

3. Tribe CARLINEAE

刺苞菊族 ci bao ju zu

Shi Zhu (石铸 Shih Chu); Werner Greuter

Herbs, biennial or perennial. Leaves alternate, rarely all basal. Capitula homogamous, bisexual, rarely unisexual in dioecious plants, persistent, solitary or several at end of stem and branches. Involucre surrounded by spiny ± divided bracts dissimilar from phyllaries. Phyllaries imbricate, undivided. Receptacle with scales and sometimes bristles, rarely naked. Florets numerous. Corolla actinomorphic, 5-lobed. Stamen filaments glabrous; anther sagittate, base caudate; connective with a sterile apical appendage. Style branches coherent, short, ± truncate. Achene covered with dense long straight appressed hairs, lacking apical rim surrounding pappus insertion. Pappus elements of one or two types of plumose or scabrid bristles, inserted directly on upper edge of achene, not surrounded by a rim.

Five genera and ca. 70 species: N Africa, Asia, Europe; three genera and six species (two endemic) in China.

- 1a. Inner phyllaries longer than florets, with a scarious and colored distal portion spreading when dry 11. *Carlina*
1b. Inner phyllaries shorter than florets, erect and lacking a colored distal portion.
2a. Most leaves cauline; florets bisexual; receptacle covered with scales 12. *Atractylodes*
2b. All leaves in a basal tuft; florets unisexual, plants dioecious; receptacle naked 13. *Tugarinovia*

11. CARLINA Linnaeus, Sp. Pl. 2: 828. 1753.

刺苞菊属 ci bao ju shu

Herbs, biennial [or annual to perennial], with a taproot. Leaves undivided [to bipinnatisect], margin spinulose [to spiny toothed]. Outer bracts similar to leaves; inner bracts more divided. Phyllaries entire; inner phyllaries longer than florets, with a scarious and colored distal portion spreading when dry. Receptacle flat, areolate, with linear scales and bristles basally conrescent in a honeycomb pattern to envelop achenes. Florets bisexual. Achene oblong, terete, costate, apex truncate. Pappus bristles plumose, all of one type, forming a ring, united groupwise at base.

About 28 species: N Africa, Asia, Europe, Macaronesia (Canary Islands); one species in China.

1. *Carlina biebersteinii* Bernhardt ex Hornemann, Suppl. Hort. Bot. Hafn. 94. 1819.

刺苞菊 ci bao ju

Carlina longifolia Reichenbach (1830), not Viviani (1824); *C. longifolia* var. *pontica* Boissier; *C. vulgaris* Linnaeus var. *longifolia* Grabowski; *C. vulgaris* var. *microcephala* Ledebour.

Herbs 20–120 cm tall, biennial. Stem solitary, apically branched, weakly cobwebby. Basal leaves long petiolate. Cauline leaves sessile, undivided, green, concolorous or abaxially paler, lanceolate to linear-lanceolate, 4–15 × 0.5–2 cm, ± thickly papery, glabrous or abaxially sparsely cobwebby, margin with spinules alternating with distant groups of stouter spines. Uppermost cauline leaves grading into bracts. Bracts very numerous, surrounding capitulum; outer bracts similar to

leaves, green, cobwebby; inner bracts gradually smaller upward, brown or dark purple, progressively reduced to bipinnate spines. Capitula 1 to several, corymbose. Involucre hemispheric-obconic, 3.5–4.5 cm in diam. Phyllaries linear, margin entire; outer phyllaries few, completely hidden by bracts, abaxially densely sericeous cobwebby, margins long interwoven ciliate, distal portion purplish, apex acuminate; inner phyllaries much longer, much exceeding florets, abaxially sparsely cobwebby, margin proximally appressed ciliate, distal portion adaxially yellow, scarious, spreading hygroscopically and showy when dry. Corolla purple, 7–9 mm. Achene oblong, 2–4 mm. Pappus bristles connate to varying lengths in groups of 2–4, all basally united into a ring. Fl. and fr. Jun–Sep. $2n = 20$.

