

PLUMBAGINACEAE

白花丹科 bai hua dan ke

Peng Tse-Hsiang¹; Rudolf V. Kamelin²

Shrubs, shrublets, or herbs. Stems striate, sometimes reduced to a caudex. Leaves simple, alternate or basal; stipules absent; leaf blade entire or rarely pinnately lobed, with chalk glands on both surfaces. Inflorescences terminal or axillary, spicate, spicate-racemose, subcapitate, capitate, or paniculate, arranged into complanate spikes if branched, all composed of 1–10 or more cymules or helicoid cymes (known as spikelets) each 1–5-flowered; bracts 1 at base of each spikelet; bractlets 1 or 2 at base of each flower. Flowers bisexual, actinomorphic, hypogynous, sessile or very short pedicellate. Calyx persistent, tubular to funnellform, 5-ribbed, 5-lobed. Corolla petals connate but sometimes only at base; lobes or segments 5, twisted. Stamens opposite corolla lobes, hypogynous or inserted at corolla base; anthers 2-locular, dehiscing longitudinally. Pistil 1. Ovary superior, 1-locular; ovules 1, pendulous from a basal funicle. Styles 5, free or connate; stigmas 5. Capsule usually enclosed within calyx. Seed 1 per capsule; embryo straight, surrounded by thin starchy endosperm.

About 25 genera and 440 species: worldwide, main diversity in C Asia and Mediterranean region; seven genera and 46 species (11 endemic) in China.

Armeria labradorica Wallroth subsp. *sibirica* (Turczaninow) Kamelin is expected to be found in Altay Shan near the border with Mongolia and/or Russia.

Peng Tse-hsiang in Lee Shu-kang, ed. 1987. Plumbaginaceae. Fl. Reipubl. Popularis Sin. 60(1): 1–47.

- 1a. Styles connate, 5-branched; stigmas on inner surface of style branches; calyx herbaceous or membranous only between ribs, never scarious, without inflated or expanded limb; corolla with long tube.
 - 2a. Calyx lacking glands 3. *Ceratostigma*
 - 2b. Calyx with conspicuous stalked glands.
 - 3a. Calyx 7.5–13 mm, glandular on tube and lobes; corolla salverform, limb rotate 1. *Plumbago*
 - 3b. Calyx 4–4.5 mm, glandular only on lobes; corolla narrowly campanulate, lobes erect 2. *Plumbagella*
- 1b. Styles 5; stigmas terminal, depressed capitate or terete; calyx limb scarious, inflated or expanded; corolla with petals connate only at base.
 - 4a. Shrubby pulvinate, usually thorny; leaves alternate, crowded, linear, sometimes spinescent, persisting when withered 4. *Acantholimon*
 - 4b. Herbs, or not thorny shrublets; leaves basal or in a rosette at apex of caudex, rarely alternate, usually deciduous.
 - 5a. Styles with terete or filiform stigmas 7. *Limonium*
 - 5b. Styles with capitate stigmas.
 - 6a. Styles slightly verrucose at base; calyx subtubular, limb narrowly campanulate; ovary apex gradually attenuate; leaf blade margin undulate 5. *Ikonnikovia*
 - 6b. Styles with long papillae at base; calyx funnellform, limb expanded; ovary apex abruptly contracted; leaf blade margin flat or nearly so 6. *Goniolimon*

1. PLUMBAGO Linnaeus, Sp. Pl. 1: 151. 1753.

白花丹属 bai hua dan shu

Thela Loureiro.

Herbs perennial or rarely annual, rarely shrubs, sometimes lianous. Stems usually branched. Petiole base slightly expanded or auriculate, clasping or nearly clasping. Inflorescences spicate-racemose; spikelets 1-flowered; bracts and bractlets herbaceous, greenish. Flowers conspicuous. Pedicel very short, persistent. Calyx tubular, ribs herbaceous, with stalked glands, membranous between ribs; limb not expanded, enlarging after anthesis; lobes minute, usually triangular. Corolla salverform, tube much longer than calyx, limb rotate; lobes apically rounded or acuminate. Stamens hypogynous, as long as corolla tube; filaments basally expanded; anthers linear. Ovary ellipsoid, ovoid, or pyriform. Styles connate, terminally 5-branched; stigma on inner surface of style branches, covered with stalked or sessile glands.

