千里光 jian yu qian li guang

Herbs, perennial, rhizomatous. Stems solitary or few fasciculate, weakly trailing below, ascending to erect above, 60–150 cm tall, not branched below synflorescence, fulvous puberulent when young. Basal and lower stem leaves withered and shed by anthesis; median stem leaf petioles 2–2.5 cm, slender, glabrous, not auriculate; blade oblong-lanceolate, 4–10 × 2–4 cm, papery, abaxially pallid and sparsely puberulent on veins, adaxially subglabrous, runcinate-pinnatifid into a small linear-lanceolate, acute, terminal lobe and 14–20 oblong-lanceolate or lanceolate, acute, apically mucronulate, entire or obscurely denticulate, basally somewhat contracted lateral lobes; upper leaves smaller. Capitula discoid, numerous, arranged in terminal compound corymbs, crowded, nodding; peduncles 1–3 mm, slender, fulvous puberulent; bracteoles 2 or 3, linear-subulate. Involucres cylindric-campanulate, ca. 6 × 1.5–2 mm, calyculate; bracts of calyculus 1 or 2, linear-subulate, ca. 2 mm; phyllaries 5, oblong-linear, ca. 6 × 1 mm, dark at apex and on upper margins, herbaceous, glabrous, margin narrowly scarious, apically obtuse. Disk florets 6; corolla orange-yellow, ca. 8 mm, with 3–3.5 mm tube and funnellform limb; lobes ovate-triangular, 1–2 mm, apically acute, papillose. Anthers linear, ca. 2 mm, basally shortly obtuse-auriculate, appendages ovate-lanceolate; antheropodium rather elongated, basally not dilated. Style branches ca. 1.2 mm. Achenes cylindric,

ca. 2.5 mm, glabrous. Pappus white, ca. 6.5 mm. Fl. Sep–Nov.

• Thicket margins; ca. 3300 m. Yunnan (Longchuan Jiang–Nu Jiang divide).

**12. *Senecio cinarifolius*** H. Léveillé, Repert. Spec. Nov. Regni Veg. 12: 283. 1913.

瓜叶千里光 *gua ye qian li guang*

Herbs, perennial, rhizomatous. Stem solitary, erect, 60–120 cm tall, simple, somewhat flexuous, adpressed puberulent when young; basal and lower stem leaves withered and shed by anthesis; median stem leaf petioles 1.5–2 cm, basally auriculate; auricle leaflike, irregularly serrate or lacerate, subamplexicaul; blade adaxially dark green, abaxially pale green, ovate-elliptic or ovate-oblong, to 16 × 9–10 cm, papery, abaxially sparsely puberulent on distinctly reticulate veins, adaxially sparsely shortly pubescent, pinnatifid into an oblong-lanceolate attenuate terminal lobe and 8–14 oblong or oblong-lanceolate, acuminate or attenuate, irregularly sharply serrate or lacerate lateral lobes. Upper leaves smaller, few, less deeply lobed; uppermost leaves linear-lanceolate or linear, margin shallowly toothed or subentire. Capitula radiate, numerous, arranged in rather dense terminal and upper axillary corymbs; peduncles 5–10 mm, densely fulvous puberulent, with 2 or 3 linear bracteoles. Involucres cylindric or narrowly campanulate, 7–8 × 2–3 mm, prominently calyculate; bracts of calyculus 5 or 6, green, linear, unequal, to 1/2 as long as involucre; phyllaries 8, oblong-lanceolate, ca. 1 mm wide, herbaceous, puberulent, margin narrowly scarios, apically obtuse, purplish and puberulent. Ray florets 5; corolla tube ca. 4 mm; lamina yellow, oblong, ca. 6 mm, 4-veined, 3-denticulate. Disk florets 15 or 16; corolla yellow, ca. 8 mm, with ca. 4 mm tube; lobes ovate-lanceolate, apically acute, papillose. Anthers ca. 2 mm, basally shortly obtuse-auriculate, appendages ovate-lanceolate; antheropodia elongate, gradually slightly dilated in lower half. Style branches ca. 1.2 mm. Achenes cylindric, ca. 2.5 mm, glabrous. Pappus white, ca. 6 mm. Fl. Aug–Sep.

**5. *Senecio* ser. *Coriaceisquami*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 371. 1984.

革苞千里光系 *ge bao qian li guang xi*

Herbs, erect, with leafy stems. Leaves ± deltoid, abaxially not tomentose, basally cordate or hastate. Capitula discoid or rarely radiate, usually nodding. Phyllaries 5, 8, or 13, rarely 12 or 14, usually leathery. Ray florets absent or rarely 5–7. Disk florets 5 to many. Anthers shortly obtuse-auriculate or subauriculate at base; antheropodia rather short to elongated, basally hardly or somewhat dilated but not markedly so.

• Six species: China.

**14. *Senecio lijiangensis*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 371. 1984.

丽江千里光 *li jiang qian li guang*

Herbs, perennial, rhizomatous. Stems 1 or 2, erect, 30–40 cm tall, not branched, ± puberulent when young. Basal and lower stem leaves withered by anthesis; median stem leaves long petiolate; petiole 3–6 cm, glabrous, not winged, basally slightly expanded, not auriculate; blade abaxially pale green, triangular, 3–5 × 2–4 cm, membranous, abaxially glabrous,

• Montane meadows; 2300–3200 m. Yunnan.

**13. *Senecio royleanus*** Candolle, Prodr. 6: 366. 1838.

珠峰千里光 *zhu feng qian li guang*

*Senecio graciliflorus* Candolle var. *hookeri* C. B. Clarke; *S. tanacetoides* Kunth & C. D. Bouché.

Herbs, perennial, rhizomatous. Stem solitary, erect, ca. 60 cm tall, ± flexuous in upper part, not branched below synflorescence, fulvous puberulent when young. Basal and lower stem leaves withered and shed by anthesis; median stem leaf petioles 1.5–3 cm, sparsely puberulent, without or with small, entire or toothed auricles; blade adaxially green, ovate-oblong, 10–15 × 6–8 cm, papery, abaxially sparsely puberulent on rather prominent veins, adaxially glabrous or sparsely puberulent, pinnatifid into a triangular-lanceolate, attenuate terminal lobe and 10–12 ovate-lanceolate or oblong-lanceolate, acuminate-attenuate, mucronulate-serrate lateral lobes. Upper leaves smaller, not auriculate. Uppermost leaves lanceolate or linear-lanceolate, basally cuneate, shortly petiolate or subsessile, margin unequally serrate, apically acuminate or long acuminate. Capitula radiate, numerous, arranged in dense compound terminal and upper axillary corymbs; peduncles 3–5(–10) mm, slender, sparsely to densely puberulent, with 1–3 linear-subulate bracteoles. Involucres narrowly campanulate, 4–5 × 1.5–2.5 mm, calyculate; bracts of calyculus 5 or 6, linear, unequal, 1–3 mm; phyllaries 8, linear, ca. 1 mm wide, herbaceous, sparsely puberulent, margin narrowly scarios, apically obtuse, purplish and puberulent. Ray florets 4 or 5; corolla tube ca. 3.5 mm; lamina yellow, oblong, ca. 4 × 1 mm, 3- or 4-veined, 3-denticulate. Disk florets 8 or 9; corolla yellow, ca. 6 mm, with ca. 3 mm tube and funnelform limb; lobes 5, ovate-triangular, ca. 1 mm, apically acute, papillose. Anthers ca. 1.5 mm, basally obtuse-auriculate, appendages ovate-lanceolate; antheropodia moderately long, basally slightly dilated. Achenes cylindric, ca. 2.5 mm, glabrous. Pappus white, ca. 4.5 mm. Fl. Aug–Sep.

Grassy slopes, by streams; 2900–3600 m. Xizang (Yadong) [Bhutan, Kashmir, Myanmar].

adaxially shortly scattered pilose or subglabrous, pinnately veined, base cordate or hastate, margin coarsely dentate, apically shortly obtuse-acuminate, mucronulate; upper leaves smaller. Uppermost leaves lanceolate or linear, margin remotely denticulate or subentire. Capitula discoid, nodding, solitary or rarely paired in axils of uppermost leaves, forming a terminal racemose cyme; peduncles cygneous, mostly shorter than subtending leaves, puberulent, not bracteolate. Involucres narrowly campanulate, 8–10 × 3–6 mm, calyculate; bracts of calyculus 3 or 4, linear, less than 1/2 as long as involucre, apically obtuse;

phyllaries 8 or 9, rarely 13, oblong-linear or linear-lanceolate, 8–10 × 1–2 mm, herbaceous, puberulent or glabrous, margin narrowly scarious, apically subacute or obtuse and puberulent. Disk florets 15–18; corolla yellow, 7–7.5 mm, with ca. 3 mm tube and narrowly campanulate limb; lobes 5, ovate-triangular, ca. 1 mm, apically acute. Anthers ca. 2 mm, basally obtuse-auriculate; antheropodia rather short, basally somewhat dilated and rounded. Style branches ca. 0.8 mm. Achenes cylindrical, ca. 4 mm, glabrous. Pappus white, ca. 6 mm. Fl. Sep.

• Montane meadows; 3000–3500 m. Sichuan (Muli), Yunnan (Lijiang).

**15. *Senecio tricuspis*** Franchet, J. Bot. (Morot) 8: 357. 1894.

三尖千里光 san jian qian li guang

*Cacalia tricuspis* (Franchet) Handel-Mazzetti.

Herbs, perennial, rhizomatous. Stems 1 or 2, erect, 60–80 cm tall, simple, glabrous. Basal and lower leaves withered by anthesis; median stem leaves long petiolate; petiole 3–7 cm, slender, not winged, glabrous, not auriculate; blade broadly triangular, 5–8 × 3–5 cm, membranous, glabrous, pinnately veined, veins inconspicuous, base hastate, margin unequally coarsely dentate or sublacerate in upper part and with 2–4 spreading, serrate-lacerate lateral lobes at base, apex acuminate-attenuate. Upper leaves shortly petiolate, similar but smaller upward. Capitula nodding, discoid, solitary, terminal and in axils of upper leaves, forming a lax terminal racemose cyme; peduncles erect, elongated, cygneous at apex, usually exceeding leaves, sparsely puberulent, with 1 or 2 linear bracteoles. Involucre campanulate, 8–10 × 7–9 mm, calyculate; bracts of calyculus 3 or 4, linear-subulate; phyllaries 12 or 13, ovate-lanceolate, ca. 8 × 1.5–2 mm, leathery or subleathery, glabrous, margin narrowly scarious, apically acutely acuminate and purplish. Disk florets many; corolla yellow, 7–8 mm, with 3–3.5 mm tube and funnelliform limb; lobes ovate-oblong, 1–1.2 mm, apically acute, papillose. Anthers ca. 2.5 mm, basally shortly obtuse-auriculate, appendages ovate-lanceolate; antheropodia rather short, basally somewhat dilated. Style branches ca. 1 mm. Achenes cylindrical, 4–5 mm, glabrous. Pappus white, ca. 6 mm. Fl. Sep–Oct.  $2n = 40^*$ .

• Montane meadows; 3500–3800 m. Sichuan, Yunnan.

**16. *Senecio humbertii*** C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 7: 153. 1936.

弥勒千里光 mi le qian li guang

Herbs, perennial, rhizomatous, stoloniferous. Stem solitary, erect, 60–70 cm tall, not branched below synflorescence, sparsely puberulent when young, soon glabrous. Basal and stolon leaves long petiolate; petiole 3.5–12 cm, slender, basally expanded but not auriculate; blade deltoid, small, 2–3 × 2–3 cm, membranous, abaxially glabrous, adaxially sparsely puberulent or glabrous, base subtruncate or weakly cordate, margin irregularly sinuate-dentate, apex acuminate. Basal and lower stem leaves withered by anthesis; lower stem leaves with narrowly winged petioles, basally subauriculate. Median stem

leaves similar but larger; petiole 3.5–6 cm, narrowly winged, basally auriculate; blade 5–15 × 4–8 cm, base subtruncate or hastate, pinnately veined. Upper leaves smaller, with shorter, broadly winged petioles, basally dilated into conspicuous rounded subamplexicaul auricles. Uppermost leaves sessile, lanceolate, basally cordate-semiamplexicaul, apically caudate-acuminate. Capitula at first erect, later nodding, discoid, numerous, arranged in dense long-stalked terminal and upper axillary rounded corymbs; peduncles 2–3 mm, fulvous puberulent; bracteoles 2 or 3, filiform. Involucre cylindrical, 6–7 × 1.5–2 mm, calyculate; bracts of calyculus 2 or 3, minute; phyllaries 5, linear, ca. 1 mm wide, subleathery, glabrous, margin narrowly membranous, apically obtuse and black. Disk florets 5 or 6, corolla yellow, 6–7 mm, with 2–2.5 mm tube and funnelliform limb; lobes ovate-triangular, 0.8–1 mm, apically acute, papillose. Anthers 2–2.5 mm, basally obtusely subauriculate, appendages lanceolate; antheropodia rather long, basally gradually dilated. Style branches ca. 0.7 mm. Achenes (immature) cylindrical, ca. 1.5 mm, glabrous. Pappus deciduous, white, 5–6 mm. Fl. Sep.

• Forests on slopes; 2000–2400 m. Yunnan (Mile).

**17. *Senecio liangshanensis*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 374. 1984.

凉山千里光 liang shan qian li guang

*Senecio faberi* Hemsley var. *discoideus* Lauener & D. K. Ferguson; *S. milleflorus* H. Léveillé (1914), not Greene (1900).

Herbs, perennial, rhizomatous. Stem solitary, erect, 30–60 cm tall, not branched below synflorescence, sparsely puberulent when young, soon glabrous. Basal and lower stem leaves withered by anthesis; median stem leaf petioles 3.5–12 cm, slender, narrowly winged, basally expanded into a toothed, subamplexicaul auricle; blade narrowly deltoid, 6–15 × 3.5–8 cm, papery, glabrous, pinnately veined, lateral veins 10–14, veins rather prominent abaxially, base hastate with triangular-lanceolate lateral basal lobes, margin irregularly coarsely mucronulate-dentate, apex acuminate. Upper leaves smaller, with shorter, rather more broadly winged petioles and more conspicuous auricles. Uppermost leaves sessile, lanceolate-attenuate, base subamplexicaul, margin denticulate. Capitula soon pendulous, discoid, numerous, arranged in rather congested terminal corymbiform stalked clusters; peduncles 5–7 mm, slender, minutely puberulent; bracteoles 2 or 3, filiform. Involucre cylindrical-campanulate, ca. 6 × 2–2.5 mm, calyculate; bracts of calyculus 3 or 4, linear-subulate, unequal; phyllaries 8, linear, ca. 1 mm wide, herbaceous, glabrous, margin narrowly scarious, apically obtuse, blackish and fimbriate. Disk florets 10; corolla yellow, ca. 6.5 mm, with ca. 3 mm tube and funnelliform limb; lobes ovate-triangular, ca. 1 mm, apically acute, papillose. Anthers ca. 1.8 mm, basally shortly obtuse-auriculate, appendages ovate-lanceolate; antheropodia rather elongated, narrow, basally hardly dilated. Style branches ca. 0.8 mm. Achenes cylindrical, ca. 3 mm, glabrous. Pappus white, ca. 6 mm. Fl. Aug–Sep.

• Montane woods and meadows; 2600–3400 m. SW Sichuan, Yunnan.

**18. *Senecio nigrocinctus*** Franchet, J. Bot. (Morot) 10: 417. 1896 [*"nigro-cinctus"*].

黑苞千里光 *hei bao qian li guang*

*Senecio delavayi* Franchet, J. Bot. (Morot) 8: 364. 1894, not Franchet (1892); *S. pteropodus* W. W. Smith.

Herbs, perennial, rhizomatous. Stem solitary, ascending then erect, 30–60 cm tall, puberulent when young, soon glabrous. Basal and lower stem leaves withered by anthesis, long petiolate; petiole 4–8 cm, not winged, basally expanded but not auriculate; blade ovate-triangular, 4–6 × 2.5–5 cm, papery, base cordate or hastate, margin coarsely sharply dentate, apex acute. Median stem leaves larger; petiole 3–5 cm, broadly winged, basally expanded into prominent subamplexicaul dentate auricle; blade ovate-triangular, 6–10 × 4–6 cm, otherwise similar, glabrous, pinnately veined, lateral veins 10–14. Upper leaves sessile; blade ovate-lanceolate or oblong-lanceolate, 4–9 × 1.5–3 cm, with auricle and petiolar wings confluent with blade, margin irregularly deeply dentate, apex long acuminate. Capitula at first erect, then nodding, discoid, numerous, arranged in terminal and upper axillary rather dense rounded corymbiform clusters; peduncles 5–12 mm, densely fulvous puberulent; bracteoles 1–3, linear. Involucres obconic-campanulate, 6–7 × 2.5–4 mm, calyculate; bracts of calyculus 4 or 5, linear, unequal, 3–6 mm, apically acute, dark; phyllaries 8–13, spreading or reflexed in upper part, linear-lanceolate, 6–7 × 1–1.5 mm, leathery, puberulent to glabrous, apically acute-acuminate, dark at apex and on upper margin. Disk florets (13–)22–26; corolla yellow, ca. 7.5 mm, with ca. 4 mm tube and funnellform limb; lobes ovate-triangular, apically acute. Anthers ca. 2 mm, basally shortly obtuse-auriculate, appendages ovate-oblong; antheropodia elongated, basally gradually slightly dilated. Style branches ca. 1 mm. Achenes cylindric, ca. 2.5 mm, glabrous. Pappus white, ca. 5 mm. Fl. Jul–Sep.

• Alpine meadows, slopes, forest margins; 3200–4000 m. SE Xizang, NW Yunnan.

**19. *Senecio coriaceisquamus*** C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 50. 1935.

革苞千里光 *ge bao qian li guang*

Herbs, perennial, rhizomatous. Stems solitary or few fasciculate, ascending, flexuous, ca. 45 cm tall, crisped-pubescent. Petioles of radical leaves 2–2.5 cm, densely pilose, narrowly winged, basally expanded but not auriculate; blade of radical leaves triangular or ovate, 3–3.5 × 2.5–3 cm, papery, both surfaces densely crisped-pilose, pinnately veined, base cordate, margin entire or obscurely mucronulate-crenulate or denticulate, apex obtuse. Basal and lower stem leaves withered and shed by anthesis; median stem leaves similar; petiole 2–4 cm, winged, basally gradually dilated into conspicuous rounded entire or few-denticulate subamplexicaul auricle; blade triangular or ovate-triangular, 4–6 × 2–4 cm. Uppermost leaves lanceolate, basally cuneate to petiole, apically acute-acuminate. Capitula erect, radiate, 5–10 in terminal rather dense corymbs; peduncles 5–20 mm, densely pubescent, bracteate at base, bracteolate. Involucres campanulate, 8–9 × 4–5 mm, calyculate; bracts of calyculus 7 or 8, green, linear, 5–7 mm; phyllaries 12–14, ca. 8 × 1–1.5 mm, leathery, puberulent, margin narrowly subcartilaginous, apically acute, black. Ray florets 5–7; corolla tube 4–4.5 mm; lamina oblong, ca. 8 × 2.5 mm, 4-veined, apically 3-denticulate or 3-lobed. Disk florets many; corolla yellow, ca. 8 mm, with ca. 4 mm tube and funnellform limb; lobes ovate-triangular, ca. 1.6 mm, marginally papillose, apically acute. Anthers ca. 2 mm, basally obtusely subauriculate, appendages ovate-oblong; antheropodia somewhat elongated, basally somewhat dilated. Style branches ca. 1.2 mm. Achenes (immature) cylindric, ca. 3.5 mm, puberulent. Pappus white, ca. 6 mm. Fl. May.

• Open wet places, by streams; ca. 3000 m. Yunnan (Longchuan Jiang–Nu Jiang divide).

**6. *Senecio* ser. *Stenoglossi*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 378. 1984.

狭舌千里光系 *xia she qian li guang xi*

Herbs, erect, tall, with leafy stems. Leaves ± deltoid, abaxially not tomentose, basally cordate or subhastate. Capitula radiate, erect. Phyllaries 8–12, ± leathery. Ray florets 3 or 4, lamina elongated, narrow. Disk florets 8–19. Anthers obtuse-auriculate at base; antheropodia rather short and broad, basally slightly or somewhat dilated but not markedly so.

• Two species: China.

**20. *Senecio arachnanthus*** Franchet, J. Bot. (Morot) 8: 355. 1894.

长舌千里光 *chang she qian li guang*

*Cacalia arachnantha* (Franchet) Handel-Mazzetti.

Herbs, perennial, rhizomatous. Stem solitary, erect, to 100 cm tall, not branched below synflorescence, puberulent when young. Leaves long petiolate, basal and lower stem leaves withered by anthesis; petiole to 24 cm, not winged, sparsely pubescent; blade broadly ovate, to 26 cm long and broad, membranous or thinly papery, abaxially sparsely shortly pilose, adaxially minutely pubescent on veins, pinnately veined, base

deeply cordate or hastate, margin acutely irregularly coarsely dentate, apex acuminate-attenuate or acute. Median and upper stem leaves broadly triangular, basally broadly cordate, with shorter petioles not winged or winged and expanded and subamplexicaul. Uppermost leaves ovate-triangular or ovate-lanceolate, basally cuneate, shortly petiolate or subsessile. Capitula radiate, rather few to numerous, arranged in long stalked terminal compound corymbs; peduncles 6–10 mm, pubescent. Bracteoles 3, linear, 5–10 mm, pubescent. Involucres cylindric, 8–10 × 3–5 mm, calyculate; bracts of calyculus 6–8, green, linear, ca. 1/3 as long as involucre; phyllaries 10–13, linear-lanceolate, ca. 8 × 1.5–2 mm, leathery, glabrous, margin narrowly scarious, apically obtuse to acute and finely ciliate. Ray florets 4; corolla

tube ca. 7 mm, puberulent in upper part; lamina yellow, linear, 20–22 × 0.5–0.7 mm, 2- or 3-veined, apically 3-denticulate. Disk florets 17–19; corolla yellow, ca. 10 mm, with 5.5–6 mm tube and funnelform limb; lobes ovate-oblong, ca. 1.5 mm, apically acute, papillose. Anthers ca. 3.5 mm, basally obtuse-auriculate, appendages ovate-lanceolate; antheropodia rather broad, basally slightly expanded. Style branches ca. 1.2 mm. Achenes cylindrical, ca. 3 mm, glabrous. Pappus white, ca. 2 mm. Fl. Aug–Sep.

• Wet places in forests, by springs, streams; ca. 3000 m. NW Yunnan (Dali, Heqing).

**21. *Senecio lingianus*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 379. 1984.

君范千里光 jun fan qian li guang

*Senecio myriocephalus* Y. Ling ex Y. L. Chen, S. Yun Liang & K. Y. Pan, Acta Phytotax. Sin. 19: 93. 1981, not Schultz Bipontinus ex A. Richard (1848), nor Baker (1884).

Herbs, perennial, rhizomatous. Stem solitary, erect, to 120 cm tall, branching into synflorescence, sparsely puberulent when young. Leaves petiolate; basal and lower stem leaves withered by anthesis; median stem leaf petiole 3–6 cm, nar-

rowly winged; blade ovate-triangular or triangular, 10–14 × 8–13 cm, membranous or thinly papery, abaxially sparsely puberulent, adaxially glabrous, base broadly cuneate and attenuate into petiole, margin irregularly dentate, apex acuminate. Upper leaves smaller, sessile, ovate-lanceolate or lanceolate, 9–11 × 1.5–3.5 cm, base cuneate-attenuate, apex acuminate. Capitula radiate, numerous, arranged in rather crowded terminal compound corymbs; peduncles 7–15 mm, slender, puberulent, often bracteate; bracteoles 2 or 3, linear, ca. 5 mm. Involucre subcylindrical, 6–7 × 2–3 mm, calyculate; bracts of calyculus 2 or 3, linear, ca. 1/2 as long as involucre; phyllaries 8, linear-oblong, 6–7 × 1–1.5 mm, subleathery, glabrous, margin scarious, apically acute, blackish, and ciliate. Ray florets 3; corolla tube 4–5 mm, sparsely puberulent in upper part; lamina yellow, linear, ca. 15 × 1 mm, 4-veined, apically deeply 2- or 3-lobed. Disk florets 8 or 9; corolla yellow, ca. 8.5 mm, with ca. 4.5 mm tube and funnelform limb; lobes oblong-lanceolate, ca. 1.7 mm, apically acute. Anthers ca. 2.3 mm, basally shortly obtuse-auriculate, appendages ovate; antheropodia somewhat expanded toward base. Style branches ca. 1 mm. Achenes ca. 2.5 mm, glabrous. Pappus white, ca. 6 mm. Fl. Aug–Sep.