Dry meadows, thickets, river terraces; ca. 1000 m. N Xinjiang (Burqin) [Kazakhstan, Russia; Europe].

12. ATRACTYLODES Candolle, Prodr. 7: 48. 1838.

苍术属 cang shu shu

Giraldia Baroni.

Herbs, perennial, rhizomatous. Rhizome with homomorphic adventitious roots. Leaves undivided to pinnatipartite, margin spinulose or with spine-tipped teeth. Bracts (except outermost leaflike ones) pectinately pinnatisect to pinnatipartite. Receptacle flat or concave, densely covered with linear scales. Florets bisexual. Achene obovoid to ovoid, compressed, apex truncate. Pappus bristles in 1 row, plumose, all of one type, basally connate into a ring.

About six species: E Asia; four species (two endemic) in China.

- 1a. Cauline leaves sessile.

- 2a. Cauline leaves undivided; corolla white, ca. 0.8 cm 1. *A. koreana*
 2b. Cauline leaves pinnately lobed or pinnatifid with 6–9 pairs of segments; corolla yellow, ca. 1.3 cm 3. *A. carlinoides*
 1b. Cauline leaves petiolate.
 3a. Corolla white or yellow, to 1.3 cm 2. *A. lancea*
 3b. Corolla purplish red, ca. 1.7 cm 4. *A. macrocephala*

1. *Atractylodes koreana* (Nakai) Kitamura, Acta Phytotax. Geobot. 4: 178. 1935.

朝鲜苍术 chao xian cang shu

Atractylis koreana Nakai, Bot. Mag. (Tokyo) 42: 478. 1928; *A. amplexicaulis* Nakai ex T. Mori (1923), not Poiret (1804).

Herbs 25–50 cm tall. Rhizome long, stout. Stems solitary or tufted, unbranched or apically branched, glabrous. Leaves ± thickly papery, green, subconcolorous, glabrous, undivided, apex acuminate to subacute. Basal and lowermost cauline leaves withered at anthesis. Lower and middle cauline leaves ± narrowly elliptic to ovate-lanceolate, 3.5–10 × 2–4 cm, base rounded and semiamplexicaul. Upper cauline leaves similar but smaller. Capitula 1 to several. Involucre campanulate to obconic-campanulate, ca. 1 cm in diam. Phyllaries imbricate, abaxially glabrous, apex obtuse to rounded; outer phyllaries ovate, 2–4 × 1–2 mm; middle phyllaries gradually longer; innermost phyllaries ± narrowly oblanceolate, ca. 11 × 4 mm. Corolla white, ca. 8 mm. Achene obovoid, ca. 4 mm. Pappus brown, 6–7 mm. Fl. and fr. Jul–Aug.

Thickets, dry slopes; 200–700 m. Liaoning, Shandong [Korea].

2. *Atractylodes lancea* (Thunberg) Candolle, Prodr. 7: 48. 1838.

苍术 cang shu

Atractylis lancea Thunberg in Murray, Syst. Veg., ed. 14, 729. 1784; *Acarina chinensis* Bunge; *Atractylis chinensis* (Bunge) Candolle; *A. chinensis* var. *liaotungensis* Kitagawa; *A. chinensis* var. *loeseneri* Kitagawa; *A. japonica* (Koidzumi) Kitagawa; *A. ovata* Thunberg; *A. ovata* f. *pinnatifolia* Komarov; *A. ovata* var. *simplicifolia* Loesener; *A. ovata* f. *ternata* Komarov; *A. pinnatifolia* (Komarov) S. Y. Hu; *A. separata* L. H. Bailey; *Atractylodes chinensis* (Bunge) Koidzumi; *A. erosodentata* Koidzumi; *A. japonica* Koidzumi; *A. lancea* var. *simplicifolia* (Loesener) Kitamura; *A. lyrata* Siebold & Zuccarini; *A. ovata* (Thunberg) Candolle; *A. ovata* var. *ternata* (Komarov) Koidzumi; *Giraldia stapfii* Baroni.