About 17 species: mainly in tropics; two species in China.

- 1a. Rachis with sessile glands; corolla white to pale bluish white; calyx 10–13 mm 1. *P. zeylanica*

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1b. Rachis lacking glands; corolla purple to dark red; calyx 7.5-9.5 mm 2. *P. indica*

1. *Plumbago zeylanica* Linnaeus, Sp. Pl. 1: 151. 1753.

白花丹 bai hua dan

Shrubs or perennial herbs, erect, 1-3 m tall, evergreen. Branches spreading, often lianous. Petiole base sometimes auriculate; leaf blade ovate, (3-)5-8(-13) × (1.8-)2.5-4(-7) cm, thin, base cuneate to obtuse, apex acuminate and mucronate. Inflorescences (3-)5-70-flowered; peduncle 0.5-1.5 cm, glandular; rachis glandular, (2-)3-8(-15) cm; bracts subovate, 4-6(-8) × (1-)1.5-2(-2.5) mm, apex acuminate; bractlets linear, ca. 2 × 0.5 mm. Calyx 1-1.2 cm, glandular almost throughout, tube ca. 2 mm in diam. at middle. Corolla white to pale bluish white, tube 1.8-2.2 cm, limb 1.6-1.8 cm in diam.; lobes obovate to oblong-lanceolate, ca. 7 × (2-)4 mm, apex mucronate to acuminate. Anthers blue, ca. 2 mm. Ovary ellipsoid, 5-angular. Style glabrous. Capsule pale yellow-brown, oblong. Seed red-brown, ca. 7 × 1.5 × 0.6 mm, apex acute. Fl. Oct-Mar, fr. Dec-Apr. 2n = 28.

100-1600 m. Fujian, Guangdong, Guangxi, S Guizhou, Hainan, Sichuan, Taiwan [Hawaii, Old World tropics].

- 1a. Corolla lobes obovate, apex mucronate 1a. var. *zeylanica*
1b. Corolla lobes oblong-lanceolate, apex acuminate 1b. var. *oxypetala*

1a. *Plumbago zeylanica* var. *zeylanica*

白花丹 (原变种) bai hua dan (yuan bian zhong)

Plumbago viscosa Blanco; *Thela alba* Loureiro.

Corolla lobes obovate, apex mucronate.

Scrub and grassland; 100-1600 m. Fujian, Guangdong, Guangxi, S Guizhou, Hainan, Sichuan, Taiwan [Hawaii, Old World tropics].

Medicinal and ornamental.

1b. *Plumbago zeylanica* var. *oxypetala* Boissier in A. de Candolle, Prodr. 12: 693. 1848.

尖瓣白花丹 jian ban bai hua dan

Corolla lobes oblong-lanceolate, apex acuminate.

* 200-700 m. Fujian.

2. *Plumbago indica* Linnaeus in Stickman, Herb. Amb. 24. 1754.

紫花丹 zi hua dan

Plumbago rosea Linnaeus; *Thela coccinea* Loureiro.