• Open forests, alpine shrubby meadows; 3600–4000 m. Xizang (Bomi, Mêdog).

**7. *Senecio* ser. *Cernui*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 380. 1984.

垂头千里光系 chui tou qian li guang xi

Herbs, erect, rather small, with leafy stems. Leaves ovate to oblanceolate, abaxially glabrous or tomentose, basally subtruncate to attenuate. Capitula radiate, nodding. Phyllaries 5 or 6 or 17–20, subleathery or herbaceous. Ray florets 6–8 or 18–20. Disk florets 23 to many; corolla lobes dark colored at apices. Anthers obtusely or subacutely auriculate at bases; antheropodia robust, elongated, basally only slightly dilated.

• Four species: China.

**22. *Senecio atrofuscus*** Grierson, Notes Roy. Bot. Gard. Edinburgh 22: 433. 1958.

黑褐千里光 hei he qian li guang

Herbs, slender, rhizomatous. Stem solitary, erect, 35–65 cm tall, simple, glabrous. Basal and lower stem leaves mostly present at anthesis; petiole to 15 cm, slender, basally expanded; blade ovate or ovate-oblong, 1–4 × 1–1.5 cm, membranous, minutely glandular ciliate on margin, otherwise glabrous, pinnately veined, base cordate to truncate or cuneate, margin remotely apiculate-denticulate, apex obtuse to acute. Median stem leaves sessile; blade oblong or oblong-lanceolate, 3–6(–8) × 0.5–1.5 cm, base cuneate, apex acute. Upper leaves linear, basally subamplexicaul, margin mucronulate-dentate or subentire, apically acuminate or acute. Capitula 1–3, terminal, lax, nodding, 2–2.5 cm in diam.; peduncles 1.5–3.5 cm, sparsely arachnoid to subglabrous; bracteoles 1 or 2, linear. Involucre broadly campanulate, 6–8 × 6–10 mm, calyculate; bracts of calyculus 9–12, linear or linear-subulate, 4–5 mm, purple, sparsely arachnoid or glabrous, ciliate on margin, apically acute; phyllaries ca. 17, ca. 2 mm wide, subleathery, blackish on veins and upper margins, sparsely fuscous pubescent at base, 3-veined, margin narrowly scarious, apically acute and ciliate. Ray florets 18; corolla tube ca. 3 mm; lamina yellow, elliptic,

10–11 × ca. 4 mm, 4-veined, apically acute, 3-denticulate. Disk florets many; corolla yellow, 7–7.5 mm, with ca. 2.5 mm tube and funnelform limb; lobes ovate-triangular, ca. 1 mm, apically blackish, acute. Anthers ca. 2.2 mm, basally shortly obtuse-auriculate, appendages lanceolate; antheropodia elongated, robust, basally slightly dilated. Style branches ca. 1.5 mm. Achenes cylindrical, ca. 3.5 mm, glabrous. Pappus white, 7–7.5 mm. Fl. Aug.

• Grassy slopes; ca. 3900 m. Xizang (Gongbo'gyamda), NW Yunnan.

**23. *Senecio nodiflorus*** C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 54. 1935.

节花千里光 jie hua qian li guang

*Senecio drukensis* C. Marquand & Airy Shaw var. *nodiflorus* (C. C. Chang) Handel-Mazzetti.

Herbs, rhizomatous. Stem usually solitary, erect, 10–50 cm tall, simple or branching into synflorescence, densely to laxly white arachnoid. Basal and lower stem leaves mostly present at anthesis; petiole 2.5–8 cm, sparsely arachnoid or glabrescent, basally somewhat expanded; blade ovate to elliptic-oblong, 4–6 × 1–3.5 cm, papery, abaxially white and densely arachnoid, adaxially sparsely arachnoid and ± glabrescent, pinnately

veined, base cuneate, margin irregularly mucronate-dentate, apex rounded to subacute. Median stem leaves shortly petiolate; blade elliptic-oblong or oblong-lanceolate. Upper leaves sessile, oblong-linear to linear, gradually smaller, base subamplexicaul; uppermost leaves linear, bractlike. Capitula 1–15, terminal on synflorescence branches, rather lax, thyrsoid, ca. 3 cm in diam., nodding; peduncles erect, apically recurved, 1–4.5 cm, stout, densely arachnoid-tomentose, bracteate; bracteoles 1 or 2, linear-lanceolate or linear, 5–12 mm. Involucres campanulate, 7–8 × 6–10 mm, calyculate; bracts of calyculus 8, purplish, linear, 4–6 mm, arachnoid-tomentose; phyllaries ca. 20, linear, 7–8 × 0.5–1 mm, subleathery, blackish purple on veins and in upper part, sparsely arachnoid, ± glabrescent, obscurely 3-veined, apically acute and villous. Ray florets 18–21; corolla tube ca. 4.5 mm; lamina bright yellow, oblong, ca. 8 × 2–3 mm, 4-veined, apically obtuse, 3-denticulate. Disk florets many; corolla yellow, ca. 8 mm, with ca. 4 mm tube and funnelform limb; lobes ovate-triangular, apically purplish, acute, and papillose. Anthers ca. 2.3 mm, basally obtusely or subacutely auriculate, appendages ovate-lanceolate; antheropodia elongated, robust, basally slightly dilated. Style branches ca. 1.3 mm. Achenes cylindrical, ca. 3 mm, glabrous. Pappus white, 7–8 mm. Fl. Aug–Oct.

• Wet stony pastures, rocky places, gravelly places, boulder screes; 3000–4500 m. Xizang, Yunnan (Dèqên).

**24. *Senecio drukensis*** C. Marquand & Airy Shaw, J. Linn. Soc., Bot. 48: 191. 1929.

垂头千里光 *chui tou qian li guang*

Herbs, rhizomatous. Stem solitary, erect, 15–35 cm tall, at first white arachnoid, glabrescent. Basal leaves mostly withered by anthesis; lower stem leaf petiole equaling or shorter than blade, narrowly winged, basally expanded; blade oblanceolate or spatulate, 4–6 × 0.8–1.5 cm, abaxially densely white tomentose, adaxially sparsely arachnoid and glabrescent, pinnately veined, base attenuate into petiole, margin mucronulate-denticulate, apex obtuse. Median and upper leaves subsessile; blade oblanceolate to linear, 3–5 × 0.3–0.6 cm, base slightly expanded and subamplexicaul, apex obtuse or subacute. Capitula radiate, nodding, few to rather numerous, arranged in a narrow elongated terminal thyrse; bracts oblanceolate-linear, similar to upper leaves but smaller, to 3 cm; peduncles 0.5–2.5 cm, densely arachnoid-tomentose, recurved at apex, with 1 or 2 linear-subulate bracteoles. Involucres cylindrical or narrowly campanulate, 5–6 × 3–5 mm, calyculate; bracts of calyculus 5 or 6, purplish, linear-subulate, 1–3 mm; phyllaries 13(–15), linear,

ca. 6 × 0.6–1 mm, herbaceous, blackish on veins and in upper part, sparsely arachnoid, glabrescent, with narrow scarious margins, apically acute, fimbriate and sometimes villous. Ray florets 6–8; corolla tube ca. 3.5 mm; lamina yellow, oblong-linear, 6–6.5 × 2–2.5 mm, 4-veined, apically 3-denticulate. Disk florets 23–25; corolla yellow, ca. 8 mm, with ca. 3.5 mm tube and funnelform limb; lobes ovate-oblong, ca. 1 mm, apically purplish, acute, and papillose. Anthers ca. 2.5 mm, basally subacutely auriculate, appendages ovate-lanceolate; antheropodia elongated, robust, basally slightly dilated. Style branches ca. 1 mm. Achenes cylindrical, 1.5–2 mm, glabrous. Pappus white, ca. 7 mm. Fl. Jul–Sep.

• Wet places, riverbanks, gravel of riversides, streambeds; 2900–3600 m. E Xizang (Bomi, Gongbo'gyamda).

**25. *Senecio daochengensis*** Y. L. Chen, Acta Phytotax. Sin. 26: 56. 1988.

稻城千里光 *dao cheng qian li guang*

Herbs, perennial, rhizomatous. Stem solitary, erect, green or becoming purplish above, 20–25 cm tall, not branched, glabrous or sometimes sparsely arachnoid-pubescent. Basal leaves withered and shed by anthesis; lower stem leaves long petiolate; petiole 3–3.5 cm, not winged, basally slightly expanded; blade ovate or ovate-elliptic, 2.5–3 × 1.2–2 cm, both surfaces glabrous, lateral veins 4–6, base cuneate-attenuate, margin entire or inconspicuously denticulate, reflexed when dry, apex obtuse or rounded. Median and upper stem leaves sessile or subsessile; blade narrowly lanceolate to linear, 2.5–4.5 × 0.5–5 cm, base slightly expanded, amplexicaul, apex slightly acute or obtuse. Capitula radiate, usually 3 or 4 in terminal raceme, with linear bracts 10–15 mm; peduncles pendulous, 5–10(–40) mm, sparsely arachnoid-pubescent. Involucres campanulate or cylindrical, 7–10 × 5–8 mm; bracteoles 5–8, black-purplish; phyllaries ca. 15, linear-lanceolate, distinctly shorter than disk, 1–2 mm wide, glabrous, apically acute and puberulent. Ray florets 8–11; corolla tube ca. 3 mm, puberulent above; lamina yellow, oblong or oblong-elliptic, ca. 7 × 2–3.5 mm, 4- or 5-veined, apically 3-denticulate. Disk florets 20–25; corolla yellow, 7–8 mm, with 1.5–2 mm tube and funnelform limb, lobes ovate-oblong, apically dark brown, puberulent. Anthers linear, basally obtuse. Style branches reflexed, subtruncate, papillose. Achenes subcylindrical, 2.5–3 mm, glabrous. Pappus white, ca. 7 mm. Fl. Aug–Sep.

• Montane meadows; ca. 4800 m. Sichuan (Daocheng).

**8. *Senecio* ser. *Monticolarum*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 257. 1984 [*“Monticolae”*].

山生千里光系 *shan sheng qian li guang xi*

*Senecio* sect. *Montani* Schischkin in Schischkin & Bobrov, Fl. URSS 26: 883. 1961, not Muschler (1909).

Herbs, dwarf, rhizomatous, with leafy stems. Leaves oblanceolate-oblong to spatulate, abaxially usually tomentose, basally cuneate to attenuate, at least stem leaves often pinnately lobed. Capitula radiate, erect. Phyllaries 13 or 18–20, herbaceous. Ray florets 5 or 6 or 10–14. Disk florets 15 to many. Anthers subacutely auriculate at bases; antheropodia rather stout, basally gradually dilated.

About six species: Himalaya and Myanmar to Russia; five species (three endemic) in China.

**26. *Senecio albopurpureus*** Kitamura, Fauna Fl. Nepal Himalaya 1: 271. 1955.

白紫千里光 *bai zi qian li guang*

*Senecio bracteolatus* J. D. Hooker, Fl. Brit. India 3: 339. 1881, not Hooker & Arnott (1841).

Herbs, dwarf, rhizomatous. Stems erect, 8–20 cm tall,

slender, simple, arachnoid-tomentose, glabrescent. Basal leaves mostly present at anthesis, long petiolate; blade elliptic or obovate-elliptic, obtusely few toothed or sublobulate; median stem leaves shorter petiolate; petiole somewhat expanded at base, not auriculate; blade oblong or oblong-lanceolate, 3–5 × 1–1.5 cm, pinnately lobed or pinnatifid with 6–10 oblong or ovate-oblong shallowly denticulate or subentire lateral lobes, abaxially densely tomentose, adaxially sparsely arachnoid, pinnately veined. Upper leaves smaller, lanceolate to linear-lanceolate, lobed or subentire, basally sessile and subamplexicaul. Capitula radiate, 2–6 in lax terminal corymb, rarely solitary; peduncles to 5 cm, sparsely arachnoid, with 2 or 3 linear or linear-subulate bracteoles. Involucres campanulate, 8–10 × 7–8 mm, calyculate; bracts of calyculus 6–8(–10), green or purplish, linear-subulate, 3–5 mm, acute, sparsely arachnoid; phyllaries 18–20, green or purplish, linear-lanceolate, 1–1.5 mm wide, dark brown or purplish on upper margin, herbaceous, sparsely arachnoid, glabrescent, apically acuminate and white pubescent. Ray florets 10–13; corolla tube ca. 5 mm; lamina yellow, oblong, 10–12 × ca. 2 mm, 4-veined, apically 3-denticulate. Disk florets many; corolla yellow, 7–8 mm, with 3–3.5 mm tube and funnellform limb; lobes ovate-lanceolate, ca. 1.5 mm, apically acute, papillose. Anthers ca. 2.5 mm, basally subacutely auriculate, appendages ovate-lanceolate; antheropodia elongate, basally somewhat dilated. Style branches ca. 1.5 mm. Achenes cylindrical, ca. 2.5 mm, glabrous. Pappus white or straw-colored at least at base, ca. 7 mm. Fl. Jul–Aug.

Streamsides; 3900–4300 m. S Xizang (Gyirong) [Bhutan, India (Sikkim), Nepal].

**27. *Senecio thianschanicus*** Regel & Schmalhausen, Trudy Imp. S.-Peterburgsk. Bot. Sada 6: 311. 1880.

天山千里光 tian shan qian li guang

*Senecio acromaculus* Y. Ling; *S. acromaculus* f. *elatus* Y. Ling; *S. drummondii* Babu & S. N. Biswas; *S. kawaguchii* Kitamura.

Herbs, dwarf, rhizomatous. Stems solitary or several fasciculate, ascending or erect, 5–20 cm tall, simple or sometimes branching from base, sparsely arachnoid when young, ± glabrescent. Basal and lower stem leaves mostly present at anthesis, petiolate; blade adaxially green, obovate or spatulate, 4–8 × 0.8–1.5 cm, abaxially ± arachnoid-pubescent and ± glabrescent to glabrous, adaxially subglabrous or glabrous, base attenuate into petiole, margin subentire, shallowly dentate, or pinnatifid, apex obtuse to subacute. Median stem leaves sessile; blade oblong or oblong-linear, 2.5–4 × 0.5–1 cm, pinnately veined, base subamplexicaul, margin shallowly dentate to pinnatifid or rarely pinnatipartite, apex obtuse. Upper leaves smaller, linear or linear-lanceolate, margin ± entire. Capitula radiate, 2–10 in lax terminal corymbs, rarely solitary; peduncles 0.5–2.5 cm, ± arachnoid; bracteoles linear or linear-subulate, 3–5 mm, apically acute. Involucres campanulate, 6–8 × 3–6 mm, calyculate; bracts of calyculus 4–8, 3–5 mm, apically acuminate, often purplish; phyllaries ca. 13, linear-oblong, 6–7 × 1–1.5 mm, usually dark colored and often fimbriate, or villous, herbaceous, sparsely arachnoid, glabrescent, margin scarious, apically acuminate. Ray florets ca. 10; corolla tube ca. 3 mm; lamina yellow,

low, oblong-linear, 5–6 × 1.5–2 mm, 4-veined, apically obtuse, 3-denticulate. Disk florets ca. 26 or 27; corolla yellow, 6–7 mm, with 3–3.5 mm tube and funnellform limb; lobes oblong-lanceolate, ca. 1.2 mm, apically acute, papillose. Anthers linear, ca. 2 mm, basally obtuse-auriculate, appendages ovate-lanceolate; antheropodia balusterform, basally dilated. Style branches ca. 1 mm. Achenes cylindrical, 3–3.5 mm, glabrous. Pappus white, ca. 8 mm. Fl. Jul–Sep.

Grassy slopes, open wet places, streamsides; 2400–5000 m. Gansu, Nei Mongol, Qinghai, Sichuan, Xinjiang, Xizang [Kazakhstan, Kyrgyzstan, N Myanmar, Russia].

**28. *Senecio megalanthus*** Y. L. Chen, Acta Phytotax. Sin. 26: 57. 1988.

大花千里光 da hua qian li guang

Herbs, perennial, rhizomatous. Rhizomes shorter. Stem erect or rather flexuous at base, 5–15 cm tall, slender, simple, white arachnoid or sometimes glabrate. Basal and lower leaves present at anthesis, long petiolate; petiole slightly expanded, but not amplexicaul; blade adaxially green, ovate or obovate, rarely spatulate or suborbicular, 1.5–4 × 1–1.7 cm, abaxially densely white arachnoid, adaxially sparsely arachnoid or ± glabrous, lateral veins 4–6-paired, inconspicuous, base cuneate-attenuate into petiole 1.5–3 cm, margin subentire or undulate-dentate, apex obtuse or rounded, rarely rather acute. Median stem leaves subsessile or shortly petiolate; blade oblong or oblong-spatulate, 2–4 × 5–8 cm, base cuneate, slightly expanded and amplexicaul, margin subentire or inconspicuously dentate, apex obtuse or slightly acute. Uppermost leaves smaller, bractlike, linear, 5–10 mm. Capitula solitary, terminal, erect or nodding, subsessile or shortly pedunculate. Involucres campanulate or campanulate-subglobose, 10–13 × 15–20 mm, basally 10–13 linear-lanceolate bracteolate; bracteoles 5–7 mm, sparsely arachnoid or glabrescent, margin brown scarious-fimbriate, apically acuminate; phyllaries 21–23, linear-lanceolate, 10–11 × 1–1.5 mm, herbaceous, puberulent or glabrous, margin narrowly scarious, apically purplish and puberulent. Ray florets 10–13; corolla tube 3.5–4 mm; lamina yellow, oblong, 10–11 × 2.5–3 mm, 4-veined, apically 3-denticulate. Disk florets many; corolla yellow, 8–9 mm, with ca. 3 mm tube and narrowly funnellform limb; lobes triangular-ovate, apically acute, puberulent. Anthers linear, basally obtuse. Style branches obtuse, papillose. Achenes cylindrical, 2–2.5 mm, glabrous. Pappus white, 10–11 mm.

• Alpine rocky slopes; 4100–4800 m. Sichuan (Kangding, Xiangcheng).

**29. *Senecio lhasaensis*** Y. Ling ex Y. L. Chen, S. Yun Liang & K. Y. Pan, Acta Phytotax. Sin. 19: 90. 1981.

拉萨千里光 la sa qian li guang

Herbs, dwarf, perennial. Stems solitary or sometimes paired, erect, 2–6 cm tall or nearly obsolete, sparsely arachnoid. Basal leaves rosulate, petiolate, present at anthesis; petiole 1–4 cm, basally expanded and subamplexicaul; blade oblanceolate-spatulate, 2–5 × 0.7–2 cm, papery, abaxially densely white tomentose, adaxially sparsely arachnoid on midvein and glabrescent, margin lyrate-pinnatifid with ovate or ovate-triangular

terminal lobe and 6–8 ovate-oblong or subtriangular, obtuse, 1- or 2-dentate lateral lobes, or sometimes subentire, apex obtuse. Stem leaves lyrate-pinnatifid, similar to basal leaves; uppermost leaves smaller. Capitula radiate, 2 or 3 in a terminal corymb or solitary, shortly pedunculate or subsessile. Involucres campanulate, 8–9 × 6–8 mm, calyculate; bracts of calyculus 3 or 4, linear-lanceolate or linear, 5–6 mm, sparsely arachnoid, fimbriate on margin, apically acuminate; phyllaries ca. 20, linear-lanceolate, 8–9 × 1.5–2 mm, herbaceous, sparsely arachnoid, margin narrowly scarious, apically acuminate, blackish brown and ciliate on upper margins and apex. Ray florets 13 or 14; corolla tube ca. 3.5 mm; lamina yellow, oblong, ca. 7.5 × 2.5 mm, 4-veined, apically obtuse, 3-denticulate. Disk florets many; corolla yellow, ca. 6.5 mm, with ca. 3 mm tube; lobes ovate-lanceolate, ca. 1 mm, apically acute, papillose. Anthers ca. 2 mm, basally subacutely auriculate, appendages ovate; antheropodia rather slender, basally slightly dilated. Style branches ca. 1.2 mm. Achenes cylindrical, ca. 2.5 mm, glabrous. Pappus white, ca. 6 mm. Fl. Aug–Sep.

- Alpine meadows; 4000–5400 m. Xizang.

**30. *Senecio kongboensis*** Ludlow, Bull. Brit. Mus. (Nat. Hist.), Bot. 5: 281. 1976.

工布千里光 gong bu qian li guang

Herbs, dwarf, perennial. Stem solitary, erect, 2–4 cm tall,

simple, arachnoid-pubescent, ± glabrescent. Basal leaves present at anthesis, rosulate; petiole short, basally expanded and subamplexicaul; blade oblanceolate-oblong or spatulate, 1.5–4 × 0.5–0.7 cm, abaxially densely white arachnoid-tomentose except for midvein, adaxially sparsely pilose and glabrescent, base cuneate-attenuate, margin mucronulate-dentate, apex obtuse to acute. Stem leaves subsessile; blade oblong or oblong-lanceolate, margin remotely dentate to deeply serrate or lyrate-pinnatifid, apex obtuse. Capitula radiate, 5–7 in a compact terminal corymb; peduncles 2–3 mm, arachnoid, linear-bracteolate. Involucres campanulate, 4–5 × 3–4 mm, calyculate; bracts of calyculus 4 or 5, linear or linear-lanceolate, 4–5 × ca. 1 mm, apically acuminate, fimbriate or minutely denticulate, dark brown; phyllaries ca. 13, ca. 6 × 0.5–1 mm, dark purplish red and ciliate on upper margins and apex, herbaceous, sparsely arachnoid to glabrous, margin narrowly scarious, apically acuminate. Ray florets 5 or 6; corolla tube ca. 4 mm; lamina yellow, ca. 4 × 0.8 mm, 4-veined, apically 3-denticulate. Disk florets ca. 15; corolla yellow, ca. 6.5 mm, with ca. 3 mm tube and funnelliform limb; lobes ovate-lanceolate, ca. 1 mm, brownish, apically acute, papillose. Anthers ca. 1.8 mm, basally subacutely auriculate; antheropodia gradually dilated toward base. Style branches ca. 1 mm. Achenes (immature) cylindrical, ca. 1.5 mm, glabrous. Pappus white, ca. 6 mm. Fl. Aug–Sep.

- Alpine grasslands, wet scree slopes; 3600–3900 m. Xizang (Bomi, Gongbo'gyamda).

### 9. *Senecio* ser. **Purpureolobati** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 388. 1984.

紫裂千里光系 zi lie qian li guang xi

Herbs, perennial (?or biennial), erect. Leaves pinnately divided, not auriculate. Capitula discoid, nodding. Phyllaries 13–20, herbaceous, usually purplish, fimbriate, bearded at apex. Disk florets many; corolla limb and tube purplish or purplish tinged; lobes dark purple. Anthers basally subacutely to acutely auriculate; antheropodia moderately elongated, basally somewhat dilated.

- Two species: China.

