

4. DIPSACUS Linnaeus, Sp. Pl. 1: 97. 1753.

川续断属 chuan xu duan shu

Herbs, biennial or perennial. Stems erect, angulate and sulcate, usually echinulate or hispid along ridges. Basal leaves long petiolate, entire, 3-cleft, or pinnatifid, usually dentate or lobed. Cauline leaves opposite, sessile or petiolate, usually 3–5-lobed, sometimes pinnatifid or entire, both surfaces usually hispid, but glabrous or papillate-echinulate in some species. Capitula terminal, oblong, globose, or ovoid-globose; involucre bracts erect or spreading, leaflike, 1- or 2-layered, rostrate; involucre 4–8-ribbed, adnate to ovary; flowers bisexual. Calyx actinomorphic, shallowly disciform, 4-lobed, white pubescent. Corolla tubular, 4-lobed; lobes unequal in size. Stamens 4, inserted at corolla tube, alternate with corolla lobes. Gynoecium of 2 carpels; ovary inferior, enveloped by involucre; ovule solitary, pendulous, anatropous; style filiform; stigma oblique or lateral. Achenes surmounted with persistent calyx, enveloped by leathery involucre. Seed coat membranous; embryo imbedded in endosperm.

About 20 species: N Africa, Asia, Europe; seven species (two endemic) in China.

- 1a. Stems glabrous; bract rostra 1.5–3 mm 1. *D. azureus*
- 1b. Stems ± spiny; bract rostra 3–11 mm.
 - 2a. Heads oblong-spherical, 2.5–7 × 2–4.9 cm; bract rostra 5–11 mm; corolla tube 3.5–5 mm.
 - 3a. Corolla black-purple, tube ca. 3.5 mm; bract rostra ca. 5 mm 4. *D. atratus*
 - 3b. Corolla white or yellowish, tube 3.5–5 mm; bract rostra 5–11 mm.
 - 4a. Segments of cauline leaves 1–3-paired; heads 2–3.5 cm in diam.; leaves glabrous abaxially 2. *D. inermis*
 - 4b. Segments of cauline leaves more than 3-paired; heads usually 3.5–4.9 cm in diam.; leaves spiny abaxially 3. *D. chinensis*
 - 2b. Heads spherical, 1.5–3 × 1.5–3.2 cm; bract rostra 3–5 mm; corolla tube 2–2.5 mm.
 - 5a. Corolla black-purple 6. *D. atropurpureus*
 - 5b. Corolla white, yellow, or pink.
 - 6a. Corolla white or yellow; plant perennial; roots fleshy and fusiform 5. *D. asper*
 - 6b. Corolla pink; plant biennial; roots ± lignified, not fleshy 7. *D. japonicus*

1. *Dipsacus azureus* Schrenk in Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 53. 1841.

天蓝续断 tian lan xu duan

Cephalaria beijiangensis Y. K. Yang, J. K. Wu & A. Sayit; *C. dipsacoides* Karelin & Kirilov; *Dipsacus dipsacoides* (Karelin & Kirilov) V. I. Bochantsev; *D. xinjiangensis* Y. K. Yang, J. K. Wu & T. Abdulla.

Herbs, perennial, 0.6–1.5 m tall. Stems glabrous, nearly spineless. Basal leaves long petiolate, undivided; cauline leaves opposite, ca. 6-paired, glabrous, sessile or petiole up to 10 cm; leaf blade 6–26 × 3–10 cm, pinnatifid to pinnatisect; terminal segment lanceolate, margin coarsely serrate; lateral segments 4–7-paired, lanceolate to elliptic, 1.2–7 × 1–3 mm. Heads 3 or 4, subspherical; terminal one 2–2.5 × 3–4.5 cm; peduncles 30–60 cm, glabrous or pubescent above; involucre bracts 2-layered; 5 or 6 in outer layer, ovate; 7–9 in inner layer, elliptic or lanceolate; bracts obovate-lanceolate or oblanceolate, 5–14 × 4–5 mm, rostra 1.5–3 mm; involucre 4-ribbed, 3–4 mm. Calyx disciform, 0.5–1 mm; lobes irregular. Corolla purple-blue, funnel-form, 8–15 mm, outside villous; lobes elliptic or oblong, 3–4 × 1.5–2.5 mm. Stamens exserted. Style strongly exserted; stigma clavate. Achenes 4-angular, ca. 3.5 mm, totally enveloped in involucre. Fl. and fr. Aug–Sep.