Herbs perennial, 0.5-2 m tall, evergreen. Stems pliable, often lianous, simple or branched from base. Petiole base without auricles; leaf blade narrowly ovate to elliptic-ovate, (3-)7-9.5(-13) × (0.8-)3-4(-6) cm, papery, base rounded to obtuse, apex acute. Inflorescences (20-)35-90-flowered; peduncle 1-3 cm, not glandular; rachis (8-)10-40(-50) cm, not glandular; bracts ovate, 2-3 × 1.5-2 mm, apex acuminate; bractlets obovate-elliptic to ovate, 2-2.5 × 1.5-2 mm, apex acute. Flowers heterostylous. Calyx 7.5-9.5 mm, glandular almost throughout, tube ca. 2 mm in diam. at middle. Corolla purple to dark red, tube 2-2.5 cm, limb ca. 2 cm in diam.; lobes obovate, ca. 12 × 7 mm, apex rounded and mucronate. Anthers blue, 1.5-2 mm. Ovary ellipsoid-ovoid, indistinctly angular. Style basally pilose; short-styled forms with style arms partly exerted, stigmatic glands without enlarged apex; long-styled form with style arms completely exerted from corolla throat, stigmatic glands capitate. Fruit not seen. Fl. Nov-Apr. 2n = 14.

Wet grasslands; near sea level to 300 m. Hainan, SE Yunnan [Old World tropics].

Medicinal and ornamental.

2. PLUMBAGELLA Spach, Hist. Nat. Vég. 10: 333. 1841.

鸡娃草属 ji wa cao shu

Herbs annual. Stems erect, branched. Leaves sessile, base clasping and decurrent. Inflorescences subcapitate when young, becoming short spicate; spikelets 2- or 3-flowered; bracts leaflike, herbaceous; bractlets 2, membranous. Flowers minute, pedicellate. Calyx siphonate-conical; tube not glandular, slightly 5-angular, angles alternating with lobes and becoming crested by fruiting stage; lobes with stalked glands along margin. Corolla narrowly campanulate, tube slightly longer than calyx, lobes erect. Stamens hypogynous or slightly adnate to corolla base; filaments linear, basally not expanded; anthers narrowly ovate. Ovary ovoid, apex acuminate. Styles connate, terminally 5-branched; stigma on inner surface of style branches, covered with stalked capitate glands.

One species: China, Kazakstan, Kyrgyzstan, Mongolia, Russia.

1. *Plumbagella micrantha* (Ledebour) Spach, Hist. Nat. Vég. 10: 333. 1841.

鸡娃草 ji wa cao

Plumbago micrantha Ledebour, Fl. Altaic. 1: 171. 1829; *P. spinosa* Hao.

Herbs. Stems (5-)10-30(-55) cm, often with small prickles. Leaves spatulate to ovate-lanceolate, upper leaves becoming narrowly lanceolate to ovate-lanceolate, (1.5-)2-7 ×

(0.5-)1-2.6 cm, base auriculate, margin minutely prickly, apex acute to acuminate. Inflorescences with 4-12 spikelets; rachis tomentose; bracts broadly ovate, apex acuminate; bractlets minute, usually lanceolate-oblong. Calyx green, 4-4.5 mm; lobes as long as tube, narrowly triangular. Corolla light blue-purple, tube 4-5 mm; lobes ovate-triangular, ca. 1 mm. Stamens ± as long as corolla tube; anthers pale yellow, ca. 0.5 mm. Capsule dark brownish red, with 5 pale striations. Seed brownish red, ovate, ca. 3.3 × 1.7 mm. Fl. Jul-Aug, fr. Jul-Sep. 2n = 12.

Wet and cold slopes; 2000–2500 (–4500) m. SW and W Gansu, Ningxia, Qinghai, Xinjiang, Xizang [Kazakstan, Kyrgyzstan, Mongolia, Russia].

Medicinal.

3. CERATOSTIGMA Bunge, Enum. Pl. China Bor. 55. 1833.

藍雪花屬 lan xue hua shu

Valoradia Hochstetter.