**31. *Senecio saussureoides*** Handel-Mazzetti, Acta Horti Gothob. 12: 294. 1938.

风毛菊状千里光 feng mao ju zhuang qian li guang

Herbs, perennial (or ?biennial). Stem solitary, erect, 30–80 cm tall, simple, subglabrous. Basal and lower leaves withered by anthesis, long petiolate; median stem leaf petiole 2–5 cm, slender, glabrous, not winged, basally slightly expanded, not auriculate; blade elliptic or lanceolate, to 15 × 5–6 cm, papery, abaxially pallid and sparsely pilose on main veins or glabrous, adaxially glabrous, margin pinnatifid to (in basal half) pinnatisect into a triangular-lanceolate or lanceolate, long acuminate or attenuate, subentire, remotely dentate, or few lobulate terminal lobe and 10–12 spreading, ovate to oblong-lanceolate, acute, irregularly coarsely serrate or lacerate lateral lobes. Upper leaves smaller, shortly petiolate or subsessile; uppermost leaves linear, bractiform. Capitula discoid, nodding, 3–8 in lax terminal corymb; peduncles erect, apically recurved, to 20 cm, stout, not bracteolate. Involucres broadly campanulate, 6–8 × 6–10 mm, calyculate; bracts of calyculus 8–10, linear-lanceolate, purplish, dark at apex and on upper margins, ± fimbriate, white pubescent at least at apex; phyllaries 15–20, broadly lan-

ceolate, 6–8 × ca. 2 mm, dark green or purple, dark at apex and on upper margins, fimbriate, herbaceous, sparsely arachnoid or fulvous puberulent, apically white bearded. Disk florets many; corolla yellow, 6.5–7.5 mm, with 2.5–3 mm tube and purplish tinged funnelliform limb; lobes triangular-lanceolate, dark purple, apically acute, papillose. Anthers yellow, ca. 2.3 mm, basally subacutely auriculate, appendages ovate-lanceolate; antheropodia rather long, basally slightly dilated. Style branches ca. 12 mm. Achenes cylindrical, 3–3.5 mm, glabrous. Pappus white, ca. 7 mm. Fl. Sep.

- Shrubs by meadows; 3900–4200 m. Sichuan (Dawu, Taining), Xizang (Gongbo'gyamda).

**32. *Senecio muliensis*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 389. 1984.

木里千里光 mu li qian li guang

Herbs, perennial (?or biennial). Stem solitary, erect, ca. 35 cm tall, simple, sparsely arachnoid, glabrescent. Basal and lower leaves withered by anthesis, long petiolate; median stem leaf petiole purplish, 1–3.5 cm, slender, sparsely arachnoid to subglabrous, not winged, basally slightly expanded, not auriculate; blade narrowly oblanceolate-oblong, 5–10 × 0.5–1.5 cm,

papery, both surfaces sparsely arachnoid and glabrescent, pinnatifid into a large lanceolate, acute, acutely dentate terminal lobe and in lower half 6–10 small, short, triangular-lanceolate, few-denticulate lateral lobes progressively smaller toward leaf base. Upper stem leaves shortly petiolate or subsessile, linear-lanceolate or linear, smaller upward, 1–3 cm, margin dentate, apex acuminate. Capitula discoid, nodding, 3 or 4 in a terminal corymb; peduncles erect, apically recurved, to 3–4 cm, stout, puberulent, not bracteate. Involucres broadly campanulate, 7–8 × ca. 8 mm, calyculate; bracts of calyculus 8–10, purplish, linear or linear-subulate, 6–7 × ca. 0.5 mm, entire, sparsely pu-

berulent, white bearded at apex; phyllaries 13–15, lanceolate, 6–8 × ca. 2 mm, purple with darker veins, tips, and upper margins, sparsely arachnoid and purple puberulent, apically acute, fimbriate and white bearded. Disk florets many; corolla purplish, ca. 9 mm, with ca. 4 mm tube, apically acute, papillose. Anthers ca. 2.5 mm, basally subacutely to acutely auriculate, appendages ovate-lanceolate; antheropodia gradually somewhat expanded toward base. Achenes cylindric, 3–3.5 mm, glabrous. Pappus white, ca. 7 mm. Fl. Sep–Oct.

- Grassy mountain slopes; ca. 4000 m. Sichuan (Muli).

**10. *Senecio* ser. *Malacophylli* C. Jeffrey & Y. L. Chen, Kew Bull. 39: 389. 1984.**

软叶千里光系 ruan ye qian li guang xi

Herbs, perennial, erect, sometimes robust, with leafy stems. Leaves usually lyrate-pinnately divided or basally sometimes undivided, ovate to triangular-lanceolate and ± cordate at base. Capitula usually radiate, erect, usually small and numerous or very numerous. Phyllaries 5–13(–18), herbaceous, apically usually obtuse. Ray florets 2–8, rarely absent. Disk florets 2–18, rarely many. Antheropodia rather small, comparatively short and narrow, basally slightly dilated, rarely distinctly so. Achenes glabrous or rarely pubescent.

Eight species: Bhutan, China, India (Sikkim), Myanmar, Nepal; eight species (seven endemic) in China.

**33. *Senecio dodrans* C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 14: 152. 1895.**

黑缘千里光 hei yuan qian li guang

Herbs, perennial, rhizomatous. Stem solitary, ascending, then erect, 10–25 cm tall, simple, glabrous. Basal leaves mostly present at anthesis, long petiolate; petiole 2–6 cm, slender, glabrous or sparsely pilose, basally dilated but not auriculate; blade broadly ovate to suborbicular, 1.5–3 × 2.5–4 cm, thinly papery, glabrous, pinnately veined, base weakly cordate or subtruncate, margin irregularly coarsely dentate, apex rounded to shortly obtuse-acuminate. Lower stem leaves similar to basal leaves; petiole with small basal auricle; median stem leaf petiole with basal auricle coarsely dentate, semiamplexicaul; blade ovate to suborbicular, 5–8 × 1.5–3 cm, base truncate and suddenly contracted into winged, denticulate, basally conspicuously auriculate petiole, margin acutely dentate, apex acute-acuminate. Upper leaves sessile, gradually smaller upward, lanceolate, base auriculate, margin irregularly dentate or lacerate, apex acuminate. Capitula radiate, 3–5 in lax terminal corymb; peduncles 5–15 mm, sparsely fulvous puberulent; bracteoles 2 or 3, linear. Involucres campanulate or hemispheric, 6–8 × 6–10 mm, calyculate; bracts of calyculus 8–10, linear, 3–6 mm, apically acute, dark at apex and on upper margins; phyllaries 15–18, linear-lanceolate, 6–8 × 1–1.5 mm, herbaceous, sparsely fulvous puberulent, blackish brown at apex and on margins, apically acuminate. Ray florets ca. 8; corolla tube ca. 3 mm; lamina yellow, oblong, 9–10 × ca. 2.5 mm, 4-veined, apically 3-denticulate. Disk florets many; corolla yellow, ca. 8 mm, with ca. 3.5 mm tube and funnellform limb; lobes ovate-lanceolate, ca. 1.3 mm, apically acute, papillose. Anthers ca. 2.5 mm, basally obtuse-auriculate, appendages ovate-lanceolate; antheropodia rather short, basally slightly dilated. Style branches ca. 1.2 mm. Achenes cylindric, ca. 2 mm, glabrous. Pappus white, ca. 6 mm. Fl. Aug.

- Alpine meadows; ca. 4400 m. Sichuan (Songpan).

**34. *Senecio actinotus* Handel-Mazzetti, Symb. Sin. 7: 1121. 1936.**

湖南千里光 hu nan qian li guang

*Senecio actinotus* f. *simplicifolius* Y. Ling.

Herbs, perennial, rather robust, rhizomatous. Stem solitary, erect, to 100 cm tall, simple or branching into synflorescences in upper part, obscurely pubescent, glabrescent to glabrous. Basal and lower stem leaves usually present at anthesis, long petiolate; petiole to 19 cm, basally gradually expanded and somewhat sheathing but not auriculate; blade triangular, 13–15 × 10–12 cm, papery, glabrous, pinnately veined, base deeply cordate, margin coarsely obtusely triangular-dentate, apex shortly obtuse-acuminate. Median stem leaves similar, to 18 cm; petiole 12–13 cm, basally auriculate; auricle orbicular or reniform; blade 1.5–4 cm in diam., base semiamplexicaul, margin coarsely dentate. Upper leaves shortly petiolate or sessile, elliptic, ovate, or lanceolate, auriculate, pinnately lobed with a large triangular-lanceolate, attenuate, cuneate terminal lobe and 2–4 spreading, oblong-lanceolate lateral lobes. Uppermost leaves sessile, lanceolate, basally auriculate, margin subentire. Capitula radiate, very numerous, arranged in an abundant, spreading terminal compound corymb, branches and peduncles pubescent; peduncles ca. 3 mm, slender, usually bracteate at base, 2- or 3-bracteolate, bracts and bracteoles linear. Involucres narrowly campanulate, 4–5 × ca. 2 mm, calyculate; bracts of calyculus 4 or 5, linear-subulate; phyllaries 6–8, linear, ca. 4 × 1–1.5 mm, herbaceous, sparsely puberulent or subglabrous, margin narrowly scarious, apically obtuse. Ray florets 3; corolla tube 2.5–3 mm; lamina yellow, oblong, ca. 4 × 1.3 mm, 3- or 4-veined, apically 3-denticulate. Disk florets 7–9; corolla yellow, 5–5.5 mm, with ca. 2.5 mm tube and funnellform limb; lobes ovate-triangular, ca. 1 mm, apically acute, papillose. Anthers ca. 1.5 mm, basally obtuse-auriculate, appendages ovate; antheropodia small, basally slightly dilated. Style branches ca. 0.8 mm.

Achenes cylindrical, ca. 2 mm, glabrous. Pappus white, ca. 4 mm. Fl. Jun.

• Montane thickets, moors; 1200–1300 m. Guangxi (Lucheng), Hunan (Wugang).

**35. *Senecio biligulatus*** W. W. Smith, J. Proc. Asiat. Soc. Bengal 7: 69. 1911.

双舌千里光 *shuang she qian li guang*

*Senecio gyirongensis* Y. L. Chen & K. Y. Pan; *S. ramsbottomii* Handel-Mazzetti.

Herbs, perennial, rhizomatous. Stem solitary, erect, 60–90 cm tall, flexuous, fulvous pubescent or glabrous. Basal leaves withered by anthesis; lower and median stem leaf petiole ± interruptedly winged in upper part, basally continuously and gradually more broadly winged, auriculate; auricle subamplexicaul, dentate; blade abaxially often purple, triangular or triangular-lanceolate, 7–12 × 2–5 cm, abaxially puberulent mostly on veins or glabrous, adaxially obscurely scattered pubescent, pinnately veined, veins rather prominent abaxially, base cordate to sagittate or subhastate and sometimes lyrate 2–4-lobed, margin irregularly coarsely dentate, apex acuminate. Upper leaves sessile, gradually smaller upward, triangular-lanceolate to linear-lanceolate, 5–10 × 1–2 cm, base cuneate, margin often lyrate-pinnatifid, confluent with auricle at base, apex acuminate-attenuate. Capitula small, radiate, numerous, arranged in dense terminal compound corymbs; peduncles very short, 1–2 mm, fulvous pubescent, minutely 1- or 2-bracteolate. Involucres cylindrical, ca. 5 × 1 mm, calyculate; bracts of calyculus 5–7, minute, linear-subulate, black at apex; phyllaries 5 or 6, linear, ca. 3 mm, herbaceous, sparsely puberulent, margin narrowly scarious, apically obtuse and black. Ray florets 2; corolla tube ca. 2 mm; lamina yellow, ca. 4 × 1 mm, apically 3-denticulate. Disk florets 2 or 3; corolla yellow, ca. 6 mm, with ca. 2.3 mm tube and funnellimb; lobes ovate-oblong, ca. 1.2 mm, apically acute. Anthers ca. 1.5 mm, basally obtuse-auriculate, appendages ovate-lanceolate; antheropodia rather short, slender, basally slightly dilated. Style branches ca. 0.7 mm. Achenes cylindrical, ca. 1 mm, sparsely puberulent. Fl. Jun–Sep.

Open places; 3000–3900 m. Xizang [Bhutan, India (Sikkim), Myanmar, Nepal].

**36. *Senecio faberi*** Hemsley, J. Linn. Soc., Bot. 23: 452. 1888.

峨眉千里光 *e mei qian li guang*

*Senecio kaschkarowii* C. Winkler.

Herbs, perennial, robust, rhizomatous. Stem solitary, erect, 80–150 cm tall, stout, fistulose, simple or branching into synflorescence above, sparsely pubescent when young, glabrescent. Basal leaves mostly withered by anthesis, long petiolate; petiole gradually expanded and somewhat sheathing but not auriculate at base; blade ovate, margin lyrate-pinnate with large irregularly coarsely dentate or lobulate terminal lobe and 2–4 small basal lobes. Lower and median stem leaf petioles 8–10 cm, ± winged, basally rounded-auriculate and subamplexicaul; blade lyrate-pinnatifid, to 40 cm, submembranous, abaxially sparsely pubescent on main veins, adaxially glabrous, with large ovate-trian-

gular, to 18 × 13–15 cm, acuminate, irregularly coarsely dentate, hastate to truncate terminal lobe and 2–4 smaller, unequal, oblong-lanceolate, acuminate, dentate lateral lobes. Upper leaves smaller, sessile; blade ovate-lanceolate to oblong, 10–25 × 5–12 cm, blade confluent into prominent rounded semiamplexicaul dentate auricle, margin irregularly coarsely dentate and pinnately narrowly lacerate-lobulate, apex acuminate. Uppermost leaves linear-lanceolate to linear, apically acuminate-attenuate. Capitula radiate, very numerous, arranged in abundant terminal compound corymbs; peduncles 3–10 mm, slender, pubescent, usually linear-bracteate at base; bracteoles 2 or 3, linear-subulate. Involucres narrowly campanulate, 3–5 × 1.5–2 mm, calyculate; bracts of calyculus 3 or 4, linear; phyllaries 8, linear, 3–4 × ca. 1 mm, herbaceous, glabrous, margin narrowly scarious, apically obtuse, purplish and minutely fimbriate. Ray florets 3 or 4; corolla tube ca. 2.5 mm; lamina yellow, linear, ca. 4.5 × 1 mm, 3- or 4-veined, 2- or 3-denticulate. Disk florets 6–9; corolla yellow, ca. 5.5 mm, with ca. 2.5 mm tube and funnellimb; lobes oblong-lanceolate, ca. 1.2 mm, apically acute, papillose. Anthers ca. 1.6 mm, basally obtuse-auriculate, appendages ovate-oblong; antheropodia rather short, slender, basally slightly dilated. Style branches ca. 1 mm. Achenes cylindrical, ca. 3 mm, glabrous. Pappus white, ca. 4 mm. Fl. Jun–Aug.

• Forests, thickets, grassy slopes, shaded wet places; 900–2700 m. Guizhou, Shaanxi, Sichuan.

**37. *Senecio filifer*** Franchet, J. Bot. (Morot) 10: 416. 1896 [“*filiferus*”].

匍枝千里光 *fu zhi qian li guang*

*Senecio filifer* var. *dilatatus* Handel-Mazzetti.

Herbs, perennial, stoloniferous, rhizomatous. Stolons slender, with long internodes, leafy or usually leaves reduced to small scales. Stem solitary, erect, 60–100 cm tall, simple, laxly pubescent and sometimes also thinly arachnoid-tomentose when young, glabrescent. Basal leaves mostly present at anthesis; petiole 3–6 cm, often ± winged in upper part, basally expanded but not auriculate; blade pandurate or usually ± lyrate, 12–18 × 3.5–6 cm, papery, glabrous, with large oblong-lanceolate, obtuse or subacute, unequally dentate or sinuate-dentate terminal lobe and 2–6 much smaller ovate-triangular to oblong lateral lobes. Median stem leaves with broadly winged petioles or sessile, oblong-lanceolate, blade ± confluent into rounded, dentate, amplexicaul auricle at base, margin coarsely dentate, sometimes ± lyrate-pinnatifid in lower part, apex obtuse. Upper leaves sessile, gradually smaller upward, lanceolate or linear-lanceolate, base rounded-auriculate, apex acuminate. Uppermost leaves narrower, apically attenuate or caudate. Capitula numerous, arranged in terminal simple or compound ± subumbelliform corymbs; peduncles 5–10 mm, slender, sparsely puberulent, mostly basally bracteate, bracteoles 2 or 3, linear-subulate. Involucres narrowly campanulate, 4–5 × 2–3 mm, calyculate, bracts of calyculus 3–5, subulate; phyllaries 13, linear, 4–5 × ca. 1 mm, herbaceous, sparsely puberulent, glabrescent, margin broadly scarious, apically obtuse, purplish and puberulent. Ray florets 5; corolla tube ca. 3.5 mm, apically sparsely puberulent; lamina yellow, oblong, 4–4.5 × ca. 1.5 mm, 4-veined, apically 3-den-

ticulate. Disk florets 11–13; corolla yellow, ca. 4.5 mm, with ca. 2 mm tube and funnelform limb; lobes ovate-triangular, ca. 1 mm, apically acute. Anthers ca. 1.7 mm, basally obtuse-auriculate, appendages ovate-lanceolate; antheropodia rather small, slightly dilated in lower half. Style branches ca. 0.5 mm. Achenes cylindrical, ca. 2.5 mm, glabrous. Pappus white, ca. 6 mm. Fl. May–Aug.

• Wet places in mixed woods, thicket margins, grassy slopes; 700–3700 m. ?Guizhou, SW Sichuan, Yunnan.

**38. *Senecio pteridophyllus*** Franchet, J. Bot. (Morot) 8: 364. 1894.

蕨叶千里光 *jue ye qian li guang*

Herbs, perennial, rhizomatous. Stem solitary, erect, 70–90 cm tall, simple, strongly crisped-pubescent near base, ± glabrescent above. Basal and lower stem leaves sometimes withered by anthesis, more often present; petiole crisped-pubescent, base expanded but not auriculate; blade oblanceolate-oblong or narrowly so, 12–35 × 4–8 cm, lyrate-pinnately narrowly many lobed. Median stem leaves sessile, thinly papery, abaxially pubescent on main veins, adaxially shortly adpressed pubescent to glabrous, pinnately lobed, with small terminal lobe and 30–40 spreading or slightly ascending, oblong-lanceolate or lanceolate, acute-acuminate, irregularly sharply dentate or lacerate-lobulate lateral lobes, basally often auriculate; auricle broad, deeply incised, amplexicaul, sometimes absent. Upper leaves smaller, with narrow, linear-lanceolate or linear, entire or few-dentate lobes. Capitula radiate, numerous, arranged in terminal compound corymbs; peduncles 3–8 mm, slender, fulvous pubescent, linear-bracteate, with 2 or 3 linear bracteoles. Involucre narrowly campanulate, 3–4 × ca. 2 mm, calyculate; bracts of calyculus 5 or 6, 2–3 mm; phyllaries ca. 13, linear, ca. 4 × 0.5 mm, herbaceous, finely scattered pubescent, margin narrowly scarious, apically obtuse and purplish and puberulent. Ray florets 5; corolla tube ca. 2.5 mm, sparsely puberulent above; lamina yellow, oblong, ca. 4.5 × 1 mm, 4-veined, apically 3-denticulate. Disk florets 11–13; corolla yellow, ca. 4.5 mm, with ca. 2 mm tube and funnelform limb; lobes oblong-lanceolate, ca. 1 mm, apically acute, papillose. Anthers ca. 1.5 mm, basally obtuse-auriculate, appendages ovate-lanceolate; antheropodia rather small, basally slightly dilated. Style branches ca. 0.5 mm. Achenes cylindrical, ca. 2 mm, glabrous. Pappus white, ca. 4 mm. Fl. Jul–Oct.

• Wet pastures, meadows; 3000–3800 m. NW Yunnan.

**39. *Senecio chungtienensis*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 397. 1984.

中甸千里光 *zhong dian qian li guang*

Herbs, perennial, rhizomatous. Stem solitary, erect, 60–80 cm tall, simple, thinly pubescent, glabrescent to glabrous. Basal and lower stem leaves mostly present at anthesis; petiole 2–5 cm, basally dilated but not auriculate; blade oblanceolate-oblong, 6.5–13 × 1.5–2.5 cm, both surfaces sparsely fulvous puberulent, glabrescent to glabrous, pinnatisect or lyrate-pinnatisect, with an indistinct, oblong-lanceolate, shortly obtuse-acuminate, coarsely pinnately dentate terminal lobe and 12–14 ob-

long or oblong-lanceolate, entire or few-dentate lateral lobes. Median stem leaves sessile, linear-lanceolate or oblong, 4.5–14 × 1–4 cm, otherwise like lower leaves, basally subauriculate or auriculate; auricle semiamplexicaul. Uppermost leaves smaller, linear, bractlike, apically attenuate, margin entire in upper part. Capitula radiate, rather numerous, arranged in a terminal compound corymb; peduncles 7–20 mm, linear-bracteate, with 2–4 linear-subulate, 2–3 mm bracteoles. Involucre campanulate, 5–6 × 2.5–4 mm, calyculate; bracts of calyculus 5; phyllaries ca. 13, linear or linear-lanceolate, ca. 6 × 1–1.5 mm, herbaceous, puberulent, margin broadly scarious, apically sub-obtuse, purplish and minutely puberulent. Ray florets 7 or 8; corolla tube ca. 4 mm, glabrous; lamina yellow, oblong, ca. 8 × 2.7 mm, 4-veined, apically 3-denticulate. Disk florets many; corolla yellow, ca. 6 mm, with narrow ca. 3 mm tube and funnelform limb; lobes ovate-oblong, ca. 1 mm, apically acute, papillose. Anthers ca. 2 mm, basally distinctly obtuse-auriculate, appendages ovate-oblong; antheropodia distinctly somewhat dilated toward base. Achenes cylindrical, ca. 3 mm, glabrous. Pappus white, ca. 5.5 mm. Fl. Jul.

• Pastures; ca. 3000 m. Yunnan (Zhongdian).

**40. *Senecio diversipinnus*** Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 5: 21. 1937.

异羽千里光 *yi yu qian li guang*

Herbs, perennial, rhizomatous. Stem solitary, erect, 50–100 cm tall, shortly pubescent, simple or branching into synflorescences in upper part. Basal and lower stem leaves present at or sometimes withered by anthesis; petiole expanded but not auriculate at base; blade oblanceolate-spatulate, to 30 × 10 cm, papery, abaxially sparsely arachnoid or pubescent, adaxially sparsely adpressed pubescent to subglabrous, lyrate-pinnatipartite with large, triangular-hastate, 8–10 × 6–8 cm, acuminate, irregularly dentate, basally truncate or subcuneate terminal lobe and 6–12 oblong to lanceolate, acute-acuminate, irregularly dentate smaller lateral lobes. Median stem leaves similar, shortly petiolate or sessile, basally ± auriculate; auricle to 2 cm wide, rounded, incised or lacerate-dentate. Upper stem leaves gradually smaller upward, sessile, with narrower lobes and attenuate terminal lobe, laxly dentate or subentire. Capitula radiate or discoid, numerous, arranged in compound terminal corymbs; synflorescence branches and peduncles fulvous puberulent, peduncles 5–15 mm, slender, linear-bracteate at base; bracteoles 1–3, linear-subulate, 2–3 mm, puberulent. Involucre narrowly campanulate, 5–6 × 2–3 mm, calyculate; bracts of calyculus 3–5, linear; phyllaries 8 or 9, linear-lanceolate, ca. 1 mm, apically acute, purplish and puberulent to glabrous. Ray florets absent or 5; corolla tube ca. 3.5 mm, glabrous; lamina oblong, 6–8 × 1–1.5 mm, 3-denticulate. Disk florets 12–15; corolla yellow, 7–7.5 mm, with ca. 3.5 mm tube and funnelform limb; lobes ovate-triangular, ca. 1 mm, apically acute, papillose. Anthers ca. 2.2 mm, basally distinctly subacutely auriculate, appendages ovate-lanceolate; antheropodia short, basally distinctly dilated. Style branches ca. 1.2 mm. Achenes cylindrical, 3.5–4.5 mm, pubescent. Pappus white, 6–7 mm. Fl. Jun–Aug, fr. Sep–Oct.

• Open grassy and rocky slopes, scrub; 1900–3800 m. Gansu, Qinghai, Sichuan.