1900–2000 m. Xinjiang (Huocheng, Tekes) [Kazakhstan, Kyrgyzstan].

2. *Dipsacus inermis* Wallich, Fl. Ind. 1: 367. 1820.

藏续断 zang xu duan

Cephalaria cachemirica Decaisne; *Dipsacus inermis* var. *mitis* (D. Don) Y. Nasir; *D. mitis* D. Don; *D. strictus* D. Don; *Virga inermis* (Wallich) Holub.

Herbs, perennial, 0.5–2 m tall. Taproots clavate, up to 3.5 cm in diam. Stems branched, usually 6-ridged, ridges sparsely spiny. Basal leaves rosulate, often wilted at anthesis, long petiolate; leaf blade elliptic, 5–13 × ca. 3.5 cm, undivided, margin serrate, or 3- or 5-segmented; terminal segment much larger; cauline leaves subsessile or with petiole up to 7 cm; leaf blade broadly lanceolate, 10–22 × 3.5–7 cm, trifid or pinnatifid; lateral segments in 2 or 3 pairs; terminal segment larger, ovate, all segments yellowish hirsute on both surfaces, margins serrate. Capitula 1 or 3, 2–3.5 cm in diam. at anthesis and in fruit; peduncles up to 40 cm; involucre bracts linear, white hirsute; bracts lanceolate or obovate-lanceolate, 14–20 mm at anthesis, rostrum 5–9 mm, setose and hirsute; involucre ovoid-columnar, 5–8 mm. Corolla white or yellowish, funnel-form, 11–15 mm; tube 3.5–4 mm; lobes unequal. Stamens exserted. Style strongly exserted. Achenes narrowly ellipsoid, ca. 4.5 × 1.5 mm, 4-angular, glabrous. Fl. Jul–Aug, fr. Aug–Oct.

Forests, grassy slopes, by streams; 2100–3900 m. Xizang (Nyalam), Yunnan [Afghanistan, Bhutan, India, Kashmir, Myanmar, Nepal, Pakistan].

3. *Dipsacus chinensis* Batalin, Trudy Imp. S.-Peterburgsk. Bot. Sada 13: 377. 1894.

大头续断 da tou xu duan

Dipsacus lijiangensis Ai & H. B. Chen [“*lijiangensis*”].

Herbs, perennial, up to 2 m tall. Taproots robust, up to 2 cm in diam. Stems branched, 8-ridged, ridges sparsely spiny. Cauline leaves opposite, lowermost leaves with petiole up to 5 cm, uppermost leaves subsessile; leaf blade broadly lanceolate, up to 25 × 7 cm, lyrate; terminal segment much larger than lateral ones; lateral segments 3–8-paired, both surfaces setose. Heads solitary or 3, globose or oblong, 3.5–4.9 cm in diam.; peduncles up to 25 cm; involucre bracts linear, setose; bracts lanceolate or obovate-lanceolate, 14–15 mm, rostrum 5–11 mm, spiny and pilose; involucels ovoid-columnar, 5–8 mm. Corolla 9–14 mm; tube 3.5–5 mm; lobes unequal. Stamens exserted. Style exserted. Achenes cuneate, 4-angular, ca. 6 × 1.5 mm, densely pubescent, apex exposed. Fl. Jul–Aug, fr. Sep–Oct.

• Forests, grassy slopes, by streams; 2100–3900 m. W Sichuan, SE Xizang, NW Yunnan (Dèqên, Lijiang, Zhongdian).

4. *Dipsacus atratus* J. D. Hooker & Thomson ex C. B. Clarke, Fl. Brit. India 3: 218. 1881.

紫花续断 *zi hua xu duan*

Virga atrata (J. D. Hooker & Thomson ex C. B. Clarke) Holub.