Herbs (15–)30–100 cm tall. Rhizome thick, horizontal or ascending. Stems solitary or tufted, unbranched or apically few branched, ± glabrous. Leaves ± rigidly papery, green, concolorous, glabrous or abaxially sparsely cobwebby. Basal leaves withered at anthesis. Lower and middle cauline leaves petiolate but lower ones sometimes subsessile; petiole 0.5–8 cm; leaf blade 8–12 × 5–8 cm, undivided or divided almost to base into 3–5(–9) pinnately arranged segments; segments undivided or sometimes near base with few small spiny lobes, ± narrowly elliptic to oblanceolate or obovate, 3–9 × 2–6 cm, base cuneate, apex shortly acuminate to rounded. Upper cauline leaves simi-

lar but smaller. Outer bracts few, leaflike; inner bracts numerous, homomorphic, reduced to pectinately arranged pinnate spines, exceeding but not completely hiding involucre. Involucre campanulate, 1–1.5 cm in diam. Phyllaries numerous, imbricate, margin cobwebby, apex rounded to obtuse; outer phyllaries ovate, 3–6 × 1–3 mm; middle phyllaries gradually longer; innermost phyllaries elliptic to linear, 11–12 × 2–4 mm. Corolla white or yellowish, 0.9–1.2 cm. Achene obovoid, ca. 5 mm, hairs white. Pappus brown to dirty white, 7–9 mm. Fl. and fr. Jun–Oct.

Grasslands, forests, thickets, rock crevices; 200–2500 m. Anhui, Chongqing, Gansu, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Zhejiang [Japan, Korea, Russia].

Atractylodes lancea is widely cultivated throughout China. The rhizomes are used medicinally.

3. *Atractylodes carlinoides* (Handel-Mazzetti) Kitamura, Acta Phytotax. Geobot. 7: 119. 1938 [“*carolinoides*”].

鄂西苍术 e xi cang shu

Atractylis carlinoides Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 642. 1937.

Herbs 30–50 cm tall. Rhizome horizontal. Stem solitary, usually purplish red, unbranched. Leaves papery, green, concolorous, glabrous. Basal leaves rosulate, petiolate; leaf blade elliptic to oblanceolate, 15–21 × 3–4 cm, pinnately lobed or pinnatifid; segments triangular; lateral segments 6–9 pairs; terminal segment largest. Cauline leaves several, sessile, elliptic to lanceolate, 5–12 × 1–3 cm, pinnately lobed to pinnatipartite, apex with a long spine. Bracts pinnatipartite. Capitula 1 or 2. Involucre campanulate, 2.5–3 cm in diam. Phyllaries few, imbricate; outer phyllaries ± narrowly elliptic, 7–11 × 3–4 mm; middle phyllaries gradually longer; innermost phyllaries linear to broadly linear, ca. 21 × 3 mm. Corolla yellow, ca. 1.3 cm. Achene obovoid, ca. 6 mm. Pappus white, 7–8 mm. Fl. and fr. Sep.

• Slopes; ca. 1600 m. W Hubei (Zigui).

4. *Atractylodes macrocephala* Koidzumi, Fl. Symb. Orient.-Asiat. 5. 1930.

白术 bai shu

Atractylis macrocephala (Koidzumi) Nemoto (1936), not Desfontaines (1799); *A. macrocephala* var. *humanensis* Y. Ling.