- 1a. Capitula radiate; fl. Jun–Aug ..... 40a. var. *diversipinnus*  
 1b. Capitula discoid; fl. Jul–Aug ..... 40b. var. *discoideus*

**40a. *Senecio diversipinnus* var. *diversipinnus***

异羽千里光(原变种) *yi yu qian li guang* (*yuan bian zhong*)

Capitula radiate. Fl. Jun–Aug.

• Open grassy and rocky slopes; 1900–3800 m. Gansu, Qinghai, Sichuan.

- 40b. *Senecio diversipinnus* var. *discoideus*** C. Jeffrey & Y. L. Chen, *Kew Bull.* 39: 400. 1984.

无舌异羽千里光 *wu she yi yu qian li guang*

Capitula discoid. Fl. Jul–Aug.

• Grassy slopes, scrub; 2900–3200 m. Sichuan (Dajin Chuan, Heishui).

**11. *Senecio* ser. *Subscaposi*** C. Jeffrey & Y. L. Chen, *Kew Bull.* 39: 400. 1984.

葶状千里光系 *ting zhuang qian li guang xi*

Herbs, perennial, erect, subscapigerous. Leaves mostly basal, unlobed, elliptic to oblanceolate-spatulate. Capitula radiate, erect, few to numerous, arranged in terminal corymbs. Phyllaries 10–13, herbaceous. Ray florets 6–8. Disk florets many. Antheropodia rather small, basally slightly dilated. Achenes pubescent or sometimes glabrous.

Two species: N Bangladesh, China, NE India, Myanmar, NE Thailand; two species (one endemic) in China.

- 41. *Senecio spathiphyllus*** Franchet, *J. Bot. (Morot)* 10: 416. 1896.

匙叶千里光 *shi ye qian li guang*

*Ligularia yui* S. W. Liu.

Herbs, perennial, subscapigerous, rhizomatous. Stem solitary, erect, 25–60 cm tall, subscapiform, simple, glabrous. Basal and lowermost stem leaves present at anthesis, rosulate, petiolate; blade elliptic, oblanceolate, or spatulate, to 19 × 1.5 cm, glabrous, obscurely pinnately veined, base cuneate or attenuate into petiole, margin shallowly sinuate-denticulate, apex obtuse. Median and upper stem leaves few, remote, sessile; blade oblanceolate-linear, linear-lanceolate, or linear, 3–7 × 0.4–1 cm, base ± dilated and subamplexicaul, margin callose-denticulate, apex obtusely to acutely ± acuminate; uppermost leaves bractiform. Capitula radiate, 3–10 in a terminal subumbelliform corymb; peduncles 5–15 mm, slender, sparsely pubescent, linear-bracteate, with 3–5 linear-subulate bracteoles. Involucres campanulate-cylindric, 6–7 × 3.5–4 mm, calyculate; bracts of calyculus 7 or 8, linear-subulate, ca. 2 mm, sparsely puberulent, dark at apex; phyllaries ca. 13, oblong-lanceolate, 1–1.5 mm wide, herbaceous, ± glabrous, margin broadly scarious, apically acute, dark and shortly bearded. Ray florets 6–8; corolla tube ca. 3 mm; lamina yellow, oblong, ca. 6 × 2 mm, 4-veined, apically deeply 3-denticulate. Disk florets many; corolla yellow, ca. 7 mm, with ca. 4 mm tube and funnelform limb; lobes ovate-oblong, ca. 1 mm, apically acute, papillose. Anthers ca. 2 mm, basally obtuse-auriculate, appendages ovate-lanceolate; antheropodia rather slender, basally slightly dilated. Style branches ca. 0.7 mm. Achenes cylindric, ca. 3 mm, pubescent or glabrous. Fl. May–Aug.

• Wet meadows, grassy slopes; 1500–3000 m. Sichuan (Muli), NW Yunnan.

- 42. *Senecio obtusatus*** Wallich ex Candolle, *Prodr.* 6: 367. 1838.

钝叶千里光 *dun ye qian li guang*

*Senecio khasianus* N. P. Balakrishnan, nom. illeg. superfl.

Herbs, perennial, subscapigerous, rhizomatous. Stems usually solitary, erect, 30–60 cm tall, slender, simple or branching into synflorescence, pubescent especially near base or ± glabrous, subscapiform. Basal leaves present at anthesis, rosulate, shortly petiolate; petiole obscure, winged, basally expanded but not auriculate; blade elliptic or oblanceolate-elliptic, 5–21 × 2–5 cm, thickly papery, both surfaces sparsely pubescent to glabrous, pinnately veined, lateral veins 14–18, base cuneate or broadly attenuate into winged petiole, margin acutely shallowly sinuate-denticulate, apex obtuse. Median stem leaves few, sessile, oblong to linear, base expanded and subamplexicaul, margin denticulate, apex obtuse; uppermost leaves linear, bractiform. Capitula radiate, few to many in a rather lax terminal corymb or compound corymb, branches slender; peduncles 5–20 mm, slender, sparsely pubescent, linear-bracteate, with 2 or 3 linear bracteoles. Involucres narrowly campanulate, 3–4 × 2–4 mm, calyculate; bracts of calyculus 4 or 5, linear-subulate; phyllaries 10–13, oblong, ca. 1 mm wide, herbaceous, sparsely puberulent, margin broadly scarious, apically acute, dark and shortly bearded. Ray florets ca. 8; corolla tube ca. 3 mm; lamina yellow, oblong or elliptic-oblong, ca. 6.5 × 2 mm, 4-veined, apically obtuse, 3-denticulate. Disk florets ca. 25; corolla yellow, ca. 5 mm, with ca. 3 mm tube and funnelform limb; lobes ovate-lanceolate, ca. 1 mm, apically acute, papillose. Anthers ca. 1.6 mm, basally distinctly subacutely auriculate, appendages ovate-lanceolate; antheropodia rather small, basally slightly dilated. Style branches ca. 0.8 mm. Achenes cylindric, ca. 4 mm, pubescent. Fl. Apr–Jun.

Both dry and wet meadows and pastures; 1500–3300 m. Guizhou, Sichuan, Yunnan [N Bangladesh, NE India, Myanmar, NE Thailand].

The apparent earlier homonym, “*Senecio obtusatus* Pursh” (*Fl. Amer. Sept.* 2: 530. 1813) was merely cited as a synonym and was therefore not validly published (*Vienna Code*, Art. 34.1(c)). The replacement name *Senecio khasianus* was therefore nomenclaturally superfluous when published and is consequently illegitimate (Art. 52.1).

**12. *Senecio* ser. *Erucifolii*** (Rouy) Schischkin in Schischkin & Bobrov, *Fl. URSS* 26: 710. 1961.

菊叶千里光系 *ju ye qian li guang xi*

*Senecio* subsect. *Erucifolii* Rouy, *Fl. France* 8: 333. 1903; *Jacobaea* Miller.

Herbs, perennial, erect, with  $\pm$  arachnoid-pubescent usually leafy stems, rarely subscapigerous. Basal leaves lyrate-pinnately divided, stem leaves pinnately divided. Capitula radiate, erect, medium-sized, several to numerous. Phyllaries 10–22, herbaceous, apically acute-acuminate. Ray florets 10–21. Disk florets many. Antheropodia distinctly to markedly dilated toward base. Achenes all glabrous or all pubescent or ray achenes glabrous and pappus sometimes absent in ray florets, rarely absent in all florets.

About 40 species: mainly temperate and montane Asia and Europe; nine species (one endemic) in China.

One of us (Nordenstam) treats the species of this series within the genus *Jacobaea*.

**43. *Senecio multibracteolatus*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 402. 1984.

多苞千里光 duo bao qian li guang

*Jacobaea multibracteolata* (C. Jeffrey & Y. L. Chen) B. Nordenstam.

Herbs, perennial, rhizomatous. Stem solitary, erect, to 60 cm tall, sparsely arachnoid, simple. Basal and often also lower stem leaves withered and shed by anthesis; lower and median stem leaves  $\pm$  sessile; blade obovate-oblong, elliptic-oblong, or ovate-oblong, 6–13  $\times$  2.5–4 cm, thickly papery, abaxially arachnoid, adaxially sparsely arachnoid, glabrescent to glabrous, base  $\pm$  expanded and lobulate-auriculate, lyrate-pinnatifid or pinnatifid with ovate-oblong or oblong, obtuse or subacute, irregularly dentate or pinnately lobulate terminal lobe and 14–18 oblong or oblong-lanceolate, irregularly dentate or lacerate lateral lobes. Upper leaves similar but smaller, thickly papery; uppermost leaves reduced, bractiform. Capitula radiate, numerous, arranged in terminal corymbs; peduncles 1–3.5 cm, white arachnoid-tomentose, with 2 or 3 linear-subulate bracteoles. Involucres campanulate, ca. 6  $\times$  6–8 mm, calyculate; bracts of calyculus 10–17, linear-subulate, acute, 3–4 mm, apex dark; phyllaries 18–20, linear-lanceolate, 1–1.5 mm wide, herbaceous, thinly arachnoid, glabrescent, margins scarious, gradually acute, apex dark brown, puberulent. Ray florets 10–13; corolla tube ca. 4 mm, slender; lamina yellow, oblong-elliptic, 9–12  $\times$  ca. 2.5 mm, apically 3-denticulate. Disk florets many; corolla yellow, ca. 6 mm, with ca. 2.3 mm glabrous tube and funnelform limb; lobes ovate-triangular, ca. 0.8 mm, apically acute, papillose. Anthers ca. 2 mm, basally obtuse-auriculate, appendages ovate-lanceolate; antheropodia rather elongated, basally somewhat expanded. Style branches ca. 0.8 mm. Achenes cylindric, 2.5–3 mm, glabrous. Pappus white, ca. 6 mm, present in all florets. Fl. Nov.

• Forest margins; 2700–2800 m. Sichuan (Daocheng, Muli), Yunnan (Lijiang).

**44. *Senecio analogus*** Candolle, Prodr. 6: 366. 1838.

菊状千里光 ju zhuang qian li guang

*Jacobaea analoga* (Candolle) Veldkamp; *Senecio chrysanthemoides* Candolle (1838), not Schrank (1789); *S. chrysanthemoides* var. *eustegius* Handel-Mazzetti; *S. chrysanthemoides* var. *khasianus* (C. B. Clarke) J. D. Hooker; *S. chrysanthemoides* var. *sisymbriiformis* (Candolle) J. D. Hooker; *S. chrysanthemoides* var. *spectabilis* (Wallich ex Candolle) J. D. Hooker; *S. laetus* Edgeworth; *S. laetus* var. *analogus* (Candolle) R. Mathur ex Karthikeyan & Moorthy; *S. laetus* var. *sisymbriiformis* (Candolle) Aswal; *S. laetus* var. *spectabilis* (Wallich ex Candolle) R. Mathur ex Karthikeyan & Moorthy; *S. pallens* Wallich ex Candolle var. *khasianus* C. B. Clarke; *S. scapiformis* Y. L.

Chen & K. Y. Pan; *S. sisymbriiformis* Candolle; *S. spectabilis* Wallich ex Candolle.

Herbs, perennial, rhizomatous, with leafy stems, rarely subscapigerous. Stem solitary, erect, 40–80 cm tall, simple or branching into synflorescence, sparsely arachnoid, glabrescent. Basal leaves sometimes present at or sometimes withered and shriveled or shed by anthesis; basal and lowest stem leaves petiolate; petiole to 10 cm; blade ovate-elliptic or ovate-lanceolate to oblanceolate, 8–10(–20)  $\times$  3–7 cm, papery, abaxially sparsely arachnoid and  $\pm$  glabrescent, adaxially glabrescent to glabrous, pinnately veined, lateral veins 16–18, base expanded, weakly cordate to cuneate or attenuate, margin dentate, apex obtuse, unlobed or lyrate-pinnately lobed with 2–8 basal lateral lobes decreasing in size toward base of leaf. Median stem leaves oblong or oblanceolate-oblong, 5–22  $\times$  2–7 cm, base auriculate; auricle dentate or lobulate, subamplexicaul, lyrate-pinnatifid or pinnatifid, very variable in dissection, with large to small, ovate to oblong-lanceolate, dentate or lobulate terminal lobe and 10–16 oblong to narrowly oblong-lanceolate, entire or usually irregularly serrate-dentate or lobulate spreading or somewhat ascending lateral lobes. Upper leaves smaller, oblong-lanceolate to oblong-linear, margin coarsely pinnate-dentate. Capitula radiate, numerous, arranged in terminal corymbs or compound corymbs; peduncles 5–25 mm,  $\pm$  arachnoid-tomentose or fulvous puberulent,  $\pm$  glabrescent, linear-bracteate, with 2 or 3 linear-subulate bracteoles. Involucres campanulate, 3–4  $\times$  3–4 mm, calyculate; bracts of calyculus 8–10, linear-subulate, 2–3 mm; phyllaries 10–13, oblong-lanceolate, herbaceous, fulvous puberulent toward base, margin broadly scarious, apically acute or acuminate, brownish black and pubescent. Ray florets 10–13; corolla tube ca. 2.5 mm; lamina yellow, oblong, ca. 6.5  $\times$  2 mm, 4-veined, apically obtuse, 3-denticulate. Disk florets many; corolla yellow, 5–5.5 mm, with ca. 2.5 mm tube and funnelform limb; lobes ovate-triangular, ca. 0.8 mm, apically acute. Anthers ca. 2 mm, basally obtuse-auriculate, appendages ovate-lanceolate; antheropodia slightly elongated, basally somewhat dilated. Style branches ca. 1 mm. Achenes cylindric, 2–2.5 mm, all or disk achenes sparsely pubescent, sometimes ray achenes or rarely all achenes glabrous. Pappus dirty white, straw-colored, or rarely rufous, ca. 4 mm, present in all achenes or sometimes scant or absent in ray achenes, those in ray achenes deciduous. Fl. Apr.

Forests, forest and thicket margins, open grassy places, field margins, roadsides; 1100–3800 m. Guizhou, Hubei, Sichuan, Xizang, Yunnan [Bhutan, NE and NW India, Nepal, NW Pakistan].

**45. *Senecio tibeticus*** J. D. Hooker, Fl. Brit. India 3: 340. 1881.

西藏千里光 xi zang qian li guang

*Jacobaea tibetica* (J. D. Hooker) B. Nordenstam.

Herbs, perennial, rhizomatous. Stems solitary or sometimes 2 or 3, erect, 13–40 cm tall, simple, white arachnoid-to-

mentose, glabrescent. Basal leaves present at anthesis, long petiolate; blade oblanceolate, 8–10 × 1–1.5 cm, abaxially white tomentose, adaxially sparsely arachnoid, lyrate-pinnatifid, with large ovate-lanceolate, obtuse, irregularly dentate terminal lobe and several short, irregularly incised lateral lobes. Median stem leaves sessile, narrowly oblong-lanceolate, pinnatifid, basally auriculate and subamplexicaul. Upper leaves smaller, linear-lanceolate to linear, apically acuminate. Capitula radiate, 2–6 in a lax terminal corymb, long pedunculate; peduncles 2–7 cm, stout, sparsely to densely arachnoid-tomentose, basally bracteate, with 2 or 3 linear-subulate bracteoles. Involucres campanulate, ca. 8 × 6–8 mm, calyculate; bracts of calyculus 6–8, subulate, 1/3–1/2 as long as involucre; phyllaries ca. 20, linear-lanceolate, ca. 1.5 mm, herbaceous, densely tomentose, 3-veined, margin broadly scarious, apically acuminate and pubescent. Ray florets 16–21; corolla tube ca. 4 mm; lamina yellow, oblong, 10–11 × ca. 2.5 mm, 4- or 5-veined, apically 3-denticulate. Disk florets many; corolla yellow, ca. 8 mm, with ca. 3 mm tube and funnelform limb; lobes ovate-triangular, ca. 1 mm, apically acute, papillose. Anthers ca. 2.7 mm, basally obtuse-auriculate, appendages ovate-lanceolate; antheropodia robust, basally distinctly dilated. Style branches ca. 1 mm. Achenes cylindric, ca. 2.5 mm, glabrous. Pappus white, ca. 7 mm, present on all achenes. Fl. Jul–Sep.

Alpine meadows; 3000–3900 m. ?SW Xinjiang [Pakistan].

This taxon has not yet been recorded for China but may well occur in SW Xinjiang (Karakorum Shan).

**46. *Senecio raphanifolius*** Wallich ex Candolle, Prodr. 6: 366. 1838.

莱菔千里光 lai fu qian li guang

*Jacobaea raphanifolia* (Wallich ex Candolle) B. Nordenstam; *Senecio diversifolius* Wallich ex Candolle (1838), not Dumortier (1827).

Herbs, perennial, rhizomatous, with leafy stems. Stems solitary or sometimes 2 or 3, erect, 60–150 cm tall, simple or branching into synflorescence, sparsely arachnoid, glabrescent. Basal leaves sometimes present at but usually withered and shriveled or shed by anthesis; basal and lowest stem leaves long petiolate; petiole 5–8 cm, base expanded; blade oblanceolate, 15–30 × 2–5 cm, papery, abaxially sparsely arachnoid or glabrous, adaxially glabrous, lyrate-pinnatifid with a large, oblong or elliptic-oblong, incised-dentate or lobulate terminal lobe and 12–16 smaller, oblong, incised-dentate lateral lobes smaller toward base of leaf. Median stem leaves sessile; blade oblong, 10–15 × 2.5–4 cm, base auriculate; auricle broad, dentate or lacerate, subamplexicaul; blade pinnatifid or subpinnatisect with somewhat indistinct ovate-oblong terminal lobe and 10–16 oblong, sharply dentate or lacerate-lobulate, spreading or somewhat ascending lateral lobes. Upper leaves smaller, oblong to oblong-lanceolate, pinnately dentate or lobulate. Capitula radiate, numerous, arranged in terminal corymbs or compound corymbs; peduncles 1–3 cm, rather stout, at first sparsely arachnoid, fulvous puberulent, ± glabrescent, with usually 2 or 3 linear bracteoles. Involucres broadly campanulate or hemispheric, 5–7 × 4–10 mm, calyculate; bracts of calyculus 8–10, linear-subulate, ca. 3 mm; phyllaries 12–16, oblong, 1.5–2 mm, herbaceous, fulvous puberulent in lower part, ± glabrescent, margin

narrowly scarious, apically acuminate, acute, blackish brown and pubescent. Ray florets 12–16; corolla tube ca. 3 mm; lamina yellow, oblong, ca. 8 × 2–3 mm, 4-veined, apically obtuse, 3-denticulate. Disk florets many; corolla yellow, ca. 5 mm, with ca. 2 mm tube and funnelform limb; lobes oblong-lanceolate, ca. 1 mm, apically acute, papillose. Anthers ca. 2 mm, basally obtuse-auriculate, appendages ovate-lanceolate; antheropodia rather elongated, basally markedly dilated. Style branches ca. 0.8 mm. Achenes cylindric, ca. 3 mm, glabrous. Pappus reddish brown, 4–5 mm, present in disk florets, scant and soon deciduous or absent in ray florets. Fl. Jul–Sep.

Montane forests, meadows, grassy slopes, riverbanks; 2700–4400 m. Xizang [Bhutan, NE India, N Myanmar, Nepal].

**47. *Senecio echaetus*** Y. L. Chen & K. Y. Pan, Acta Phytotax. Sin. 19: 94. 1981.

裸纓千里光 luo ying qian li guang

*Jacobaea echaeta* (Y. L. Chen & K. Y. Pan) B. Nordenstam.

Herbs, perennial, rhizomatous, with leafy stems. Stem solitary, erect, 30–60 cm tall, simple or branching into synflorescence, arachnoid, glabrescent. Basal leaves withered by anthesis, petiolate; lower and median stem leaves sessile; blade oblong-lanceolate, 4.5–8 × 1.5–5 cm, papery, abaxially sparsely finely pubescent on main veins, adaxially glabrous, pinnatifid or subpinnatisect with small, rather indistinct terminal lobe and 18–20 oblong, 2–2.5 × 0.5–1 cm, acutely dentate or lacerate-lobulate, spreading or somewhat ascending lateral lobes; base auriculate; auricle dentate or lacerate, subamplexicaul. Upper leaves smaller, oblong-lanceolate to lanceolate, pinnately lobulate. Capitula radiate, 3–10 in terminal and upper axillary corymbs; peduncles 10–15 mm, arachnoid, with 1 or 2 linear bracteoles. Involucres campanulate or hemispheric, 5–6 × 6–8 mm, calyculate; bracts of calyculus 6–8, linear, 3–4 mm, apically acuminate, purplish; phyllaries 20–22, lanceolate, 4–5 × 1–1.5 mm, herbaceous, sparsely arachnoid-pubescent at base, 3-veined, apically acuminate or acute, dark margined and white bearded. Ray florets 16–18; corolla tube ca. 2.5 mm; lamina yellow, elliptic-oblong, 9–10 × ca. 3 mm, 8-veined, apically 3-denticulate. Disk florets many; corolla yellow, ca. 5 mm, with 1–1.5 mm tube and funnelform limb; lobes ovate-oblong, ca. 1.2 mm, apically acute, papillose. Anthers ca. 2 mm, basally acutely long auriculate, appendages ovate-lanceolate; antheropodia rather short, basally distinctly dilated. Style branches ca. 0.7 mm. Achenes cylindric, ca. 1.7 mm, glabrous. Pappus absent from all florets. Fl. Jul.

Tsuga forests; ca. 2700 m. S Xizang (Gyirong) [Nepal].

**48. *Senecio nudicaulis*** Buchanan-Hamilton ex D. Don, Prodr. Fl. Nepal. 178. 1825.

裸茎千里光 luo jing qian li guang

*Jacobaea nudicaulis* (Buchanan-Hamilton ex D. Don) B. Nordenstam; *Senecio blattariifolius* Franchet; *S. esquirolii* H. Léveillé; *S. pallens* Wallich ex Candolle; *S. rosulifer* H. Léveillé & Vaniot; *S. yunnanensis* Franchet (1894), not Franchet (1893).

Herbs, perennial, ± subscapigerous, rhizomatous. Stems solitary or 2 or 3-fasciculate, erect, 30–70 cm tall, simple. Basal leaves rosulate, sessile, oblong-obovate, 3–18 × 1–6 cm, abaxially sparsely arachnoid, glabrescent to glabrous and sometimes purplish, pinnately veined, lateral veins 10–14, midvein and main veins rather prominent abaxially, attenuate to base, margin subentire or crenate-serrate, apically obtuse or rounded. Stem leaves few, usually 3–5, sessile; blade oblong or oblanceolate-oblong, 2–4 × 0.5–1.5 cm, base expanded, auriculate and subamplexicaul, margin crenate-dentate to lobulate, apex obtuse. Capitula radiate, few to many in terminal compound corymbs; peduncles 1–2.5 cm, sparsely arachnoid or puberulent, bracteate, with 1–3 linear bracteoles. Involucres broadly campanulate, 5–6 × 3–6 mm, calyculate; bracts of calyculus 4 or 5, linear-subulate, 2–3 mm, herbaceous, sparsely arachnoid or subglabrous, 3-veined, margin broadly scarious, apically acute and puberulent. Ray florets 13; corolla tube ca. 4 mm; lamina yellow, oblong, ca. 10 × 2–2.5 mm, 4-veined, apically 3-denticulate. Disk florets many; corolla yellow, ca. 6 mm, with ca. 2.5 mm tube and funnellform limb; lobes ovate-triangular, ca. 0.8 mm, apically acute. Anthers ca. 1.8 mm, basally obtusely to subacutely auriculate, appendages ovate-oblong; antheropodia rather short, basally distinctly dilated. Achenes cylindrical, ca. 2 mm, pubescent. Pappus whitish, ca. 5 mm. Fl. Mar–Apr.

Forests, grassy slopes; 1500–1900 m. Guizhou, Sichuan, Yunnan [Bhutan, India, Kashmir, Myanmar, Nepal, Pakistan].

**49. *Senecio ambraceus*** Turczaninow ex Candolle, Prodr. 6: 348. 1838.

琥珀千里光 hu po qian li guang

*Jacobaea ambracea* (Turczaninow ex Candolle) B. Nordenstam; *Senecio ambraceus* var. *glaber* Kitamura; *S. manshuricus* Kitamura.