Herbs, perennial, ca. 1 m tall. Stems branched, ridged, retrorsely spiny, up to 1 cm in diam. Basal leaves and lower cauline leaves wilted at anthesis; upper cauline leaves sessile, 10–15 × 4–5 cm, both surfaces hispid, pinnatisect; terminal segment much larger than lateral ones, elliptic, apex acuminate; lateral segments 2–4-paired; all segments large serrate on margins. Heads globose, 3–3.5 cm at anthesis; peduncles to 40 cm; involucre bracts 5 or 6, ovate-elliptic, undivided, abaxially hirsute; bracts obovate, 9–11 mm; rostrum triangular, ca. 5 mm; base ca. 2 mm wide, spiny-hirsute on 2 lateral sides; involucels ca. 3 mm, glabrous, 4-ribbed and 4-dentate, with 4 minute teeth and 4 obscure ribs between large teeth and ribs. Calyx shallowly cup-shaped, 4-lobed, ca. 1 mm, edges spiny-hirsute. Corolla black-purple, funnelform, ca. 1.1 cm, base narrowly tubular, ca. 3.5 mm. Stamens exserted. Fl. Sep.

Forests on southern slopes; ca. 3600 m. S Xizang (Cona) [Bhutan, N India, Nepal].

5. *Dipsacus asper* Wallich ex C. B. Clarke, Fl. Brit. India 3: 218. 1881.

川续断 *chuan xu duan*

Dipsacus asperoides C. Y. Cheng & Ai; *D. asperoides* var. *emeiensis* Z. T. Yin; *D. cyanocapitatus* C. Y. Cheng & Ai; *D. daliensis* Ai; *D. daliensis* var. *multifidus* H. B. Chen; *D. enshiensis* C. Y. Cheng & Ai; *D. kangdingensis* Ai & F. X. Feng; *D. simaoensis* Y. Y. Qian; *D. yulongensis* Ai & L. J. Yang.

Herbs, perennial, up to 2 m tall. Taproots simple or branched, fusiform, up to 1.2 cm in diam., fleshy. Stems erect, branched, 4–8-ridged, ridges sparsely covered with retrorse spines. Basal leaves rosulate; petiole up to 25 cm; leaf blade pinnatisect, rarely entire, 15–25 × 5–20 cm, adaxially white setose, or papillate-setose, abaxially densely setose along veins; segments 5–9; terminal segment largest, up to 15 × 9 cm; lateral ones usually obovate or spatulate; lower cauline leaves simi-

larly long petiolate, leaf blade entire, but mostly pinnatifid, with 5–9 segments; terminal segment lanceolate, up to 11 × 5 cm, margin sparsely large serrate, apex acuminate; upper cauline leaves shorter petiolate, lanceolate, undivided or 3-segmented. Heads globose, 1.5–3.2 cm in diam.; peduncles up to 50 cm; involucre bracts 5–7, leaflike, lanceolate or linear, hispid; bracts obovate, 7–11 mm, hispidulous, rostrate, rostrum 3–5 mm, setose; involucels 4-ribbed, obovoid-columnar, 5–8 mm, white puberulent, apex 8-dentate. Calyx 4-ribbed, disk-shaped, ca. 1 mm, undivided or 4-lobed, outside hispidulous. Corolla yellowish or white, funnelform, 9–11 mm; tube ca. 2.5 mm; lobes unequal, outside puberulent. Stamens exserted; anthers purple. Achenes obovoid-columnar, ca. 4 mm. Fl. Jul–Sep, fr. Sep–Nov. $2n = 18$.

Margins of forests, thickets, among herbs, by streams, roadsides; 1500–3700 m. Chongqing, N Guangdong (Lianxian), N and W Guangxi (Longsheng, Napo, Xing'an), Guizhou, W Hubei (Xingshan), Sichuan, S Xizang (Cona, Nyalam), Yunnan [India, Myanmar].

6. *Dipsacus atropurpureus* C. Y. Cheng & Z. T. Yin, Acta Phytotax. Sin. 23: 302. 1985.

深紫续断 *shen zi xu duan*

Dipsacus fulingensis C. Y. Cheng & Ai.