Shrubs, shrublets, or perennial herbs. Stems erect or spreading, rarely sublianos, branched, usually strigose. Leaf blade margin with incurved hairs. Inflorescences terminal or axillary, subcapitate to capitate, with 2 to many spikelets; spikelets usually 1-flowered; bracts herbaceous; bractlets 2, membranous. Calyx tubular, herbaceous along ribs, membranous between ribs except at base, usually split between ribs by fruiting time. Corolla salverform, extended beyond calyx, limb rotate, lobes obovate to obdeltate. Stamens hypogynous or adnate to corolla base; anthers oblong-linear, slightly exerted. Ovary oblong-ovoid to ellipsoid, slightly 5-angular or 5-sulcate, apex conical. Style 1, apically 5-branched; stigma on inner side of style branches, covered with stalked or sessile capitate glands.

Eight species: E Africa, Asia; five species in China.

- 1a. Bud scales rigid, linear to needlelike; bark of old stems fissured and exfoliating; leaves (0.3–)3–6 mm wide 1. *C. ulicinum*
1b. Bud scales absent or scalelike; bark not fissured; leaves (6–)8–30(–54) mm wide.
2a. Corolla less than 2 cm; calyx 6.5–9.5(–10.5) mm; plants shrubby.
3a. Plants evergreen; leaves densely strigose; hairs on young shoots red-brown to dark yellow-brown 2. *C. griffithii*
3b. Plants deciduous; leaves glabrous or sparsely strigose, if densely strigose then hairs on young shoots grayish white or pale yellow 3. *C. minus*
2b. Corolla 2.2–2.8 cm; calyx 10–15(–18) mm; plants suffrutescent.
4a. Bud scales present at base of some branches; calyx lobes 4–4.5 mm 4. *C. willmottianum*
4b. Bud scale absent; calyx lobes ca. 2 mm 5. *C. plumbaginoides*

1. *Ceratostigma ulicinum* Prain, J. Bot. 44: 7. 1906.

刺鳞藍雪花 ci lin lan xue hua

Shrublets deciduous, 5–20(–60) cm tall. Stems often basally branched; bark of older branches fissured and exfoliating; nodes without a ringlike scar; branchlets red-brown, slender, densely minutely hispid. Bud scales linear to almost needlelike, rigid. Leaf blade obovate-lanceolate, oblanceolate, or sometimes linear, 0.8–2.2(–2.6) cm × (0.3–)3–6 mm, glabrous or abaxial surface slightly minutely hispid along midrib, base cuneate, margin minutely hispid, apex acute to acuminate and with a small awn. Inflorescences terminal or axillary, subcapitate, with spikes usually 10-flowered or more; bracts lanceolate, 7–8.5 × ca. 2 mm; bractlets lanceolate, 4–5 × ca. 1 mm. Calyx brownish red, 7–8 × ca. 1.5 mm; lobes ca. 1 mm, apically puberulent. Corolla blue, 1.1–1.3 cm; lobes lanceolate-obovate, ca. 5 × 2–2.5 mm, apex acute to obtuse. Anthers blue, 1.4–1.8 mm. Ovary ovoid. Style branches extending beyond anthers. Capsule ca. 4.5 mm. Seed dark brown. Fl. Jun–Oct, fr. Aug–Nov.

Sunny slopes; 3300–4500 m. S Xizang [Nepal].

2. *Ceratostigma griffithii* C. B. Clarke in J. D. Hooker, Fl. Brit. India 3: 481. 1882.

毛藍雪花 mao lan xue hua

Shrubs evergreen, 40–130 cm tall. Stems many branched; branches hard, without ringlike scars, pith reduced; young branches densely strigose; hairs rust colored to brown, attenuate from conical base, usually mixed with 6–12-rayed stellate hairs. Bud scales scalelike. Leaf blade spatulate, obovate, or subrhombic, (1.5–)2–5(–7.6) × (0.8–)1–2.2(–2.9) cm, both

surfaces densely and uniformly strigose, base abruptly constricted and then becoming attenuate, apex acute. Inflorescences terminal or axillary, 5–20-flowered; bracts oblong-lanceolate to oblong-ovate, 6–7.5 × 2–2.8 mm; bractlets lanceolate, 5–7.2 × 1.5–2 mm. Calyx (7–)8–9.5(–10.5) × ca. 1.5 mm, sericeous between ribs and mixed with a few stellate hairs. Corolla 1.5–1.9 cm, tube purple; lobes blue, obdeltate, 6–7 × 4.5–5 mm, apex emarginate and triangularly mucronate. Anthers blue, ca. 2 mm. Ovary ovoid. Style branches equal in length to anthers. Capsule ca. 6 mm. Seed dark brown. Fl. Aug–Dec, fr. Sep–Jan.