Herbs, perennial, rhizomatous. Stem solitary, erect, 45–100 cm tall, sparsely arachnoid-pubescent or subglabrous, simple, branching into synflorescence. Basal leaves mostly withered by anthesis, petiolate; blade obovate, margin serrate-dentate, usually lyrate-pinnately lobulate in lower part, apex obtuse. Lower stem leaves petiolate; blade obovate-oblong, 6–12 × 2 to 4 cm, papery, abaxially sparsely minutely pubescent or glabrous, adaxially glabrous, apex obtuse, margin deeply pinnatisect, with indistinct terminal lobe and 10–16 oblong, irregularly dentate or lobulate lateral lobes. Median stem leaves sessile, basally usually laciniate-auriculate, deeply pinnatisect or pinnatifid, with oblong-linear, obtuse to acute, dentate to deeply lobulate spreading or ascending lateral lobes. Upper leaves smaller, pinnately lobed, coarsely dentate, or linear and subentire. Capitula radiate, few to rather numerous, arranged in a usually rather spreading terminal compound corymb; peduncles 1.5–6 cm, erect or ascending, sparsely arachnoid-pubescent, glabrescent, bracteate, with a few linear or linear-subulate, 3–5 mm bracteoles. Involucres broadly campanulate to hemispheric, 7–8 × 6–10 mm, calyculate; bracts of calyculus 2–6, linear; phyllaries 13–15, narrowly oblong, 7–8 × 1–2 mm, herbaceous, glabrous, margin narrowly scarious, apically acuminate and bearded. Ray florets 13 or 14; corolla tube ca. 4.5 mm; lamina oblong, ca. 12 × 3–3.5 mm, 4-veined, apically ob-

tuse, 3-denticulate. Disk florets many; corolla yellow, ca. 6 mm, with ca. 2.5 mm tube and funnellform limb; lobes ovate-triangular, ca. 0.7 mm, apically acute, papillose. Anthers ca. 1.8 mm, basally auriculate, appendages ovate-lanceolate; antheropodia distinctly dilated toward base. Style branches ca. 1 mm. Achenes cylindrical, ca. 3 mm, glabrous in ray florets, sparsely pubescent in disk florets, rarely all glabrous. Pappus whitish, ca. 6 mm, present in all florets. Fl. Aug–Sep, fr. Sep–Oct.

Grassy places, forest margins; 500–1400 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong [Korea, Mongolia, Russia (Altai, Far East, E Siberia)].

**50. *Senecio argunensis*** Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 20(2): 18. 1847.

额河千里光 e he qian li guang

*Jacobaea argunensis* (Turczaninow) B. Nordenstam; *Senecio argunensis* f. *angustifolius* Komarov; *S. argunensis* var. *blinii* (H. Léveillé) Handel-Mazzetti; *S. argunensis* f. *latifolius* Komarov; *S. blinii* H. Léveillé; *S. erucifolius* Linnaeus subsp. *argunensis* (Turczaninow) E. Wiebe; *S. jacobaea* Linnaeus var. *grandiflorus* Turczaninow ex Candolle.

Herbs, perennial, rhizomatous. Stem solitary, erect, 30–60(–80) cm tall, arachnoid-pubescent, sometimes ± glabrescent, branching into synflorescence. Basal and lower stem leaves withered and usually shed by anthesis; median stem leaves rather crowded, sessile; blade ovate-oblong to oblong, 6–10 × 3–6 cm, papery, abaxially sparsely arachnoid and ± glabrescent, adaxially glabrous, base narrowly auriculate or laciniate-auriculate, pinnatisect to pinnatifid with small indistinct terminal lobe and ca. 12 narrowly lanceolate or linear, 1–2.5 × 0.1–0.5 cm, apically obtuse to acute, marginally 1- or 2-dentate or narrowly lobulate or entire somewhat ascending lateral lobes. Upper leaves smaller and apically more attenuate, otherwise similar. Capitula radiate, numerous, arranged in terminal compound corymbs; peduncles 1–2.5 cm, slender, sparsely to densely arachnoid, bracteate, with a few linear-subulate, 3–5 mm, acuminate bracteoles. Involucres subcampanulate, 5–6 × 6–7 mm, calyculate; bracts of calyculus ca. 10, linear, 3–5 mm; phyllaries ca. 13, green or sometimes purplish, oblong-lanceolate, 1–1.5 mm, herbaceous, sparsely arachnoid, margin broadly scarious, apically acuminate or acute and shortly bearded. Ray florets 10–13; corolla tube ca. 4 mm; lamina yellow, oblong-linear, 8–9 × 2–3 mm, 4-veined, apically obtuse, 3-denticulate. Disk florets many; corolla yellow, ca. 6 mm, with 2–2.5 mm tube and funnellform limb; lobes ovate-oblong, ca. 0.7 mm, apically acute. Anthers ca. 2 mm, basally distinctly subacutely auriculate, appendages ovate-lanceolate; antheropodia rather stout, basally dilated. Style branches ca. 0.7 mm. Achenes cylindrical, ca. 2.5 mm, glabrous. Pappus whitish, ca. 5.5 mm. Fl. Aug–Oct.

Montane meadows, grassy slopes; 500–3300 m. Anhui, Gansu, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan [Japan, Korea, Mongolia, Russia (Far East, SE Siberia)].

**51. *Senecio jacobaea*** Linnaeus, Sp. Pl. 2: 870. 1753.

新疆千里光 xin jiang qian li guang

*Jacobaea vulgaris* Gaertner; *Senecio foliosus* Candolle; *S. jacobaea* subsp. *nudus* (Weston) Soják; *S. jacobaea* var. *nudus* Weston; *S. jacobaeoides* Willkomm.

Herbs, biennial, rhizomatous. Stems solitary or 2- or 3-fasciculate, erect, 30–70(–100) cm tall, branching into synflorescence, at first arachnoid, glabrescent to subglabrous. Basal leaves withered and usually shed by anthesis; lower stem leaf petioles 3–4 cm, base expanded; blade oblong-obovate, to 15 × 3–4 cm, papery, abaxially sparsely arachnoid, adaxially glabrous, obtusely dentate or lyrate-pinnatifid, with large terminal lobe and 6–8 smaller, oblong-lanceolate lateral lobes. Median stem leaves rather crowded, sessile, pinnatisect, 8–10 × 1–4 cm, base lacerate-auriculate, with indistinct terminal lobe and linear-lanceolate to linear, obtuse, dentate or subentire somewhat ascending lateral lobes. Upper leaves similar but smaller, with oblong or linear-oblong lateral lobes. Capitula radiate, numerous, arranged in terminal compound corymbs; peduncles 0.5–1.5 cm, sparsely arachnoid, bracteate, with 2 or 3 linear bracteoles. Involucres broadly campanulate or hemispheric, 5–6 × 5–7 mm, calyculate; bracts of calyculus 2–6, linear, 2–3 mm,

apically acuminate; phyllaries ca. 13, oblong-lanceolate, ca. 1.5 mm, herbaceous, subglabrous, margin scarious, apically acuminate and puberulent. Ray florets 12–15; corolla tube 2.5–3 mm; lamina yellow, oblong, 8–10 × 2–2.5 mm, 4-veined, apically 3-denticulate. Disk florets many; corolla yellow, ca. 6 mm, with ca. 2 mm tube and funnelform limb; lobes triangular-ovate, ca. 0.5 mm. Anthers ca. 2.5 mm, basally distinctly subacutely auriculate, appendages ovate-lanceolate; antheropodia rather short, markedly dilated in lower half. Style branches ca. 1 mm. Achenes cylindric, ca. 2 mm, pubescent in disk florets, longer and glabrous or rarely pubescent in ray florets. Pappus white, ca. 6 mm, persistent in disk florets, readily deciduous in ray florets. Fl. May–Jul.  $2n = 40, 80$ .

Meadows, lax forests; 500–2000 m. Jiangsu, Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia (Siberia), Tajikistan, Uzbekistan; Europe].

The occurrence of *Senecio jacobaea* in Jiangsu is presumably the result of an introduction; this species was first recorded for this province by Kitamura.

**13. *Senecio* ser. *Asperifolii*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 415. 1984.

糙叶千里光系 cao ye qian li guang xi

Herbs, perennial, erect or semidecumbent, with woody tuberous rhizomes. Leaves sessile, lanceolate, unlobed, abaxially asperulous, basally not auriculate. Capitula radiate, erect, numerous. Phyllaries 13, herbaceous, apically acute-acuminate. Ray florets 12 or 13. Disk florets many. Antheropodia rather stout, basally markedly dilated. Achenes pubescent, all papillose.

• One species: China.

**52. *Senecio asperifolius*** Franchet, J. Bot. (Morot) 10: 414. 1896.

糙叶千里光 cao ye qian li guang

*Senecio henrici* Vaniot; *S. lebrunei* H. Léveillé; *S. luticola* Dunn.

Herbs, perennial, with woody tuberous rhizomes. Stems solitary or 2- or 3-fasciculate, rather woody at base, erect or semidecumbent, 50–90 cm tall, branching, sparsely arachnoid, glabrescent, soon glabrous. Basal and lower leaves withered and shed by anthesis; median stem leaves rather crowded, numerous, sessile; blade lanceolate to linear, abaxially and marginally shortly hispid or asperulous, adaxially sparsely scabrid or glabrous, pinnately veined, lateral veins 12–14, obscure adaxially, base cuneate and not auriculate, margin revolute and obscurely remotely callose-denticulate or subentire, apex acute or apiculate; upper leaves linear, smaller. Capitula radiate, few to numerous, arranged in rather narrow and elongated terminal

and upper axillary paniculoid thyrses; peduncles 1–2.5 cm, bracteate, ± arachnoid, with 1–10 linear-subulate bracteoles. Involucres campanulate or shortly turbinate, 7–9 × 4–8 mm, calyculate; bracts of calyculus 6–8, linear-subulate; phyllaries 13, lanceolate, 1–1.5 mm wide, herbaceous, sparsely arachnoid-tomentose, ± glabrescent, 3-veined, margin broadly scarious, apically acuminate or acute and shortly bearded. Ray florets 12 or 13; corolla tube ca. 4.5 mm; lamina yellow, oblong, 8–9 × ca. 2 mm, apically obtuse, 3-denticulate. Disk florets many; corolla yellow, ca. 6 mm, with ca. 2.5 mm tube and funnelform limb; lobes oblong-lanceolate, ca. 1.2 mm, apically acute. Anthers ca. 2.2 mm, basally obtuse-auriculate, appendages ovate-lanceolate; antheropodia stout, basally markedly expanded. Style branches ca. 2 mm. Achenes cylindric, 2.5–3 mm, pubescent. Pappus white, 5–6 mm. Fl. Oct–May.

• Dry grassy and rocky slopes; 700–2500 m. Guizhou, Sichuan, Yunnan.

**3. *Senecio* sect. *Madaractis*** (Candolle) J. D. Hooker, Fl. Brit. India 3: 342. 1881.

岩生千里光组 yan sheng qian li guang zu

*Madaractis* Candolle, Prodr. 6: 439. 1838.

Herbs, perennial, erect, rhizomatous, with leafy stems. Leaves pinnately veined. Capitula radiate, erect. Anthers obtuse-auriculate; antheropodia rather slender, basally somewhat dilated. Achene epidermal cells not papillose, cuticle thin; mechanical tissue in 5 somewhat distant tracts, bi-allantoid (shaped like 2 sausages joined) in cross section. Pappus absent from ray florets.

About 12 species: S and SE Asia; one species in China.

One of us (Nordenstam) recognizes the species of this section as the genus *Madaractis*.

**53. *Senecio wightii*** (Candolle) Bentham ex C. B. Clarke, Compos. Ind. 197. 1876.

岩生千里光 *yan sheng qian li guang*

*Doronicum wightii* Candolle in Wight, Contr. Bot. India, 23. 1834; *Madaractis glabra* Candolle; *Senecio camptodontus* Franchet; *S. gentilianus* Vaniot; *S. saxatilis* Wallich ex Candolle.

Herbs, perennial, with slender rhizomes. Stem solitary, erect or ascending, 60–120 cm tall, simple or branched, glabrous or nearly so, rather slender. Basal leaves withered by anthesis; stem leaves 5–10 × 0.5–1.5 cm; lower leaves elliptic to linear, cuneate or attenuate into a petioid base; median leaves narrowly oblong or oblong-lanceolate to linear, somewhat attenuate into a slightly expanded subamplexicaul sessile base; all papery, abaxially pubescent on veins to glabrous, adaxially sparsely shortly adpressed pilose to glabrous, pinnately veined, lateral veins 12–14, margin obscurely and remotely to evidently and coarsely acutely callose-dentate or serrate; upper leaves

smaller. Capitula radiate, rather few in lax terminal corymbs; peduncles 0.5–2 cm, slender, sparsely pubescent, bracteate, with 2 or 3 linear-subulate, 2–3 mm, acute bracteoles. Involucres hemispheric, 3–4 × 3.5–4 mm, laxly calyculate; bracts of calyculus 3–5, subulate; phyllaries 20–22, green or purplish, oblong-linear, 0.5–1 mm wide, sparsely pubescent or glabrous, strongly 3-veined, apically acuminate and acute. Ray florets 11–13; corolla tube ca. 1 mm, sparsely shortly pilose in distal part; lamina yellow, oblong, 7–8 × ca. 2.2 mm, 4-veined, apically obtuse, 3-denticulate. Disk florets many; corolla yellow, ca. 3.5 mm, with ca. 1.5 mm tube; lobes ovate-oblong, ca. 0.7 mm, apically acute, papillose. Anthers ca. 1 mm, basally obtuse-auriculate, appendages ovate; antheropodia rather slender, basally moderately dilated. Style branches ca. 0.5 mm. Achenes cylindrical, ca. 2 mm, glabrous. Pappus straw-colored, ca. 3 mm, absent in ray florets. Fl. Aug–Nov.  $2n = 20$ .

Wet places, by streams and ponds, roadsides; 1100–3000 m. Guizhou, Sichuan, Yunnan [Bhutan, India, Myanmar, Thailand].

**4. *Senecio* sect. *Flexicaules*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 417. 1984 [*“Flexicaulis”*].

曲茎千里光组 *qu jing qian li guang zu*

Herbs, perennial, decumbent or scandent, with woody rhizomes and leafy stems. Leaves deltoid, lanceolate or pinnately or lyrate-pinnately lobed, basally often auriculate. Capitula radiate, ascending. Anthers auriculate or shortly caudate, tails to 0.25 × as long as antheropodia; antheropodia rather elongated, basally slightly expanded. Achene epidermal cells papillose, cuticle thin; mechanical tissue in 5 or 6 distant tracts, bi-allantoid in cross section.

At least five species: E and S Africa, C and S Asia east to Japan and Philippines; four species (three endemic) in China.

One of us (Nordenstam) recognizes this section as generically distinct from *Senecio*.

**54. *Senecio stauntonii*** Candolle, Prodr. 6: 363. 1838.

闽粤千里光 *min yue qian li guang*

Herbs, perennial, weakly erect or subscaudent, rhizomatous. Stems erect or weakly ascending, flexuous, usually 30–60 cm tall, branched, angular, glabrous. Basal leaves soon withered; stem leaves numerous, sessile; blade ovate-lanceolate to narrowly oblong-lanceolate, 5–12 × 1–4 cm, leathery, abaxially laxly pilose mainly on veins to glabrous, adaxially scattered pilose to glabrous, pinnately veined, lateral veins 14–18, base auriculate; auricle entire to dentate or shortly lacerate, semiamplexicaul; blade margin revolute and shallowly obscurely to distinctly, rather remotely sinuate-dentate, rarely pinnatisect toward base, apex acute-acuminate or attenuate; upper leaves smaller and relatively narrower, otherwise similar. Capitula radiate, few to rather numerous, arranged in lax terminal corymbs; peduncles 1.5–3.5 cm, glabrous or sparsely puberulent, basally bracteate, with a few linear-subulate bracteoles. Involucres campanulate, ca. 7 × 5–7 mm, calyculate; bracts of calyculus 6–8, linear-subulate, 2–3 mm, puberulent, apically acute; phyllaries 13, linear-lanceolate, 1–1.5 mm wide, herbaceous, glabrous or sparsely puberulent near apex, margin narrowly scarious, acuminate, acute and shortly ciliate on upper

margins and apex. Ray florets 8–13; corolla tube ca. 3.5 mm, pubescent near apex; lamina yellow, oblong, ca. 8 × 2.5 mm, 4-veined, apically obtuse, 3-denticulate. Disk florets many; corolla yellow, ca. 7 mm, with ca. 3 mm tube and funnellform limb; lobes ovate-lanceolate, ca. 1.2 mm, apically acute, papillose. Anthers ca. 2.3 mm, basally shortly caudate, tails to 0.25 × as long as antheropodia, slender; appendages ovate-oblong; antheropodia rather elongated, slightly dilated in lower half. Style branches ca. 1.2 mm. Achenes cylindrical, ca. 3 mm, pubescent. Pappus white, ca. 5.5 mm. Fl. Oct–Nov.

• Thickets, open forests, limestone hills, dry slopes, ravines; ca. 600 m. Guangdong, Guangxi, Hunan.

**55. *Senecio fukienensis*** Y. Ling ex C. Jeffrey & Y. L. Chen, Kew Bull. 39: 419. 1984.

闽千里光 *min qian li guang*

Herbs, perennial, weakly erect or subscaudent, rhizomatous. Stems erect or weakly ascending, flexuous, to 70 cm, branched, angular, glabrous. Basal leaves soon withered; stem leaves sessile; blade oblong-elliptic or narrowly so, 3–5 × 0.5–1.5 cm, abaxially sparsely pilose on veins, adaxially glabrous, base auriculate; auricle small, sagittate-denticulate, semiamplex-

icaul; blade pinnatisect with oblong, obtuse-acuminate, remotely denticulate terminal lobe and 6–10 shorter, oblong, spreading or slightly ascending subentire or few-denticulate lateral lobes, margin revolute and shortly ciliate. Upper leaves smaller, linear-lanceolate, margin dentate or subentire. Capitula radiate, few in lax terminal corymbs; peduncles 3–5 cm, slender, glabrous, bracteate at base, with a few subulate 2–3 mm adpressed ascending bracteoles. Involucres campanulate, 5–7 × 5–7 mm, calyculate; bracts of calyculus ca. 8; phyllaries 13, linear or linear-lanceolate, 1–1.5 mm wide, herbaceous, glabrous, 3(–5)-veined, margin scarious, apically acutely to subobtusely acuminate and minutely ciliate-puberulent. Ray florets 7 or 8; corolla tube 2.5–3.5 mm; lamina yellow, oblong-linear, 5–6 × 1–2 mm, 4-veined, apically 3-denticulate. Disk florets many; corolla yellow, ca. 5.5 mm, with ca. 2.5 mm tube and narrowly campanulate limb; lobes ovate-lanceolate, ca. 1 mm. Anthers ca. 2 mm, basally obtusely long auriculate or shortly caudate, tails stout, slightly under 0.25 × as long as antheropodia; antheropodia rather elongated, basally slightly dilated. Style branches ca. 0.8 mm. Achenes cylindric, pubescent, basally slightly attenuate. Pappus white, 3.5–4.5 mm.

- Montane slopes, roadsides; ca. 600 m. Fujian (Liancheng).

**56. *Senecio tarokoensis*** C. I Peng, Bot. Bull. Acad. Sin. 40: 57. 1999.

太鲁阁千里光 *tai lu ge qian li guang*

Herbs, perennial, erect, shortly rhizomatous. Stems erect, 15–75 cm tall, simple, striate, villous toward base, glabrous or subglabrous in upper part. Leaves petiolate, exauriculate; petiole 3–8 cm; blade thickly papery to leathery, lower and median stem leaves triangular-ovate or lanceolate, 3–9 × ca. 2.5 cm, abaxially villous, adaxially almost glabrous, base obtuse, truncate, or cordate, sometimes with 1 or 2 small lateral lobes near base, margins serrate to coarsely serrate or serrate-sublobulate, apically acute, mucronate; upper stem leaves shortly petiolate to subsessile, lanceolate to linear, (3–)4–5 × (0.3–)1–2 cm, irregularly lobed to subentire. Capitula radiate, up to ca. 20 in lax terminal corymbs; peduncles 2.5–6(–12) cm, slender, subglabrous to sparsely puberulent, with 2–5 remote, linear, ascending, 1–4.5 mm bracteoles. Involucres cylindric, ca. 8 × 5–6 mm, calyculate; bracts of calyculus 4 or 5, 3–3.5 mm; phyllaries ca. 20, green, linear-lanceolate, ca. 1.5 mm wide, glabrous to sparsely puberulent, margins membranous, apically tinged purple, acuminate. Ray florets 8–12; corolla tube ca. 5 mm; lamina yellow, 10–12 mm, 4-veined. Disk florets ca. 40; corolla yellow, ca. 6.5 mm, with ca. 2 mm tube and funnelform limb; lobes 1.3–1.5 mm, acute. Anthers 1.8–2.2 mm, basally obtuse, appendages ovate, obtuse; antheropodia basally slightly dilated. Style branches ca. 1.2 mm. Achenes cylindric, 3–4 mm, slightly narrowed at both ends. Pappus white, 4–5.5 mm. Fl. Mar–Jun.

- Rocky limestone ridges; 1000–2000 m. Taiwan.

**57. *Senecio scandens*** Buchanan-Hamilton ex D. Don, Prodr. Fl. Nepal. 178. 1825.

千里光 *qian li guang*

Herbs, perennial, scandent, rhizomatous. Stems elongated, flexuous, 2–5 m, much branched, pubescent or glabrous, becoming woody and with pale bark when old. Leaf petiole 0.5–1(–2) cm, pubescent or subglabrous, base not auriculate or with small auricle; blade ovate-lanceolate to narrowly triangular, 2.5–12 × (1.5–)2–4.5 cm, both surfaces shortly pubescent to glabrous, pinnately veined, base broadly cuneate, truncate, hastate, or rarely cordate, margin rarely subentire, usually shallowly or deeply dentate, sometimes lobulate or pinnatifid, at least toward base, with 2–6 smaller lateral lobes, apex acute-acuminate. Upper leaves smaller, lanceolate or linear-lanceolate, apically attenuate. Capitula radiate, numerous, arranged in abundant, divaricately branching, terminal compound thyrses; branches and peduncles densely to sparsely puberulent; peduncles 1–2 cm, bracteate, usually with 1–10 linear-subulate bracteoles. Involucres cylindric-campanulate, 5–8 × 3–6 mm, calyculate; bracts of calyculus ca. 8, linear-subulate, 2–3 mm; phyllaries 12 or 13, linear-lanceolate, herbaceous, puberulent or glabrous, 3-veined, margin broadly scarious, acuminate and ciliate-puberulent on upper margins and apex. Ray florets 8–10; corolla tube ca. 4.5 mm; lamina yellow, oblong, 9–10 × ca. 2 mm, 4-veined, apically obtuse, 3-denticulate. Disk florets many; corolla yellow, ca. 7.5 mm, with ca. 3.5 mm tube; lobes ovate-oblong, apically acute, papillose. Anthers ca. 2.3 mm, basally obtuse-auriculate; auricles ca. 1/7 as long as antheropodia; appendages ovate-lanceolate; antheropodia elongated, basally slightly expanded. Style branches ca. 1.8 mm. Achenes cylindric, ca. 3 mm, pubescent. Pappus white, ca. 7.5 mm. Fl. Aug–Apr or Oct–Dec. *2n* = 20.

Climbing in forests and thickets, on shrubs, over rocks, on buildings, by streams, mountain slopes; sea level to 4000 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Qinghai, Shaanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, Cambodia, India, Japan, Laos, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam].