Herbs 20–60 cm tall. Rhizome thick. Stem branched from base, glabrous. Leaves papery, glabrous. Middle cauline leaves petiolate; petiole 3–6 cm; leaf blade divided almost to base into 3–5 segments; lateral segments entire or bipartite, oblanceolate to ± narrowly elliptic, 4.5–7 × 1.5–2 cm; terminal segment largest. Upper cauline leaves similar but smaller. Outer bracts

sessile, elliptic to narrowly elliptic, margin entire; inner bracts pinnatisect. Capitula 6–10. Involucre broadly campanulate, 3–4 cm in diam. Phyllaries numerous, imbricate, margin white cobwebby, apex obtuse; outer phyllaries ovate to triangular, 6–8 × 3–4 mm; innermost phyllaries lanceolate to broadly linear, 11–20 × 2–3 mm. Corolla purplish red, ca. 1.7 cm. Achene ob-

conic, ca. 7.5 mm, hairs white. Pappus dirty white, ca. 1.7 cm. Fl. and fr. Aug–Oct. $2n = 24^*$.

• Grasslands, forests; 600–2800 m. W Anhui, Chongqing, N Fujian, Guizhou, Hubei, Hunan, W Jiangxi, Zhejiang.

Atractylodes macrocephala is cultivated throughout China. The rhizomes are used medicinally.

13. TUGARINOVIA Iljin, Izv. Glavn. Bot. Sada S.S.S.R. 27: 356. 1928.

革苞菊属 ge bao ju shu

Herbs, perennial, dioecious, stemless. Taproot crowned by a thick woody stock. Leaves all basal, tufted, petiolate; leaf blade leathery, pinnately divided; segments spiny. Flowering scapes lateral, axillary, short. Capitulum solitary, homogamous, female or functionally male. Receptacle naked. Male florets small; female florets larger, with staminodes. Anthers basally with long filiform tails. Pappus elements of two types; inner pappus of distinct scabrid bristles; outer pappus shorter, of few slender tortuous hairs.

One species: China, Mongolia.

1. Tugarinovia mongolica Iljin, Izv. Glavn. Bot. Sada S.S.S.R. 27: 357. 1928.

革苞菊 ge bao ju

Woody stock 6–7 cm in diam., densely beset with persistently lanate petiole remains. Petiole 1.5–7 cm, proximal half with dense long silky indumentum; leaf blade elliptic, oblong, or ovate, 3–15 × 1–4 cm, pinnatipartite to pinnately lobed, both surfaces sparsely to densely cobwebby or lanate; segments wide and short, with irregular shallow spine-tipped teeth; spines rigid, 2–4 mm. Flowering scapes solitary or few, decumbent or ascending, unbranched, leafless, 2–4 cm, densely whitish lanate. Bracts leathery, with shallow spiny lobes, abaxially cobwebby; outer bracts leaflike, not always present; inner bracts smaller, grading into phyllaries, with yellow spinules. Male capitula ca. 1 cm; female capitula ca. 2 cm. Involucre obconic to obovoid, ca. 1 cm in diam. Phyllaries few, imbricate, linear-lanceolate, abaxially subglabrous, margin entire and ciliate, apex spiny. Corolla whitish, 0.7–1.4 cm. Style distally thickened, in female florets smooth and with ± divergent triangular-ovate branches, in functionally male florets covered with sweeping hairs at tip; branches coherent, linear. Achene oblong, 8–10 mm, densely

sericeous-villose. Pappus dirty white, inner pappus to 1.5 cm. Fl. and fr. May–Jun.

Stony hillsides, sandy sloping fields, gravelly slopes; 800–1500 m. Nei Mongol [Mongolia].

The roots are used medicinally.

1a. Leaf blade narrowly elliptic to

oblong 1a. var. *mongolica*

1b. Leaf blade ovate 1b. var. *ovatifolia*

1a. Tugarinovia mongolica var. **mongolica**

革苞菊(原变种) ge bao ju (yuan bian zhong)

Leaf blade narrowly elliptic to oblong.

Stony hillsides, sandy sloping fields; ca. 1500 m. Nei Mongol [Mongolia].

1b. Tugarinovia mongolica var. **ovatifolia** Y. Ling & Ma, Fl. Reipubl. Popularis Sin. 75: 248. 1979.

卵叶革苞菊 luan ye ge bao ju

Leaf blade ovate.

• Gravelly slopes; ca. 800 m. Nei Mongol (Ih Ju Meng).