Herbs, perennial, 1–1.8 m tall. Taproots columnar, slightly fleshy. Stems erect, 6–8-ridged, ridges sparsely covered with retrorse spines. Basal leaves rosulate; petiole up to 30 cm; leaf blade broadly lanceolate, 10–18 × 6–12 cm, pinnatifid or pinnatisect; segments 5–7; terminal segment larger, oblong or broadly ovate, 6–12 × 4–8 cm; lateral ones smaller downward, lanceolate to ovate; all segments abaxially glabrous, adaxially puberulent or glabrous. Lower and middle cauline leaves shorter petiolate; leaf blade pinnatisect; terminal segment larger; lateral segments 2- or 3-paired, ovate to lanceolate; upper cauline leaves undivided or 3-segmented, segments lanceolate, both surfaces glabrous, sometimes adaxially sparsely white puberulent, margins entire. Heads globose, 2–2.5 cm in diam.; peduncles up to 30 cm; involucre bracts 7 or 8, leaflike, lanceolate, white puberulent; bracts oblong-obovate, 6–8 mm, rostrum 1–3 mm, glabrous, sparsely setose, or villous basally; involucels obovoid-columnar; limb 4-lobed; lobes acute at apex. Calyx disk-shaped, 4-angular, outside glabrous, inside and apex villous. Corolla black-purple; tube 6–7 mm, base narrowly tubular, 1–1.5 mm; limb with one larger lobe. Stamens strongly exserted. Achenes pale brown, 2.5–4 mm, 4-angular, cuneate. Fl. Jul–Sep, fr. Sep–Nov.

• Among herbs by streams, grassy slopes by fields. Chongqing (Fuling, Nanchuan, Qianjiang).

Dipsacus atropurpureus differs from *D. asper* only in having a black-purple corolla (vs. yellowish or white) and a shorter rostrum (1–2 vs. 3–5 mm). Although accepted as separate species here, the two may be conspecific. Field observations and population sampling are needed to clarify this issue.

7. *Dipsacus japonicus* Miquel, Verslagen Meded. Afd. Natuurk. Kon. Akad. Wetensch., ser. 2, 2: 83. 1868.

日本续断 *ri ben xu duan*

Fl. China 19: 658–660. 2011.

Dipsacus lushanensis C. Y. Cheng & Ai; *D. tianmuensis* C. Y. Cheng & Z. T. Yin.

Herbs, biennial or perennial?, up to 1.5 m tall. Roots not fleshy. Stems often branched, 4–6-ridged, with retrorse spines on ridges. Basal leaves rosulate, long petiolate; leaf blade narrowly elliptic, pinnatisect or undivided. Cauline leaves opposite, long petiolate to sessile; leaf blade elliptic-ovate to elliptic, 8–25 × 3–10 cm, abaxially spiny-hispid, adaxially hispidulous, pinnatisect or pinnatifid, rarely undivided; segments 2- or 3-paired; terminal lobe much larger. Capitula terminal, globose, 1.5–3.2 cm at anthesis and in fruit; involucre bracts linear, spiny-hispid; bracts obovate, 9–11 × 4–5 mm, hispidulous, rostrum 3–5 mm, lateral sides spiny-hispid; involucels 4-ribbed, 5–6 mm, white villous, 8-dentate at apex. Calyx cup-shaped, ca. 1 mm, 4-lobed, white villous. Corolla pink, purple-red, or purplish, 5–8 mm, outside villous. Stamens slightly exerted. Achenes oblong-cuneate, 4-angular, ca. 6 mm, glabrous. Fl. Aug–Sep, fr. Sep–Nov.

Grassy slopes, roadsides; below 2600 m. Anhui (Qingyang, Shucheng), Chongqing (Chengkou, Wushan, Wuxi), E Gansu (Pingliang, Yuzhong), Hebei, Henan, Hubei (Xianfeng), Hunan (Cili), Jiangsu, Jiangxi, Liaoning, Shaanxi, Shandong, Shanxi, N Sichuan (Barkam, Songpan), W Zhejiang [Japan, Korea].

Fl. China 19: 658–660. 2011.