- 1a. Leaf blade 2–3.5 × ca. 1.5 cm, thick in texture, triangular, incised-dentate with broad triangular teeth, sometimes lobulate toward base; fl. Oct–Dec ..... 57c. var. *crataegifolius*
- 1b. Leaf blade 2.5–12 × 2–4.5 cm, ovate-lanceolate to lanceolate, dentate or pinnatifid; fl. Aug–Feb or to Apr.
  - 2a. Leaf blade simple, subentire to dentate, unlobed and without small lateral lobes at base; fl. Aug–Apr ..... 57a. var. *scandens*
  - 2b. Leaf blade pinnatifid, or with large terminal lobe and 2–6 small lateral lobes at base; fl. Aug–Feb ..... 57b. var. *incisus*

**57a. *Senecio scandens* var. *scandens***

千里光(原变种) *qian li guang* (*yuan bian zhong*)

*Cineraria chinensis* Sprengel; *C. repanda* Loureiro (1790),

not (J. R. Forster & G. Forster) G. Forster (1786); *Senecio campyloides* Candolle; *S. chinensis* (Sprengel) Candolle; *S. hindsii* Benthams; *S. intermedius* Wight; *S. solanifolius* Jeffrey; *S. stipulatus* Wallich ex Candolle; *S. wightianus* Candolle.

Leaf blade simple, subentire to dentate, unlobed and without small lateral lobes at base. Fl. Aug–Apr.

Climbing in forests and thickets, on shrubs, over rocks, on buildings, by streams; sea level to 3200 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, Cambodia, India, Japan, Laos, Myanmar, Nepal, Philippines, Thailand, Vietnam].

**57b. *Senecio scandens* var. *incisus*** Franchet, J. Bot. (Morot) 10: 418. 1896.

缺裂千里光 *que lie qian li guang*

*Senecio flexicaulis* Edgeworth.

Leaf blade pinnatifid, or with large terminal lobe and 2–6 small lateral lobes at base. Fl. Aug–Feb.

Climbing on shrubs, in thickets, over rocks, by streams; sea level to 4000 m. Gansu, Guangdong, Guizhou, Jiangxi, Qinghai, Shaanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, S India, Nepal, Sri Lanka].

**57c. *Senecio scandens* var. *crataegifolius*** (Hayata) Kitamura, Acta Phytotax. Geobot. 9: 37. 1940.

山楂叶千里光 *shan zha ye qian li guang*

*Senecio crataegifolius* Hayata, Icon. Pl. Formosan. 8: 67. 1919.

Leaf blade small, usually 2–3.5 × ca. 1.5 cm, thick in texture, triangular, incised-dentate with broad triangular teeth, sometimes lobulate toward base. Fl. Oct–Dec.

• Mountain slopes, climbing on shrubs; 2100–2900 m. Taiwan.

### 5. *Senecio* sect. *Senecio*

#### 千里光组 *qian li guang zu*

Herbs, annual (in China), erect. Leaves usually pinnately divided. Capitula radiate or discoid. Phyllaries free or connate. Anthers obtusely ± auriculate at base; antheropodia small, basally somewhat to distinctly dilated. Achene epidermal cells papillose, cuticle thin, mechanical tissues in 9–11 distinct tracts, elliptic in cross section. Pappus often dimorphic, with apically fluked as well as tapered hairs, present in all florets.

Maybe ca. 1,000 species: worldwide (except Antarctica); eight species (two endemic) in China.

**58. *Senecio subdentatus*** Ledebour, Fl. Altaic. 4: 110. 1833.

近全缘千里光 *jin quan yuan qian li guang*

*Senecio coronopifolius* N. L. Burman var. *subdentatus* (Ledebour) Boissier.

Herbs, annual. Stems erect, 5–25 cm tall, slender, branched from base or middle, branches ascending, glabrous. Leaves sessile; blade oblong or broadly linear, 2.5–6.5 × 0.2–1 cm, glabrous, upper leaves dilated and subamplexicaul at base, margin pinnately few dentate or lobulate or subentire, apex obtuse. Uppermost leaves small, linear, bractlike. Capitula radiate, few to many, terminal, laxly corymbose; peduncles 1.5–4 cm, slender, glabrous or sparsely shortly pilose; bracteoles linear-subulate. Involucres cylindric, ca. 6 × 2–4 mm, calyculate; bracts of calyculus 2–5, linear-subulate; phyllaries ca. 13, oblong-lanceolate, ca. 1 mm wide, herbaceous, with membranous margin, glabrous, apically acute and shortly puberulent. Ray florets 7 or 8; corolla tube ca. 2.5 mm; lamina yellow, oblong, ca. 6 × 2 mm, 5-veined, apically obtuse, 3-denticulate. Disk florets many; corolla yellow, 4.5–5 mm, with ca. 2 mm tube and funnellform limb; lobes oblong, ca. 0.7 mm, apically acute. Anthers ca. 1.7 mm, basally obtuse-auriculate, appendages ovate-lanceolate; antheropodia rather stout, basally markedly dilated. Style branches ca. 0.6 mm. Achenes cylindric, ca. 3.5 mm, densely pubescent. Pappus white, 5–6 mm. Fl. May–Jun.

Gravelly places; 400–700 m. Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia (SC Siberia), Tajikistan, Turkmenistan, Uzbekistan; SW Asia (S Caucasus)].

**59. *Senecio desfontainei*** Druce, List Brit. Pl. 2: 61. 1928.

苞叶千里光 *bao ye qian li guang*

*Senecio coronopifolius* Desfontaines, Fl. Atlant. 2: 273. 1799, not N. L. Burman (1768); *S. glaucus* Linnaeus subsp. *coronopifolius* Alexander.

Herbs, annual. Stems erect or subdecumbent, 10–25 cm tall, usually branched from base or middle; branches erect or divaricate-ascending, glabrous or sparsely pubescent or pubescent only in leaf axils. Leaves sessile; blade oblong, 1.5–4 × 0.5–1.5 cm, glabrous or sparsely pubescent at least on midvein abaxially, pinnatifid to pinnatisect with 6–8 oblong or oblong-linear, entire or 1- or 2-denticulate lateral lobes, apex obtuse; lower leaves attenuate into a petioid base, upper ones auriculate and semiamplexicaul at base. Uppermost leaves oblong-linear or linear, pinnatifid or dentate. Capitula radiate, few to rarely many, terminal, laxly corymbose; peduncles 1–3 cm, sparsely pubescent or glabrous, with a few linear-subulate bracteoles. Involucres narrowly campanulate, 4–5 × 2–4 mm, calyculate; bracts of calyculus 8–10, linear-subulate, blackish tipped; phyllaries 15–20, linear-lanceolate, ca. 0.5 mm wide, herbaceous, glabrous, apically acute and sparsely shortly puberulent. Ray florets 8–12; corolla tube ca. 3 mm; lamina yellow, elliptic-oblong, ca. 6 × 2.5–3 mm, 4-veined, apically obtuse, 3-denticulate, becoming revolute. Disk florets many; corolla yellow, ca. 5.5 mm, with 2–2.5 mm tube and funnellform limb; lobes ovate-triangular, ca. 0.7 mm, apically acute. Anthers ca. 1.8 mm, basally distinctly obtuse-auriculate, appendages ovate; antheropodia distinctly dilated at base. Style branches ca. 0.5 mm.

Achenes cylindric, ca. 3 mm, shortly adpressed pubescent. Pappus white, ca. 4.5 mm. Fl. Jul–Aug.  $2n = 20$ .

Gravelly places by streams; 3100–4600 m. Xizang (Ngari) [NW India, Kashmir; N Africa, SW Asia, Macaronesia (Canary Islands)].

**60. *Senecio krascheninnikovii*** Schischkin, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 15: 410. 1953.

细梗千里光 xi geng qian li guang

*Senecio pedunculatus* Edgeworth, Trans. Linn. Soc. London 20: 74. 1846, not Schultz Bipontinus (1844).

Herbs, annual. Stems erect, 5–30 cm tall, branching from base or in upper part; branches erect or divaricate-spreading, slender, sparsely pubescent or subglabrous. Leaves sessile; blade ovate-oblong, 1.5–5 × 0.4–1.5 cm, both surfaces sparsely pubescent to subglabrous, base slightly dilated and subamplexicaul, pinnatifid to finely and deeply pinnatisect with 4–8 usually narrow, linear, irregularly denticulate or entire lateral lobes, apex obtuse to subacute. Upper leaves smaller, pinnately lobed to linear and subentire. Capitula radiate, few to many, terminal, laxly corymbose; peduncles 1–3(–5) cm, slender, rather densely to sparsely white pubescent; bracteoles 2–4, linear-subulate. Involucres narrowly campanulate, 5–7 × 1.5–4 mm, calyculate; bracts of calyculus 4 or 5, subulate, inconspicuous; phyllaries 13–15, linear or linear-lanceolate, 0.3–0.5 mm wide, herbaceous, with narrow membranous margins, glabrous, apex acute-acuminate, sometimes dark tipped. Ray florets 4–7; corolla tube 3–3.5 mm; lamina yellow, oblong, very short, 2–2.5 mm, hardly exceeding involucre, 4-veined, apically 3-denticulate, becoming revolute. Disk florets many; corolla yellow, ca. 5.5 mm, with ca. 3 mm tube and narrowly funnelform limb; lobes ovate-oblong, ca. 0.5 mm, apically subobtusate. Anthers ca. 2 mm, basally obtuse-auriculate, appendages ovate; antheropodia distinctly dilated toward base. Style branches ca. 0.5 mm. Achenes cylindric, 2.5–3 mm, sparsely adpressed pubescent. Pappus white, ca. 5.5 mm. Fl. Jun–Sep.  $2n = 18, 20$ .

Gravelly slopes, sandy places; 1800–3900 m. Qinghai, Xinjiang (Tuoxun), Xizang [NE Afghanistan, NW India, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan; SW Asia (Iran)].

**61. *Senecio dubitabilis*** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 427. 1984.

北千里光 bei qian li guang

*Senecio dubius* Ledebour, Fl. Altaic. 4: 112. Jul–Dec 1833, not Beck (May–Jun 1833); *S. coronipifolius* N. L. Burman var. *discoideus* C. Winkler ex Danguy; *S. vulgaris* Linnaeus var. *dubius* Trautvetter.

Herbs, annual. Stems erect, 5–30 cm tall, branching from base or middle; branches erect or spreading, glabrous or sparsely pubescent with long white hairs when young. Leaves sessile; blade spatulate, oblong-lanceolate, oblong, or linear, 3–7 × 0.3–2 cm, lower ones attenuate into a petioloid base, middle ones often ± expanded at base into irregularly toothed subamplexicaul auricles, pinnately shortly lobulate with entire or few-denticulate lobes to remotely dentate or entire, apex obtuse to acute. Upper leaves smaller, lanceolate to linear, margin den-

tulate or entire. Capitula discoid, few to many, terminal, usually laxly corymbose; peduncles 1.5–4 cm, slender, glabrous or sparsely pubescent, with 1 or 2 linear-lanceolate bracts. Involucres narrowly campanulate, 6–7 × 2.5–5 mm, calyculate; bracts of calyculus 4 or 5, linear-subulate, short, apically acute, sometimes shortly black tipped; phyllaries ca. 15, linear, 0.5–1 mm wide, herbaceous, with narrow membranous margins, glabrous, apically acute, finely shortly bearded and sometimes blackish. Ray florets absent. Disk florets many; corolla yellow, 6–6.5 mm, with 4–4.5 mm tube and cylindric limb; lobes ovate, ca. 0.3 mm. Anthers linear, ca. 1 mm, basally very shortly obtuse-auriculate, appendages ovate-lanceolate; antheropodia dilated toward base. Style branches ca. 0.6 mm. Achenes cylindric, 3–3.5 mm, densely pubescent. Pappus white, 7–7.5 mm. Fl. May–Sep.

Sandy and rocky places, field margins; 2000–4800 m. Gansu, Hebei, Nei Mongol, Qinghai, Shaanxi, Xinjiang, Xizang [NW India, Kashmir, Kyrgyzstan, Mongolia, Pakistan, Russia (E and W Siberia), Tajikistan, Uzbekistan].

**62. *Senecio vulgaris*** Linnaeus, Sp. Pl. 2: 867. 1753.

欧洲千里光 ou zhou qian li guang

Herbs, annual. Stems erect, 12–45 cm tall, branched from base or middle, sparsely arachnoid to glabrous. Leaves sessile; blade oblanceolate-spatulate or oblong, 3–11 × 0.5–2 cm, ± arachnoid especially abaxially, to glabrous, shallowly to deeply pinnatifid with 6–8 oblong or oblong-lanceolate, usually irregularly dentate lateral lobes, lower ones attenuate into a petioloid base, middle ones subamplexicaul, apex obtuse; upper leaves smaller. Capitula discoid, few to many in dense terminal corymbs; peduncles 0.5–2 cm, sparsely pubescent or glabrous, with a few linear-subulate bracteoles. Involucres campanulate, 6–7 × 2–4 mm, calyculate; bracts of calyculus 7–11, linear-subulate, 2–3 mm, usually with long black tips; phyllaries 18–22, linear, ca. 0.5 mm wide, herbaceous, with narrow membranous margin, glabrous, apically acute and blackish. Ray florets absent. Disk florets many; corolla yellow, 5–6 mm, with 3–4 mm tube and funnelform limb; lobes ovate, ca. 0.3 mm, apically obtuse. Anthers ca. 0.7 mm, basally shortly obtuse-auriculate, appendages ovate; antheropodia slender, dilated toward base. Style branches ca. 0.5 mm. Achenes cylindric, 2–2.5 mm, pubescent on ribs. Pappus white, 6–7 mm. Fl. Apr–Oct.  $2n = 40$ .

Disturbed open places; 300–2300 m. Guizhou, Jilin, Liaoning, Nei Mongol, Sichuan, Taiwan, Xizang, Yunnan [Mongolia; throughout temperate N and S Africa, Asia, and Europe; widely adventive].

**63. *Senecio exul*** Hance, J. Bot. 6: 174. 1868.

散生千里光 san sheng qian li guang

Herbs, annual. Stems erect, 20–40 cm tall, branching from base or only in upper part, sparsely pubescent or subglabrous. Leaves sessile; blade oblanceolate to oblong, 4–6 × 0.5–3.5 cm, both surfaces sparsely pubescent to glabrous, lower ones attenuate into a petioloid base, middle ones dilated with entire or denticulate subamplexicaul auricles at base, pinnatipartite with 6–8 unequal, oblong-lanceolate or oblong, obtuse, entire or re-

motely denticulate lateral lobes to pinnatifid or entire, apex obtuse. Upper leaves linear or linear-lanceolate, gradually smaller. Capitula radiate, few to numerous, arranged in lax terminal sometimes subumbelliform corymbs; peduncles 0.5–2.5 cm, slender, glabrous; bracteoles 1–3, linear-subulate. Involucre subcampanulate, 4–5 × 2–3 mm, inconspicuously calyculate; bracts of calyculus 2 or 3, linear-subulate, minute; phyllaries 14 or 15, linear, 0.3–0.5 mm wide, herbaceous, glabrous, margin broadly hyaline, apically acute and sparsely puberulent. Ray florets ca. 12; corolla tube ca. 2 mm; lamina yellow, oblong, minute, 1–1.5 mm, 3-denticulate. Disk florets many; corolla yellow, ca. 3 mm, with ca. 1.7 mm tube and funnelform limb; lobes ovate-triangular, ca. 0.4 mm, apically acute, papillose. Anthers ca. 0.6 mm, basally obtusely subauriculate, appendages ovate-oblong; antheropodia dilated toward base. Style branches ca. 0.4 mm. Achenes cylindric, ca. 2.5 mm, densely shortly pubescent. Pappus white, ca. 3 mm. Fl. Apr–Jun.

River margins, pastures; sea level to 600 m. Chongqing, Guangdong, Hubei, Sichuan, Zhejiang [Thailand].

**64. *Senecio oryzetorum*** Diels, Notes Roy. Bot. Gard. Edinburgh 5: 194. 1912.

田野千里光 *tian ye qian li guang*

Herbs, annual. Stems erect, 20–30 cm tall, branching from base or in upper part, sparsely pubescent to subglabrous. Leaves oblanceolate-linear to oblong-linear, 3–8 × 1–2 cm, papery, sparsely pubescent to ± glabrous, lower ones attenuate into a petioloid base, middle and upper ones sessile, basally scarcely auriculate, margin somewhat remotely coarsely dentate or pinnatifid with 6–10 linear to shortly linear-oblong, acute, remotely denticulate or entire, ascending-spreading lateral lobes, apex acute or subacute. Capitula radiate, few to many, terminal, corymbose; peduncles 5–10 mm, slender, subglabrous, with a few linear-lanceolate bracteoles. Involucre narrowly campanulate, 5–6 × 2.5–3 mm, calyculate; bracts of calyculus 3 or 4, linear-subulate, inconspicuous; phyllaries 13–15, linear-lanceo-

late, 0.3–0.5 mm wide, connate to middle or above, herbaceous, glabrous, margin narrowly hyaline, apically acute. Ray florets 3; corolla tube ca. 2 mm; lamina yellow, minute, 1–1.5 mm, 3-veined, 3-denticulate. Disk florets many; corolla yellow, ca. 3.5 mm, with ca. 2 mm tube and narrowly funnelform limb; lobes ovate-triangular, ca. 0.5 mm, apically subobtusely. Anthers ca. 0.8 mm, basally very shortly obtuse-auriculate, appendages ovate; antheropodia dilated toward base. Style branches ca. 0.3 mm. Achenes cylindric, 2.5–2.8 mm, sparsely minutely pubescent. Pappus white, ca. 3 mm, bristles expanded at base. Fl. May.

• Open wet pastures; 1500–2400 m. NW Yunnan.

**65. *Senecio yungningensis*** Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 639. 1937.

永宁千里光 *yong ning qian li guang*

Herbs, annual, dwarf. Stems 5–12 cm tall, much branched from base; branches spreading, ascending, glabrous. Leaves sessile; blade oblanceolate, 2–3.5 × 0.5–1 cm, glabrous, base scarcely auriculate, margin irregularly coarsely dentate or pinnatifid with 4–6 shortly triangular-oblong to linear-oblong obscurely denticulate lateral lobes, apex obtuse; upper leaves smaller. Capitula minutely radiate, solitary, axillary, subsessile. Involucre narrowly ovoid, 5–6 × 2–3 mm, contracted toward apex, minutely calyculate; bracts of calyculus 2 or 3, linear or linear-subulate, apically obtuse; phyllaries 8–14, oblong-linear, ca. 0.5 mm wide, connate except at apex, herbaceous, apically triangular, rather obtuse, puberulent. Ray florets ca. 7; corolla tube ca. 1.5 mm; lamina yellow, oblong, minute, ca. 0.5 mm, 3-veined, apically 2- or 3-lobulate. Disk florets 13–15; corolla yellow, ca. 2 mm, with ca. 0.7 mm tube and narrowly funnelform limb; lobes ovate, ca. 0.3 mm, apically obtuse. Anthers ca. 0.5 mm, basally distinctly auriculate; appendages ovate; antheropodia short, basally dilated. Style branches ca. 0.3 mm. Achenes cylindric, 3–4 mm, glabrous. Pappus white, ca. 1.5 mm, bristles few, unequal. Fl. May–Jun.

• Lake and swamp margins; 2600–2800 m. Sichuan (Yongning).

## 109. *CRASSOCEPHALUM* Moench, Methodus, 516. 1794.

野茼蒿属 *ye tong hao shu*

Chen Yilin (陈艺林 *Chen Yi-ling*); Bertil Nordenstam, Charles Jeffrey

Herbs, annual or perennial. Leaves alternate. Capitula discoid or rarely radiate, often pendulous by anthesis, when discoid homogamous; florets numerous, bisexual. Involucre cylindric, calyculate; phyllaries uniseriate, subequal, linear-lanceolate, with narrow scarious margins, erect at anthesis, later spreading and reflexed; receptacle flat, glabrous, areolate. Corolla finely tubular, upper part gradually expanded into a short limb; lobes 5. Anthers obtuse or auriculate at base. Style branches slender, papillose, with a short to long appendage of fused papillae. Achenes narrowly cylindric, ribbed, with gray-white ring at apex. Pappus hairs fine, numerous, white, early deciduous.

About 21 species; mainly in tropical Africa; two species (both introduced) in China.

1a. Capitula several to numerous in terminal corymbiform cymes, shortly pedunculate; corollas dull orange

to brick red ..... 1. *C. crepidioides*

1b. Capitula 1–8, solitary on long peduncles; corollas blue, purple, or magenta, rarely pink or red ..... 2. *C. rubens*

**1. *Crassocephalum crepidioides*** (Benth) S. Moore, J. Bot. 50: 211. 1912.

野茼蒿 *ye tong hao*

*Gynura crepidioides* Benth in Hooker, Niger Fl. 438. 1849.

Plants erect, 20–120 cm tall. Stems striate, glabrous. Leaf

petiole 2–2.5 cm; blade elliptic or oblong-elliptic, 7–12 × 4–5 cm, membranous, both surfaces glabrous or subglabrous, base cuneate, margin irregularly serrate or double-serrate, sometimes pinnately lobed at base, apex acuminate. Capitula several to numerous in terminal corymbiform cymes, shortly pedunculate, 3–5 mm in diam. Involucres cylindric, 1–1.2 cm, basally truncate, with few unequal linear bracteoles; bracts of calyculus 6–21, 2–6 mm; phyllaries uniseriate, linear-lanceolate, equal, ca. 1.5 mm wide, margin narrowly scarious, apically puberulent. Florets tubular, bisexual; corolla red-brownish or orange, rarely yellow, 8–10 mm; lobes 5, ca. 1 mm. Style branches acute, papillose. Achenes brownish, narrowly oblong, 1.8–2.3 mm, ribbed, hairy. Pappus 7–13 mm, early deciduous. Fl. Jul–Dec.

Slopes, roadsides, streamsides, thickets; 300–1800 m. ?Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Hubei, ?Jiangsu, Jiangxi, ?Shaanxi, Sichuan, Taiwan, Xizang, Yunnan, ?Zhejiang [native to Africa; pantropical weed of Africa, S and SE Asia, Australia, Central and South America, and Pacific islands].

*Crassocephalum crepidioides* is used medicinally to invigorate the spleen and treat indigestion; the young leaves are an edible wild vegetable.

**2. *Crassocephalum rubens*** (Jussieu ex Jacquin) S. Moore, J. Bot. 50: 212. 1912.

蓝花野苘蒿 lan hua ye tong hao

*Senecio rubens* Jussieu ex Jacquin, Hort. Vindob. 3: 50. 1777.

Plants erect, 20–100(–150) cm tall. Stems usually repent at base, striate, simple or few branched, pubescent or subglabrous. Leaves sessile; blade obovate, oblanceolate, elliptic, lanceolate, or ovate, 1–20 × 0.5–7.5 cm, pubescent at least abaxially on veins, cuneate or attenuate into petaloid base, margin sinuate-dentate to sinuate-serrate, unlobed or lyrate-pinnately or pinnately lobed, apex rounded to acute. Capitula 1–8, solitary on long peduncles. Involucres cylindric, 0.8–1.3 cm, with 5–22 calycular bracts; phyllaries uniseriate, linear-lanceolate, equal, ca. 1.5 mm wide, often tinged purple below apex, glabrous or sparsely pubescent, apex purple. Florets tubular, bisexual; corollas blue, purple, or mauve, sometimes pink or red; lobes 5. Style branches acute, papillose. Achenes 2–2.5 mm, ribbed, hairy in grooves. Pappus of numerous white setae, 7–12 mm. Fl. Dec–Apr of next year.

Wastelands, roadsides, grasslands; 500–600 m. Yunnan [native to Africa, SW Asia (Yemen), Indian Ocean islands (Comoros, Mascarene Islands), and Madagascar].

*Crassocephalum rubens* is an invasive species in China.

### 110. *ERECHTITES* Rafinesque, Fl. Ludov. 65. 1817.

菊芹属 ju qin shu

Chen Yilin (陈艺林 Chen Yi-ling); Bertil Nordenstam

Herbs, annual or perennial, robust. Stems erect, branched. Leaves alternate, glabrous or pubescent, subentire, serrate, or pinnately lobed. Capitula disciform, heterogamous, in terminal paniculate corymbs, few calyculate. Involucres cylindric; phyllaries uniseriate, linear-lanceolate, equal, with scarious margins. Receptacle flat or slightly concave, alveolate or fimbriate. All florets tubular, fertile, outer florets biseriate or uniseriate, female, corolla filiform, 4- or 5-denticulate; central florets bisexual, funnelliform, 5-denticulate. Anthers obtuse at base. Style branches elongate, apically truncate or obtuse, papillose. Achenes brownish, subcylindric, 10-ribbed. Pappus hairs many seriate, subequal, slender.