Warm valleys; 2200–2800 m. SW Xizang [Bhutan].

3. *Ceratostigma minus* Stapf ex Prain, J. Bot. 44: 7. 1907.

小藍雪花 xiao lan xue hua

Shrubs deciduous, 30–150 cm tall. Stems many branched; branches without ringlike scars, pith reduced; branchlets densely strigose; hairs white or pale lemon yellow, abruptly attenuate from ellipsoid base, sometimes less than 1 mm, occasionally mixed with 3–6-rayed stellate hairs. Bud scales scalelike. Leaf blade obovate, spatulate, or subrhombic, 2–3 × (0.6–)0.8–1.6 cm, abaxially densely strigose, rarely only along midrib, adaxially glabrous or sparsely strigose, sometimes strigose-hirsute, base attenuate, apex obtuse or rounded, rarely acute or mucronate. Inflorescences terminal and (5–)7–13(–16)-flowered or axillary and 1–9-flowered; bracts oblong-ovate, 4–5 × ca. 2.5 mm, apex acute; bractlets ovate to oblong-ovate, 4.5–5 × 1.5–2 mm, apex acuminate. Calyx 6.5–9 × ca. 1.5 mm; lobes ca. 1.5 mm, with slender appressed hairs along ribs of exposed part or rarely mixed with

stellate hairs. Corolla 1.5–1.7(–1.9) cm, tube purple; lobes blue, obdeltate, 6–7 × 4–5 mm, apex emarginate and filiform-mucronate. Anthers blue to purple, 1.4–1.6(–2) mm. Ovary green, ovoid. Style branches exerted. Capsule ovoid, (2–)6.5 mm. Fl. Jun–Oct, fr. Jun–Nov.

* Valleys; 1000–4800 m. S Gansu, W Sichuan, E and S Xizang, N Yunnan.

Medicinal.

4. *Ceratostigma willmottianum* Stapf, Bot. Mag. 140: t. 8591. 1914.

岷江藍雪花 min jiang lan xue hua

Herbs perennial, deciduous, rhizomatous, to 2 m tall. Rhizomes rooting at nodes just below ground. Branches spreading, fragile, pith equal or wider than surrounding xylem, nodes with ringlike scars; branchlets sparsely strigose. Bud scales scalelike. Petiole basally clasping, often forming ringlike scars after falling; leaf blade obovate-rhombic, ovate-rhombic, or rarely obovate, (1.5–)2–5 × (0.8–)1.2–1.8(–2.5) mm, usually lanceolate below inflorescence, base cuneate and attenuate into petiole. Inflorescences terminal or axillary, 3–7-flowered, sometimes crowded to capitate; bracts ovate-oblong to oblong, 6–8(–10) × 2–3.5 mm; bractlets ovate to oblong, 5–7 × ca. 3 mm. Calyx 1–1.5 × ca. 1 mm, sparsely strigose and with a few stellate hairs along ribs, lobes 4–4.5 mm. Corolla 2–2.6 cm, tube red-purple; lobes blue, obdeltate, 9–11 × 6.5–7 mm, apex emarginate and mucronate. Stamens ± as long as corolla tube; anthers purple, ca. 2 mm. Ovary ovoid. Style branches extending beyond anthers. Capsule ca. 6 mm. Seed black. Fl. Jul–Oct, fr. Jun–Nov.