About five species: mainly in the Americas; two species (both introduced) in China.

- 1a. Stems pubescent; leaves sessile, basally gradually attenuate or subamplexicaul, margin irregularly coarsely dentate; pappus white ..... 1. *E. hieraciifolius*
- 1b. Stems subglabrous; leaves petiolate, narrowly winged, margin irregularly doubly serrate or pinnately divided; pappus reddish ..... 2. *E. valerianifolius*

**1. *Erechtites hieraciifolius*** (Linnaeus) Rafinesque ex Candolle, Prodr. 6: 294. 1838 [“*hieracifolia*”].

梁子菜 liang zi cai

*Senecio hieraciifolius* Linnaeus, Sp. Pl. 2: 866. 1753 [“*hieracifolius*”].

Herbs, annual. Stem solitary, erect, 40–100 cm tall, simple or much branched in upper part, striate, sparsely pubescent. Leaves sessile, winged; blade lanceolate to oblong, 7–16 × 3–4 cm, both surfaces glabrous or shortly pubescent on veins, pinnately veined, basally gradually attenuate or subamplexicaul, margin irregularly coarsely dentate, apex acute or shortly acuminate. Capitula numerous, arranged in terminal corymb,

ca. 15 × 1.5–1.8 mm. Involucres yellowish to brown-green, tubular, calyculate at base, bracteoles linear; phyllaries uniseriate, linear or linear-lanceolate, 8–11 × 0.5–1 mm, glabrous or sparsely pilose, margin narrowly scarious, apically acute or rather obtuse. Florets numerous, greenish or red tinged, tubular; outer florets uni- or biseriate, corolla filiform, 7–11 mm, 4- or 5-denticulate; central florets minutely tubular, 8–12 mm, 5-denticulate. Achenes cylindric, 2.5–3 mm, conspicuously ribbed. Pappus white, 7–8 mm. Fl. Jun–Oct.

Forests, thickets, slopes, wet places; 1000–1400 m. Fujian, Guizhou, Sichuan, Taiwan, Yunnan [native to tropical America; throughout SE Asia].

The young leaves can be eaten as a vegetable.

**2. *Erechtites valerianifolius*** (Link ex Sprengel) Candolle, Prodr. 6: 295. 1838 [*“valerianaefolia”*].

败酱叶菊苣 bai jiang ye ju qin

*Senecio valerianifolius* Link ex Sprengel, Syst. Veg. 3: 565. 1826 [*“valerianaefolius”*].

Herbs, annual. Stems erect, 50–100 cm tall, simple or branched in upper part, striate, subglabrous. Leaves long petiole; petiole narrowly winged; blade oblong to elliptic, both surfaces glabrous, pinnately veined, base cuneate, margin irregularly double serrate or pinnatifid; lobes 12–16, lanceolate, acuminate, serrate to irregularly lobed, or rarely shallowly lobed, apex acute or acuminate; upper leaves similar to median leaves but smaller. Capitula numerous, erect or pendulous, in

terminal and upper axillary dense corymbose panicles, ca. 10 × 3 mm, with linear bracteoles. Involucres cylindrical-campanulate; phyllaries uniseriate, 12–14(–16), linear, 7–8 × 0.5–0.75 mm, glabrous or sparsely puberulent, 4- or 5-veined, apically acute or acuminate. Florets numerous, yellowish purplish; outer florets uni- or biseriate, corolla filiform, apically 5-denticulate; central florets minutely tubular-funnelform, 7–8 mm, rather longer and broader than outer ones, 5-denticulate, apically glandular thickened. Style branches with conical appendages. Achenes cylindrical, 2.5–3.5 mm, glabrous or puberulent, 10–12-ribbed. Pappus reddish, as long as florets. Fl. year-round.  $2n = 40$ .

Roadsides, field margins; ca. 1700 m. Guangdong, Hainan, Taiwan [native to tropical America; a pantropical weed].

## 111. GYNURA Cassini in F. Cuvier, Dict. Sci. Nat. 34: 391. 1825, nom. cons.

菊三七属 ju san qi shu

Chen Yilin (陈艺林 Chen Yi-ling); Bertil Nordenstam

Herbs, perennial, sometimes subsucculent, rarely subshrubs, glabrous or hispid. Leaves alternate, dentate or pinnately divided, rarely entire, petiolate or sessile. Capitula discoid, homogamous, solitary or few to numerous corymbose. Involucres campanulate or cylindrical, with many linear bracteoles at base; phyllaries uniseriate, 9–13, lanceolate, equal, imbricate, with scarious margins. Receptacle flat, areolate or shortly fimbriate. All florets bisexual, fertile; corolla yellow or orange, rarely purplish, tubular, with slender tube and narrowly campanulate limb, lobes 5. Anthers entire or subauriculate at base. Style branches slender, appendages subulate, papillose. Achenes cylindrical, 10-ribbed, glabrous or puberulent, truncate at both ends. Pappus white, sericeous.

About 40 species: Africa, Asia, Australia; ten species (one endemic) in China.

Besides the species enumerated below, *Gynura aurantiaca* (Blume) Candolle (Prodr. 6: 300. 1838), a native of Indonesia, is cultivated in gardens as an ornamental.

1a. Roots dilated into tuberiform rhizomes.

2a. Scapigerous herbs; flowering stem simple, 20–50 cm tall; leaves crowded at base, rosulate, obovate, spatulate, or elliptic, marginally repand-dentate or pinnatifid; petioles basally not auriculate; capitula 1–5, in lax corymb ..... 1. *G. pseudochina*

2b. Robust herbs, to 150 cm tall, much branched; stem leaves numerous, lyrate-pinnatifid to pinnatifid; petioles basally rounded, with pinnatifid auricles; capitula numerous, corymbose-paniculate ..... 2. *G. japonica*

1b. Roots not dilated, not tuberiform.

3a. Scandent herbs; stems procumbent; leaves ovate or ovate-oblong, apically acute or acuminate, marginally entire or repand-dentate, both surfaces glabrous or sparsely hairy, base of petioles not auriculate; capitula 3–5 in terminal or axillary corymbs ..... 10. *G. procumbens*

3b. Erect herbs or shrubs.

4a. Stem procumbent in lower part.

5a. Plants and phyllaries densely fulvous tomentose; leaves narrowly elliptic, ovate, or rhombic, margin entire or serrate in upper half, basally cuneate-attenuate into petiole; lateral veins 3–6-paired, both surfaces sparsely or densely shortly hairy ..... 3. *G. nepalensis*

5b. Plants and phyllaries glabrous or subglabrous.

6a. Leaves sessile or subsessile, oblong-elliptic, obovate, or oblong-lanceolate, basally amplexicaul, with broad auricle, margin irregularly sharply serrate, lateral veins 12–30-paired; capitula 4–15, corymbose-paniculate ..... 5. *G. cusimbua*

6b. Leaves petiolate, obovate or oblanceolate, basally cuneate, narrow, not auriculate, margin repand-dentate, or mucronulate, lateral veins 7–9-paired; capitula numerous, laxly corymbose ..... 4. *G. bicolor*

4b. Stem erect or declined at base.

7a. Leaves simple, elliptic, marginally entire or laxly denticulate, apex obtuse, base of petiole with incised auricle ..... 9. *G. elliptica*

7b. Leaves marginally repand-dentate or lyrate pinnately divided.

8a. Leaves usually crowded on lower part of stem, petiolate or subsessile, ovate, elliptic, or oblanceolate, veinlets coalescent into suboblong, parallel-reticulate, conspicuous black lines when dry; capitula 3–5 corymbose-paniculate, divaricate ..... 6. *G. divaricata*

- 8b. Leaves lax, rarely crowded on stem, elliptic or spatulate, veinlets inconspicuous, not coalescent into black lines when dry; capitula laxly corymbose, not divaricate.
- 9a. Plants hispid; leaves lyrate-ovate, basally attenuate into long petioles, upper or median leaves 1- or 2-denticulate, apically obtuse, both surfaces adpressed pilose; capitula 3, laxly corymbose; peduncles 5–7 cm ..... 7. *G. formosana*
- 9b. Plants fulvous pubescent; leaves lyrate-pinnatilobate, 4–12 cm, terminal lobe large, triangular-ovate, apex acuminate, base truncate or cordate, lateral lobes 1- or 2-paired, ovate-oblong, both surfaces fulvous pubescent; capitula 1–3, laxly corymbose; peduncles 1–3 cm ..... 8. *G. barbareaifolia*

**1. *Gynura pseudochina*** (Linnaeus) Candolle, Prodr. 6: 299. 1838.

狗头七 gou tou qi

*Senecio pseudochina* Linnaeus, Sp. Pl. 2: 867. 1753; *Cacalia bulbosa* Loureiro; *Gynura bodinieri* H. Léveillé; *G. bulbosa* (Loureiro) Hooker & Arnott; *S. bulbosus* (Loureiro) H. Léveillé (1916), not Schultz Bipontinus (1867); *S. crassipes* H. Léveillé & Vaniot.

Herbs, perennial, scapigerous, 20–50 cm tall, slightly fleshy. Roots globose or sometimes branched, tuberiform, (1–)2–6 cm in diam., fleshy, with many fibrous roots. Stems erect, 1–3, ascending or creeping, green or purplish, striate when dry, sparsely pubescent or glabrous. Leaves often crowded at base of stem, rosulate; petiole 0.5–3 cm, basally broad, slightly fleshy, not auriculate; blade abaxially often purplish, adaxially green, obovate, spatulate, or elliptic, rarely ovate, 5–18 × 2.5–5 cm, both surfaces sparsely shortly pubescent or ± glabrescent, lateral veins 8–20-paired, to lobes or curved before margins, inconspicuous, base gradually attenuate into petiole, margin pinnatifid, rarely dentate; lobes triangular or ovate-oblong, entire or denticulate, apex obtuse or rather acute. Median or upper leaves reduced, or with 1 or 2 leaflets, shortly petiolate or subsessile; leaflets pinnatilobed, lobes small, both surfaces pubescent. Capitula 1–5, 10–15 mm in diam., terminal, laxly corymbose; peduncles 0.5–4 cm, often with 1 or 2 linear or filiform-linear bracteoles, densely or sparsely pubescent. Involucres campanulate, 10–12 × 8–10 mm; bracts of calyculus 8 or 9, unequal, linear; phyllaries uniseriate, 13, green or purplish, linear-lanceolate or lanceolate, 7–12 × ca. 1.5 mm, conspicuously 1–3-ribbed, sparsely shortly pubescent, margin broadly scarious, apically acuminate. Florets yellow to reddish; corolla 10–13 mm, distinctly exceeding involucre, tube 7–9 mm, slender, expanded above; lobes ovate-triangular, apically obtuse. Anthers obtuse at base. Style branch tips conical, papillose. Achenes red-brown, cylindrical, 3–4 mm, glabrous or puberulent, 10-ribbed. Pappus hairs numerous, white, 10–12 mm, sericeous, early deciduous. Fl. Apr–Nov.  $2n = 20$ .

Sandy places on slopes, forest margins, roadsides; 200–2100 m. Guangdong, Guangxi, Guizhou, Hainan, Yunnan [Bhutan, India, Myanmar, Nepal, Sri Lanka, Thailand; Africa; tropical Africa; cultivated in Indonesia (Java)].

**2. *Gynura japonica*** (Thunberg) Juel, Acta Horti Berg. 1(3): 86. 1891.

菊三七 ju san qi

*Senecio japonicus* Thunberg in Murray, Syst. Veg., ed. 14,

756. 1784; *Cacalia pinnatifida* Loureiro; *C. segetum* Loureiro; *Gynura aurita* C. Winkler; *G. flava* Hayata; *G. japonica* var. *flava* (Hayata) Kitamura; *G. pinnatifida* (Loureiro) Candolle; *G. segetum* (Loureiro) Merrill; *G. vaniotii* H. Léveillé; *Kleinia japonica* (Thunberg) Lessing.

Herbs, perennial, high and robust, 60–100 cm or taller. Roots thick, tuberiform, 3–4 cm in diam., with numerous fibrous roots. Stems erect, basally woody, ca. 15 mm in diam., conspicuously canaliculate, crisped-pubescent when young, glabrescent, much branched, branchlets ascending. Basal leaves often withered and shedding by anthesis. Basal and lower leaves smaller, elliptic, simple to lyrate-pinnatilobed, terminal lobe large. Median leaves long or shortly petiolate, large; petiole basally rounded, dentate or pinnatilobate, auriculate, semi-amplexicaul; blade abaxially green or becoming purplish, adaxially green, elliptic or oblong-elliptic, 10–30 × 8–15 cm, adpressed pilose or subglabrous, pinnatipartite; terminal lobe large, obovate or oblong to oblong-lanceolate; lateral lobes (4–)6–12-paired, elliptic or oblong to oblong-linear, 1.5–5 × 0.5–2(–2.5) cm, margin unequally coarsely dentate or sharply serrate, incised, rarely entire, apex acute or acuminate. Upper leaves smaller, pinnatilobate, gradually reduced to bractiform leaves upward. Capitula numerous, 1.5–1.8 cm in diam., terminal, corymbose-paniculate; peduncles 1–3(–6) cm, slender, shortly pubescent; bracts 1–3, linear. Involucres narrowly campanulate or campanulate, 10–15 × 8–15 mm; bracts of calyculus 9–11, linear; phyllaries uniseriate, 13, linear-lanceolate, 10–15 × 1–1.5 mm, glabrous or sparsely hairy, margin scarious, apically acuminate. Florets 50–100; corolla yellow or orange, 13–15 mm; tube 10–12 mm, slender, dilated above; lobes ovate, apically acute. Anthers obtuse at base. Style branches with conical papillose appendages. Achenes brownish, cylindrical, 4–5 mm, puberulent, 10-ribbed. Pappus white, silky, easily deciduous. Fl. Aug–Oct.

Valleys, grassy slopes, forests, forest margins; 1200–3000 m. Anhui, Fujian, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Nepal, Thailand].

The roots are used in Chinese medicine.

**3. *Gynura nepalensis*** Candolle, Prodr. 6: 300. 1838.

尼泊尔菊三七 ni bo er ju san qi

*Gynura dielsii* H. Léveillé, nom. illeg. superfl.; *G. nudibasis* (H. Léveillé & Vaniot) Lauener & D. K. Ferguson; *Senecio nudibasis* H. Léveillé & Vaniot.

Herbs, perennial. Stems erect or ascending, robust, 30–

45 cm tall, woody at base, ca. 10 mm in diam., corymbosely branched in upper part, densely fulvous tomentose. Stem leaves numerous, absent on lower part of stem. Leaves petiolate, basally not auriculate; blade narrowly elliptic, ovate, or rhombic or oblong-lanceolate, 3–20 × 1–6 cm, lateral veins 3–6(–8)-paired, abaxially pubescent, adaxially gray-white sparsely or densely fulvous pubescent, base cuneately gradually attenuate to petiole, margin entire or serrate in upper half, rarely lobed, apex acute or acuminate. Upper leaves smaller, becoming bractlike, narrowly lanceolate-linear, sessile. Capitula numerous, ca. 10 mm in diam., usually in terminal elongate lax corymbs; peduncles 1–10 cm, with few linear bracts, densely shortly pubescent. Involucres campanulate, 10–13 × ca. 10 mm, with 7 or 8 linear calycular bracts, densely shortly pubescent; phyllaries uniseriate, 13 or 14, linear-lanceolate, ca. 10 × 1.5–2.5 mm, densely fulvous tomentose or subglabrous, sometimes sessile glandular hairy, margin scarious, apically acuminate. Florets yellow; corolla 8–10 mm; tube 4–5 mm, slender; limb dilated, lobes triangular-ovate. Anthers obtuse at base. Style branch tips conical, papillose. Achenes cylindrical, 3–4(–6) mm, glabrous or sparsely hairy, 10-ribbed. Pappus hairs numerous, white, silky, easily deciduous. Fl. May–Oct.

On rocks, field margins, by streams; 1100–2100 m. Guizhou, Yunnan [Bhutan, India, Kashmir, Myanmar, Nepal, Thailand].

**4. *Gynura bicolor*** (Roxburgh ex Willdenow) Candolle, Prodr. 6: 299. 1838.

红凤菜 hong feng cai

*Cacalia bicolor* Roxburgh ex Willdenow, Sp. Pl. 3: 1731. 1803.

Herbs, perennial. Stems erect, 50–100 cm tall, glabrous, flaccid, rather woody at base, corymbosely branched in upper part, striate when dry. Leaves petiolate or subsessile; blade abaxially becoming purplish when dry, adaxially green, obovate or oblanceolate, rarely oblong-lanceolate, both surfaces glabrous, lateral veins 7–9-paired, curved, base gradually attenuate into winged petioles or subsessile, ± expanded, but not auriculate, margin irregularly repand-dentate or mucronulate, rarely pinnatifid near base. Upper leaves shortly petiolate or subsessile, lanceolate to linear-lanceolate, small. Capitula numerous, ca. 10 mm in diam., in terminal lax corymbs; peduncles 3–4 cm, slender, with 1 or 2(or 3) filiform bracts. Involucres campanulate, 11–15 × 8–10 mm; bracts of calyculus 7–9, linear; phyllaries 13, linear-lanceolate, 11–15 × 0.9–1.5(–2) mm, glabrous, conspicuously 3-ribbed, margin scarious, apically acute or acuminate. Florets orange to reddish; corolla distinctly exceeding involucres, 13–15 mm; tube 10–12 mm, slender; lobes ovate-triangular. Anthers rounded at base, or slightly acute. Style branch tips subulate, papillose. Achenes brownish, cylindrical, ca. 4 mm, glabrous, 10–15-ribbed. Pappus white, silky, easily deciduous. Fl. May–Oct.

Forests on slopes, rocky or wet places by rivers; 600–1500 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Sichuan, Taiwan, Yunnan, Zhejiang [Myanmar, Thailand; widely cultivated in gardens].

**5. *Gynura cusimbua*** (D. Don) S. Moore, J. Bot. 50: 212. 1912.

木耳菜 mu er cai

*Cacalia cusimbua* D. Don, Prodr. Fl. Nepal. 179. 1825; *Gynura angulosa* Candolle.

Herbs, perennial, robust. Stems procumbent in lower part, erect above, green or purplish, 150–300 cm tall, 1.5–2 cm in diam., fleshy, woody at base, much corymbosely branched, conspicuously canaliculate, glabrous or ± hairy in upper part. Leaves large, sessile or shortly petiolate; blade abaxially sometimes becoming purplish, adaxially green, obovate, oblong-elliptic, elliptic, or oblong-lanceolate, (5–)10–30 × 4–11 cm, both surfaces glabrous, lateral veins 12–30-paired, base cuneately attenuate into short petiole or sessile with expanded semiamplexicaul broad auricle, margin irregularly sharply serrate, mucronulate, apex acuminate. Upper leaves smaller, oblong-lanceolate or lanceolate, apex long acuminate or caudate-acute. Capitula 10–12 mm in diam., usually 4–15 in terminal corymbose panicles; synflorescence branches unequal; peduncles 1.5–3 cm, slender, with 2 or 3 filiform-linear bracts, shortly pubescent. Involucres narrowly campanulate or cylindrical, 12–17 × 8–12 mm; bracts of calyculus 7–9, linear-filiform; phyllaries 13–15, linear or linear-lanceolate, 13–15 × 1–1.5 mm, glabrous or subglabrous, conspicuously 3-ribbed, margin scarious, apically acuminate. Florets ca. 50; corolla orange, 11–13 mm; tube 7–9 mm, slender, dilated in upper part. Achenes brownish, 4–4.5 mm, puberulent, 10-ribbed. Pappus hairs numerous, white, 10–15 mm, silky, easily deciduous. Fl. Sep–Oct.

Forests, slopes, grasslands, roadsides; 1300–3400 m. Sichuan, Xizang, Yunnan [Bangladesh, Bhutan, India, Myanmar, Nepal, Thailand].

F. G. Davies (Kew Bull. 33: 629–640. 1999) includes *Gynura cusimbua* in her circumscription of *G. bicolor*, stating that they are intergrading in all characters. Intermediates are therefore to be expected.

**6. *Gynura divaricata*** (Linnaeus) Candolle, Prodr. 6: 301. 1838.

白子菜 bai zi cai

*Senecio divaricatus* Linnaeus, Sp. Pl. 2: 866. 1753; *Cacalia incana* Linnaeus; *C. ovalis* Ker Gawler; *Gynura auriculata* Cassini; *G. hemsleyana* H. Léveillé; *G. ovalis* (Ker Gawler) Candolle; *G. ovalis* var. *pinnatifida* Hemsley; *G. panershenia* Z. Y. Zhu.

Herbs, perennial. Stems erect, or ± ascending from base, 30–60 cm tall, woody, striate when dry, simple or with synflorescence branched in upper part, glabrous or shortly pubescent, purplish. Leaves thick, usually crowded in lower part, petiolate or subsessile; petiole 0.5–4 cm, shortly pubescent, with ovate or half-moon-shaped, dentate auricle at base; blade abaxially purplish, adaxially green, ovate, elliptic, or oblanceolate, 2–15 × 1.5–5 cm, both surfaces shortly pubescent, with conspicuous black lines when dry, lateral veins 6–10-paired, veinlets often coalescent into subparallel oblong reticulate veins, base cuneate-attenuate or decurrent into petiole, subtruncate or slightly cordate, margin coarsely dentate, sometimes lyrate lobed, rarely entire, apex obtuse or acute. Upper leaves smaller, bractlike, narrowly lanceolate or linear, pinnatifid, sessile, semiamplexicaul. Capitula 1.5–2 cm in diam., usually (2 or) 3–5 terminal laxly corymbose-paniculate, often divaricately branched; peduncles 1–15 cm, densely shortly pubescent; bracts 1–3, linear. Involucres campanulate, 8–10 × 6–8 mm; bracts of calyculus

several, linear or filiform; phyllaries 11–14, narrowly lanceolate, 8–10 × 1–2 mm, sparsely shortly pubescent or subglabrous, 3-veined, margin scarious, apically acuminate, narrowly triangular. Florets orange-yellow, fragrant, slightly exceeding involucre; corolla 11–15 mm, with 9–10 mm tube and narrowly campanulate limb; lobes oblong-ovate, apically reddish, acute. Anthers obtuse or rather hastate at base. Style branches slender; appendages conical, papillose. Achenes brown, cylindrical, ca. 5 mm, puberulent, 10-ribbed. Pappus white, silky, 10–12 mm. Fl. Aug–Oct.

Grassy and weedy slopes, wet places by fields, seaside rocks; sea level to 2800 m. Guangdong, Hainan, Sichuan, Yunnan [N Vietnam].

**7. *Gynura formosana*** Kitamura, Acta Phytotax. Geobot. 2: 175. 1933.

白凤菜 bai feng cai

*Gynura divaricata* (Linnaeus) Candolle subsp. *formosana* (Kitamura) F. G. Davies.

Herbs, perennial, subscapigerous. Stems procumbent in lower part, erect above, striate when dry, 25–50 cm tall, terete, hispidulous, branched, branchlets 2 or 3, ascending. Basal leaves withered by anthesis, lower and median leaf petioles with 1 pair of auriculate pseudostipules at base, lower and median part often 1- or 2-denticulate; blade elliptic or spatulate, rarely lyrate-pinnatifid, 4–6 × 2–4 cm, fleshy, both surfaces adpressed shortly hairy, lateral veins 6–8-paired, midvein and veinlets inconspicuous, base gradually attenuate into long petiole, margin repand-denticulate, apex obtuse. Upper leaves sessile, small, oblong, pinnatifid, or lanceolate, mucronulate, with pseudostipules at base. Uppermost leaves reduced, linear or linear-lanceolate, 5–20 mm. Capitula 2–5, usually 3 in terminal lax corymbs, 15–18 mm in diam.; peduncles 5–7 cm, slender, puberulent, 1–3-bracteate. Involucre tubular, ca. 11 × 12–15 mm; bracts of calyculus several, linear; phyllaries 12–14, lanceolate, 1–1.5 mm wide, sparsely puberulent, margin scarious, apically acute or acuminate. Florets exceeding involucre; corolla yellow, 14–15 mm, with slender, 10–11 mm tube and dilated limb; lobes ovate-lanceolate. Anthers obtuse at base. Style branches apically with lanceolate appendages, papillose. Achenes cylindrical, 4–4.5 mm, puberulent, 10-ribbed. Pappus hairs numerous, white, silky, ca. 10 mm. Fl. and fr. May–Jul.