* Warm valleys at forest edges or in thickets; 700–3500 m. Gansu (Wen Xian), W Guizhou, S and W Sichuan, SE Xizang, E and N Yunnan.

Medicinal.

5. *Ceratostigma plumbaginoides* Bunge, Enum. Pl. China Bor. 55. 1833.

藍雪花 lan xue hua

Plumbago larpentae Lindley; *Valoradia plumbaginoides* (Bunge) Boissier.

Herbs perennial, 20–30(–60) cm tall. Rhizomes branched, ca. 2–3 cm in diam., with a brown scale at each node; scales ovate, clasping. Stems slender, simple or branched, without bud scales, sparsely minutely hispid toward apex. Leaf blade broadly ovate to obovate, (2–)4–6(–10) × (0.8–)2–3(–5.3) cm, glabrous or glabrescent, base attenuate to abruptly constricted and then becoming attenuate, apex short acuminate to occasionally obtuse. Inflorescences terminal or axillary, (1–) 15–30-flowered or more; bracts lanceolate to oblong; bractlets ovate, apex acute and apiculate. Flowers heterostylous. Calyx (1.2–)1.3–1.5(–1.8) cm × 1.5–2 mm, sparsely strigose along ribs; lobes ca. 2 mm. Corolla 2.5–2.8 cm, tube red-purple; lobes blue, obdeltate, ca. 8 × 8 mm, apex emarginate and narrowly triangular mucronate. Stamens slightly exerted; anthers blue, ca. 2 mm. Ovary ellipsoid. Styles included in short-styled forms, exerted beyond anthers in long-styled forms. Capsule pale yellowish brown, ellipsoid-ovoid, ca. 6 mm. Seeds red-brown. Fl. Jul–Sep, fr. Aug–Oct. $2n = 14$.

* Rocky places, often in foothills. Beijing Shi, Henan, Jiangsu, Shanxi, Zhejiang.

Ornamental.

4. ACANTHOLIMON Boissier, Diagn. Pl. Orient. 1(7): 69. 1846, nom. cons.

彩花属 cai hua shu

Armeriastrum (Jaubert & Spach) Lindley; Statice subgen. *Armeriastrum* Jaubert & Spach.

Shrublets pulvinate, usually thorny, often subglobose, many branched. Leaves borne on current year's branches, crowded, sessile, persistent on old branches, spring leaves similar or different from summer leaves; leaf blade linear, linear-needlelike, or linear-subulate, usually very shallowly obdeltate to subcomplanate in cross section, apex usually pointed to awned. Inflorescences borne in axil of spring leaves, branched or unbranched; spikes pedunculate, with 2–8 spikelets, arranged in 2 rows, sometimes rachis undeveloped with spike or spikelets axillary; spikelets 1–5-flowered; bracts distinctly shorter than bractlet of first flower, margin membranous; first bractlet similar to bract, margin broadly membranous. Calyx funnelform or rarely subtubular; tube straight or occasionally basally oblique, inconspicuously herbaceous along ribs and scarious between ribs; limb purple, pink, or white, broad, scarious, 5- or 10-lobed. Corolla slightly exerted from calyx; petals basally slightly connate. Stamens adnate to corolla base. Ovary linear-cylindric, apex attenuate. Styles 5, free, glabrous; stigmas depressed capitate. Capsule oblong-filiform.

About 190 species: C and SW Asia, Europe; 11 species in China.

Acantholimon fetisowii Regel has been reported from Xinjiang, but this may be a misidentification.

1a. Spikelets forming a sessile spike (but see *A. roborowskii*) or spikelets solitary; current year's branches very short with several crowded and appressed leaves.

2a. Calyx limb dark purple; spikelet solitary 11. *A. tianschanicum*

2b. Calyx limb white or pale rose colored with purple-brown veins; spikelets usually 2 or 3, clustered or solitary.