• Sandy shores; sea level to 500 m. Taiwan.

**8. *Gynura barbareaifolia*** Gagnepain, Bull. Soc. Bot. France 68: 119. 1921.

山芥菊三七 shan jie ju san qi

*Gynura divaricata* (Linnaeus) Candolle subsp. *barbareaifolia* (Gagnepain) F. G. Davies; *G. maclurei* Merrill.

Herbs, perennial. Stems erect or slightly curved, 30–80 cm tall, simple or branched, canaliculate. Leaves lax, rarely densely crowded; petiole auriculate at base; blade lyrate-pinnately divided, 4–12 cm, base attenuate into a lobed petiole; terminal lobe large, triangular-ovate, 3–7 × 2–5 cm, base truncate or subcordate, rarely cuneate, margin irregularly sharply serrate or lobulate, apex acuminate or rather obtuse; lateral lobes usually 2–4-

paired, opposite or alternate, ovate-oblong or oblong, entire or laxly dentate, 5–10 cm, not black when dry, fulvous-black, adpressed shortly pubescent on both surfaces, lateral veins 6–8-paired, inconspicuously reticulate; auricles similar to lateral lobes. Capitula usually 1–3, in terminal lax corymbs; peduncles 1–3 cm, fulvous puberulent; bracts 1–3, linear. Involucre campanulate, 10–15 × 8–12 mm, with several calycular bracts; phyllaries ca. 13, linear-oblong, 9–12 × 1–1.5 mm, densely or sparsely puberulent, inconspicuously 3-veined, margin scarious, apically acuminate. Florets yellow; corolla 11–14 mm, with 9–11 mm slender tube and dilated limb; lobes ovate, apically acuminate, reddish tinged. Anthers obtuse at base. Style branch tips subulate, papillose. Achenes cylindrical, 1.5–2.7 mm, 9–11-ribbed, puberulent between ribs. Fl. and fr. Apr–May.

Rocky places and ravines in forests; sea level to 1500 m. Hainan, S Yunnan [N Vietnam].

**9. *Gynura elliptica*** Y. Yabe & Hayata, J. Coll. Sci. Imp. Univ. Tokyo 18(8): 25. 1904.

兰屿木耳菜 lan yu mu er cai

Herbs, fleshy. Stems 35–50 cm, slightly procumbent from base, 6–10 mm in diam., canaliculate when dry, branched, glabrous or sparsely pubescent on synflorescence. Stem leaves numerous, thinly papery; lower and median leaf petioles 1–3 cm, incised-rounded auriculate at base; blade elliptic, 4–12 × 2–6 cm, both surfaces shortly pubescent, lateral veins 6–8(–12)-paired, curved, veinlets coalescent, reticulate, base rounded or cuneate, margin entire or laxly crenate, apex obtuse, mucronulate. Upper leaves bractlike, smaller, distinctly auriculate. Capitula 14–17 mm in diam., 2–5 in terminal lax corymbs; peduncles 6–23 mm, shortly pubescent in upper part. Involucre broadly campanulate, 8–9 × 14–17 mm, with many linear calycular bracts; phyllaries ca. 14, lanceolate, 8–12 × 1–1.3 mm, apically subtriangular, sparsely puberulent. Florets ca. 50, exceeding involucre; corolla yellow, 10–12 mm, with slender, 7–9 mm tube and dilated limb; lobes ovate, ca. 2 mm. Anthers obtuse at base. Style branches with lanceolate appendages, papillose. Achenes brownish, cylindrical, glabrous or puberulent. Pappus white, silky, ca. 10 mm. Fl. May–Nov.

Valleys, seashores; sea level to 500 m. Taiwan [Philippines].

**10. *Gynura procumbens*** (Loureiro) Merrill, Enum. Philipp. Fl. Pl. 3: 618. 1923.

平卧菊三七 ping wo ju san qi

*Cacalia procumbens* Loureiro, Fl. Cochinch. 2: 485. 1790; *C. sarmentosa* Blume; *Gynura cavaleriei* H. Léveillé; *G. emeiensis* Z. Y. Zhu; *G. sarmentosa* (Blume) Candolle.

Herbs, scandent. Stems procumbent, brownish or purple striate, glabrous or pubescent when young, branched. Leaf petiole 5–15 mm, glabrous; blade abaxially purplish, adaxially green, ovate, ovate-oblong, or elliptic, 3–8 × 1.5–3.5 cm, both surfaces glabrous, rarely sparsely pubescent, lateral veins 5–7-paired, curved, veinlets inconspicuous, base rounded-obtuse or cuneately attenuate into petiole, margin entire or repand-dentate, apex acute or acuminate. Upper stem leaves and leaves on synflorescence branches reduced, lanceolate or linear-lan-

ceolate, sessile or subsessile. Capitula 3–5 in each corymb, in terminal or axillary corymbs; peduncles long, slender, often with 1–3 linear bracts, sparsely shortly pubescent or glabrous. Involucres campanulate or funnelform, 15–17 × 5–10 mm; bracteoles at base 5 or 6, linear; phyllaries (9 or) 11–13, becoming purplish, oblong-lanceolate, 15–17 × ca. 1.5 mm, glabrous, 1–3-veined, margin narrowly scarious, apically acuminate. Florets 20–30; corolla orange, 12–15 mm, with slender 8–10 mm tube

and dilated limb; lobes ovate-lanceolate, apically acute. Anthers obtuse at base, appendages triangular. Style branch tips conical, papillose. Achenes brown, cylindrical, 4–6 mm, glabrous, 10-ribbed. Pappus white, silky. Fl. Mar–Apr.  $2n = 20$ .

By streams in forests, sandy slopes, climbing on shrubs or trees; 200–900 m. ?Fujian, Guangdong, Guizhou, Hainan, Sichuan, Yunnan [Indonesia, Malaysia, Myanmar, Thailand, Vietnam; Africa].

## 112. *EMILIA* Cassini, Bull. Sci. Soc. Philom. Paris 1817: 68. 1817.

一点红属 *yi dian hong shu*

Chen Yilin (陈艺林 *Chen Yi-ling*); Bertil Nordenstam, Charles Jeffrey

Herbs annual or perennial, with fibrous roots, mostly subglabrous. Stems erect, branched or simple. Leaves mostly radical, alternate, simple, petiolate or sessile. Capitula discoid or radiate, homogamous or heterogamous, in terminal corymbs, sometimes solitary, without calyculus. Involucres cylindrical; phyllaries uniseriate, free or basally connate. Receptacle flat, glabrous. Ray florets yellow; disk florets bisexual, yellow, orange, red, purple, pinkish, pale mauve, or white; corolla with funnelform limb and 5, usually narrow, lobes. Anther obtuse or slightly sagittate at base. Style branches truncate to obtuse, often penicillate, or with an appendage of fused papillae. Achenes elliptic-oblong, 5-ribbed, glabrous or hairy between ribs. Pappus of numerous white, slender bristles.

About 100 species: palaeotropical; five species (one introduced) in China.

- 1a. Style branches ending in a conspicuous appendage; florets orange-red or scarlet, rarely yellow ..... 1. *E. coccinea*
- 1b. Style branches truncate or subtruncate, or at most with a short conical appendage, without a conspicuous appendage of fused papillae; florets purplish, dull red, pale yellowish, pale orangish, or cream.
  - 2a. Achenes glabrous; lower leaves entire or laxly dentate ..... 5. *E. prenanthoidea*
  - 2b. Achenes pubescent; lower leaves lyrate-lobed or strongly dentate.
    - 3a. Florets cream, pallid yellow, or pale orange; corollas distinctly exceeding involucre ..... 4. *E. praetermissa*
    - 3b. Florets purple or dull red, hardly or distinctly exceeding involucre.
      - 4a. Lower leaves lyrate; involucres 3–4 × as long as broad, slightly shorter than or equaling corollas .... 2. *E. sonchifolia*
      - 4b. Lower leaves strongly dentate; involucres 2–3 × as long as broad, ca. 3/4 as long as corollas ..... 3. *E. fosbergii*

**1. *Emilia coccinea*** (Sims) G. Don in Sweet, Hort. Brit., ed. 3, 382. 1839.

绒缨菊 *rong ying ju*

*Cacalia coccinea* Sims, Bot. Mag. 16: t. 564. 1802; *C. sagittata* Willdenow (1803), not Vahl (1794); *Emilia sagittata* Candolle var. *lutea* L. H. Bailey.

Herbs, annual. Stems erect, 40–70(–100) cm tall, glabrous or hispidulous. Basal and lower leaves shortly petiolate; blade oblong, obovate, or subspatulate, 5–7 × 2–2.5 cm, both surfaces puberulent, veins convex abaxially and conspicuously concave adaxially, base gradually attenuate, winged and semiamplexicaul, margin entire or repand-denticulate, apex obtuse. Median stem leaves sessile, oblong or ovate-oblong, large, basally hastate and amplexicaul. Upper leaves smaller, lanceolate or oblong-lanceolate, basally auriculate and amplexicaul, apically acute. Capitula several in terminal corymb, 10–15 mm; peduncles 10–30 mm, not bracteate. Involucres urceolate or top-shaped, 10–12 × 9–12 mm, without bracts at base; phyllaries distinctly shorter than florets, 10–13, linear-lanceolate, glabrous, margin narrowly scarious, apically acuminate. Florets numerous, ca. 50; corolla scarlet, rarely yellow, tube slender; lobes 5, lanceolate, 1.6–2.2 mm. Achenes cylindrical, ca. 3 mm, puberulent, 5-ribbed. Pappus white, ca. 4 mm. Fl. Jul–Nov.  $2n = 10, 20$ .

Often cultivated as an ornamental plant in gardens in China [native to Africa; cultivated worldwide].

**2. *Emilia sonchifolia*** (Linnaeus) Candolle in Wight, Contr. Bot. India, 24. 1834.

一点红 *yi dian hong*

Herbs, annual; root vertical. Stems erect or ascending, gray-green, 25–40 cm tall, rather curved, usually branching from base, glabrous or sparsely pilose. Leaves thick, lower leaves crowded, abaxially dark green, often becoming purple, lyrate-pinnatifid, 5–10 × 2.5–6.5 cm; terminal lobe large, broadly ovate-triangular, margin irregularly dentate, apex obtuse or subrounded; lateral lobes usually paired, oblong or oblong-lanceolate, both surfaces crisped-hairy, margin shallowly and bluntly dentate, apex obtuse or acute. Median stem leaves lax, sessile, smaller, ovate-lanceolate or oblong-lanceolate, basally hastately semiamplexicaul, margin entire or irregularly denticulate, apically acute; upper leaves few, linear. Capitula pendulous before anthesis, erect later, usually 2–5, in terminal lax corymbs; peduncles 2.5–5 cm, slender, not bracteate. Involucres cylindrical, 6–12 × 1.5–4 mm; phyllaries 8 or 9, yellow-green, oblong-linear or linear, nearly equaling florets, glabrous, margin narrowly scarious, apically acuminate. Florets pink or purplish; corolla ca. 9 mm, with slender tube and dilated limb, deeply 5-lobed. Achenes cylindrical, 3–4 mm, puberulent between ribs, 5-ribbed. Pappus of capillary-like bristles, snow white, ca. 8 mm. Fl. Jul–Oct.  $2n = 10, 20$ .

Weedy slopes, roadsides, field margins, sandy places; sea level to

2100 m. Anhui, Fujian, Guangdong, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [pantropical].

*Emilia sonchifolia* is used medicinally as an antiphlogistic and for dysentery.

- 1a. Corollas equaling or exceeding involucre by not more than 2 mm; corolla lobes 0.5–1.5 mm ..... 2a. var. *sonchifolia*
- 1b. Corollas exceeding involucre by (2.5–)3–4 mm; corolla lobes 1.2–2.2 mm ..... 2b. var. *javanica*

**2a. Emilia sonchifolia var. sonchifolia**

一点红(原变种) yi dian hong (yuan bian zhong)

*Cacalia sonchifolia* Linnaeus, Sp. Pl. 2: 835. 1753; *Crassocephalum sonchifolium* (Linnaeus) Lessing; *Emilia sinica* Miquel; *Senecio sonchifolius* (Linnaeus) Moench.

Involucres 6–12 × 1.5–3.5 mm. Corollas equaling involucre or exceeding it by not more than 2 mm; corolla lobes 0.5–1.5 mm. 2n = 10.

Weedy slopes, roadsides, field margins; 800–2100 m. Anhui, Fujian, Guangdong, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [pantropical].

**2b. Emilia sonchifolia var. javanica** (N. L. Burman) Mattfeld, Bot. Jahrb. Syst. 62: 445. 1929.

紫背草 zi bei cao

*Hieracium javanicum* N. L. Burman, Fl. Indica, 174. 1768; *Emilia flammea* Cassini; *E. javanica* (N. L. Burman) C. B. Robinson; *E. sagittata* Candolle; *E. taiwanensis* S. S. Ying.

Involucres 6–12 × 2–4 mm. Corollas exceeding involucre by (2.5–)3–4 mm; corolla lobes 1.2–2.2 mm. 2n = 20.

Weedy places, roadsides, field margins, sandy places; sea level to 900 m. Anhui, Fujian, Guangdong, Hainan, Hunan, Taiwan, Zhejiang [Japan; islands of S Pacific from Indonesia to E Polynesia].

**3. Emilia fosbergii** Nicolson, Phytologia 32: 34. 1975.

纓荣花 ying rong hua

Herbs, annual. Stems erect or ascending, 20–60(–100) cm tall, glabrous or sparsely pilose. Basal and lower stem leaves petiolate; blade ovate, ± dentate, strongly decurrent into petiole; median stem leaves oblong to oblong-lanceolate, base semiamplexicaul-hastate, margin shallowly to deeply dentate, apically acute; upper leaves ovate to lanceolate, dentate or entire, becoming bractiform upward. Capitula in lax compound corymbs. Involucres cylindrical to suburceolate, ca. 15 × 5 mm; phyllaries ca. 10. Florets definitely exceeding involucre at anthesis; corolla dull red, with slender tube and cylindrical limb; lobes 1–1.5

mm. Achenes ca. 5 mm, pubescent between ribs. Pappus white. 2n = 20.

Waste places. Taiwan [tropical Pacific islands, Neotropics].

In spite of suggestions in the literature of an African origin, *Emilia fosbergii* does not occur in Africa.

**4. Emilia praetermissa** Milne-Redhead, Kew Bull. 5: 375. 1951.

黄花紫背草 huang hua zi bei cao

Herbs, annual. Stems erect or ascending, to 140 cm tall, glabrous or pilose. Basal and lower stem leaves petiolate; petiole 1.5–3 cm, in basal leaves unwinged and exauriculate, in lower stem leaves winged and basally auriculate; blade broadly ovate, 4–6 × 4.5–6 cm, ± pilose, base subcordate, margin dentate, apically obtuse; median and upper stem leaves sessile, pandurate to triangular, becoming smaller upward. Capitula up to 7 in lax corymbs, rarely solitary. Involucres cylindrical, ca. 10 × 3–4 mm; phyllaries 9–12. Florets distinctly exceeding involucre; corollas cream, yellowish, or pallid orange, ca. 8 mm; lobes ca. 2 mm, tinged purple or orange. Achenes ca. 3 mm, pubescent. Pappus ca. 7 mm. 2n = 20.

Disturbed places. N Taiwan [W tropical Africa].

*Emilia praetermissa* is presumably introduced, an allotetraploid of hybrid origin (*Emilia sonchifolia* var. *sonchifolia* × *E. lisowskiana* C. Jeffrey, the latter previously identified as *E. coccinea*).

**5. Emilia prenanthoidea** Candolle, Prodr. 6: 302. 1838.

小一点红 xiao yi dian hong

*Emilia angustifolia* Candolle.

Herbs, annual. Stems erect or ascending, 30–90 cm tall, glabrous or sparsely pilose. Basal leaves obovate or obovate-oblong, small, base gradually attenuate into long petiole, margin entire or laxly dentate, apex obtuse. Median leaves sessile, abaxially sometimes purplish, adaxially green, oblong or linear-oblong, 5–9 × 1–3 cm, glabrous or subglabrous, base semiamplexicaul, hastate or auriculate, margin repand-dentate, apex obtuse or acute. Upper leaves linear-lanceolate, small. Capitula arranged in terminal lax corymbs; peduncles 3–10 cm, slender. Involucres cylindrical or narrowly campanulate, 6–11 × 2–3 mm; phyllaries 10, oblong, 6–12 × 1–2 mm, shorter than florets, glabrous, margin scarious. Florets red or purple-red; corolla ca. 10 mm, tube slender, limb 5-lobed; lobes lanceolate, 2–3 mm. Style branches apically thickened. Achenes cylindrical, ca. 3 mm, glabrous, 5-ribbed. Pappus of capillary-like bristles, soft, white. Fl. and fr. May–Oct.

Roadsides on slopes, lax forests, wet places in forests; 500–2000 m. Fujian, Guangdong, Guangxi, Guizhou, Sichuan, Yunnan, Zhejiang [India, Indonesia, Malaysia, New Guinea, Philippines, Thailand, Vietnam].

**113. PERICALLIS** D. Don in Sweet, Brit. Fl. Gard. 6: t. 228. 1834.

瓜叶菊属 gua ye ju shu

Chen Yilin (陈艺林 Chen Yi-ling); Bertil Nordenstam

Shrubs, subshrubs, or perennial herbs, gray-white tomentose or glabrous. Leaves alternate on stem, margin obtusely dentate to

sharply serrate, palmately veined. Capitula numerous, corymbose, rarely solitary, heterogamous, radiate. Involucres not calyculate, campanulate; phyllaries 1-seriate, equal, margin membranous, apically obtuse or acute. Receptacle flat, without paleae. Ray florets radiate, female, fertile, variously colored but not yellow; central florets bisexual; corolla tubular with campanulate limb, white, cream-colored, or pink (never yellow), 5-lobed. Anthers not caudate, obtuse or sagittate at base; endothelial tissue polarized; antheropodium balusterform (basally distinctly enlarged). Style branches linear with separated stigmatic areas, apically truncate, with short sweeping hairs. Achenes terete (not compressed), elliptic-oblong, glabrous or puberulent, ribbed. Pappus of many fine caducous bristles, sometimes absent in ray florets.  $x = 30$ .

Fifteen species: Macaronesia (Azores, Canary Islands, Madeira), one species widely cultivated including in China.

**1. *Pericallis hybrida*** B. Nordenstam, Opera Bot. 44: 21. 1978.

瓜叶菊 *gua ye ju*

*Cineraria hybrida* Willdenow, Enum. Pl. 2: 893. 1809, non Bernhardt (1800).

Herbs, perennial. Stems erect, 30–70 cm tall, sparsely to densely white pubescent. Leaf petiole 4–10 cm, basally expanded and amplexicaul; blade abaxially green, adaxially gray-white, reniform to broadly cordate, sometimes upper leaves triangular-cordate, large, 10–15 × 10–20 cm, densely tomentose, palmately veined, concave abaxially, convex adaxially, base deeply cordate, margin irregularly deltoid-lobed or obtusely dentate, apex acute or acuminate. Uppermost leaves subsessile,

smaller. Capitula numerous, terminal, broadly corymbose, 3–5 cm in diam.; peduncles 3–6 cm, coarse. Involucres campanulate, 5–10 × 7–15 mm; phyllaries 1-seriate, lanceolate, apically acuminate. Ray florets purple-red, blue, pink, or whitish; lamina spreading, narrowly elliptic-oblong, 2.5–3.5 × 1–1.5 cm, apically 3-denticulate. Disk florets white, cream-colored, or pink (never yellow), ca. 6 mm. Achenes oblong, 1.5–2 mm, angled or ribbed, at first hairy, glabrescent. Pappus of capillary-like bristles, white, 4–5 mm. Fl. and fr. Mar–Jul.

Widely cultivated in gardens and parks throughout China, also indoors [only known in cultivation, of hybrid origin from species native to Macaronesia (Canary Islands, Madeira)].

*Pericallis hybrida* is a colorful ornamental plant.

**114. HAINANECIO** Y. Liu & Q. E. Yang, Bot. Stud. 52: 117. 2011.

海南菊属 *hai nan ju shu*

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Herbs, perennial. Rhizomes thickened. Leaves rosulate, long petiolate; blade ovate to obovate, pinnately veined. Capitula solitary, terminal. Involucres hemispheric, ecalyculate; phyllaries ca. 13, lanceolate, apex acuminate. Ray florets ca. 13; lamina white, elliptic-oblong, apex acuminate, often 2-denticulate. Disk florets many; corolla white. Anthers rounded at base; apical appendage ovoid with abaxial cells obviously enlarged; endothelial cell wall thickenings polar and radial. Antheropodia cylindric. Pollen grains triporate, helianthoid. Style branches truncate. Achenes obovoid. Pappus absent.  $x = 29^*$ .

• One species: China.

The genus has polar and radial endothelial cell wall thickenings, cylindric antheropodia, and a basic chromosome number of  $x = 29$ , all of which are characteristic of subtribe Tussilaginatae. Nevertheless, recent molecular data suggest a position within subtribe Senecioninae and a relationship to the Macaronesian genus *Pericallis*, which shares some unusual characters with *Hainanecio* such as the non-yellow florets and the helianthoid pollen.

**1. *Hainanecio hainanensis*** (C. C. Chang & Y. C. Tseng) Y. Liu & Q. E. Yang, Bot. Stud. 52: 118. 2011.

海南菊 *hai nan ju*

*Senecio hainanensis* C. C. Chang & Y. C. Tseng, Fl. Hainan. 3: 585. 1974; *Sinosenecio hainanensis* (C. C. Chang & Y. C. Tseng) C. Jeffrey & Y. L. Chen.

Herbs, scapigerous. Rhizomes stout, to 6 mm in diam., rather woody. Stems 1–3, erect, scapiform, 15–30 cm tall, simple, arachnoid-tomentose, with white hairs when young, glabrescent. Leaves several, radical, rosulate, long petiolate; petiole 5–10 cm, stout, sparsely arachnoid-tomentose; blade ovate, ovate-oblong, or obovate, 6–12 × 4–8 cm, both surfaces densely white tomentose when young, ± glabrescent to glabrous or sparsely puberulent, pinnately veined with 6 or 7 lateral veins on each side, midvein prominent abaxially, base rounded to

broadly cuneate and sometimes unequal, margin shallowly repand-dentate, with mucronulate teeth, apex rounded. Capitula solitary, terminal, ca. 2 cm in diam.; scapes not bracteate. Involucres campanulate-hemispheric, ca. 6 × 7 mm, not calyculate; receptacle subglabrous; phyllaries ca. 9, lanceolate, 1–1.5 mm wide, herbaceous, puberulent, margin scarious, apically puberulent, acuminate. Ray florets 9 or 10; corolla tube ca. 3 mm; lamina yellow, elliptic-oblong, 8–10 × 3–4 mm, 7-veined, apically 2-denticulate, acuminate. Disk florets numerous; corolla yellow, ca. 3.5 mm, with 1.5–2 mm tube and campanulate limb; lobes oblong-lanceolate, ca. 2 mm, apically acute. Anthers oblong, ca. 1.8 mm, basally obtuse to rounded, appendages ovate. Style branches recurved. Achenes obovoid-elliptic, ca. 3.5 mm, smooth, glabrous. Pappus absent. Fl. Jul–Oct, fr. Aug–Nov.  $2n = 58^*$ .

• Shaded places in woods; 900–1200 m. Hainan (Baoting, Changjiang, Qiongzong).