3a. Calyx 7–8.5 mm, veins extending to limb margin; leaf blade apex acute to acuminate and short awned 9. *A. hedinii*

- 3b. Calyx 5–6.5 mm, veins not extending to limb margin; leaf blade apex obtuse or acute but not awned 10. *A. diapiensoides*
- 1b. Spikelets forming a pedunculate spike; current year's branches distinct, 2–15(–25) mm, with dense but never appressed leaves.
- 4a. Spikelets 1-flowered; bracts and first bractlet glabrous or sparsely puberulent.
- 5a. Leaf blade velvety puberulent especially so when young 4. *A. kokandense*
- 5b. Leaf blade glabrous except margin.
- 6a. Calyx 7–8 mm, glabrous 2. *A. laevigatum*
- 6b. Calyx (10–)11–12 mm, pubescent between ribs.
- 7a. Peduncles 3–6 cm, densely pubescent 1. *A. alatavicum*
- 7b. Peduncles (9–)12–15 cm, subglabrous 3. *A. kaschgaricum*
- 4b. Spikelets 2- or 3-flowered (or sometimes terminal spikelet 1-flowered); bracts and rib of first bractlet pubescent.
- 8a. Peduncles 0–2 cm.
- 9a. Peduncles distinct; cushions to 20–25 cm wide; leaf blade 5–7 mm 5. *A. borodinii*
- 9b. Peduncles practically lacking; cushions to 50–100 cm wide; leaf blade (7–)10–12 mm 6. *A. roborowskii*
- 8b. Peduncles (3–)4–6 cm.
- 10a. Leaf blade glaucous; spikes distichous; calyx 6–8 mm 7. *A. lycopodioides*
- 10b. Leaf blade light green; spikes dense, 1-sided; calyx 10–12 mm 8. *A. popovii*

1. ***Acantholimon alatavicum*** Bunge, M 闢. Acad. Sci. Saint P 闢 ersbourg, S 闢. 7, 18(2): 40. 1872.

刺叶彩花 ci ye cai hua

Shrublets. Cushions 30–40(–100) cm wide. Branches of current year 0.5–1.5(–2.5) cm. Leaf blade glaucous, linear-needlelike to linear-subulate, 2.5–4 cm × 1–2 mm for summer leaves but in spring usually shorter, very shallowly obdeltate in cross section, rigid, glabrous, apex short awned. Inflorescences unbranched; peduncle 3–6 cm, densely pubescent; spike ca. 2 cm, with (1–)5–8 spikelets; spikelets 1-flowered; bracts glabrous, usually oblong-ovate, 5–6 mm, apex acuminate; first bractlet 7–8 mm, apex obtuse to acute. Calyx 1–1.2 cm; tube sparsely velvety between ribs; limb white, apically 5- or 10-lobed, veins purple and extending to apex of lobes, basally velvety along veins. Corolla light purple. Fl. Sep–Oct.

Rocky slopes of desert grasslands; 1300–2500 m. W Xinjiang [Kazakstan, Kyrgyzstan, N Tajikistan, Uzbekistan].

2. ***Acantholimon laevigatum*** (Peng) Kamelin, Novon 3: 261. 1993.

光萼彩花 guang e cai hua

Acantholimon alatavicum var. *laevigatum* Peng, Guihaia 3: 291. 1983.

Shrublets. Cushions ca. 30 cm wide. Leaf blade light green, linear, subcomplanate in cross section, 1–2.5 cm, rigid, glabrous, apex awned. Inflorescences unbranched, 5–9 cm, slightly pubescent; spike with 5–8 spikelets; spikelets 1-flowered; bracts 3–3.5 mm, glabrous; first bractlet 6–6.5 mm. Calyx 7–9 mm, tube glabrous, limb white. Corolla light purple.

* Xinjiang (Tianshan).

3. ***Acantholimon kaschgaricum*** Linczevski, Novosti Sist. Vyssh. Rast. 17: 209. 1980.

喀什彩花 ka shi cai hua

Shrublets loosely pulvinate, cushions 10–15 wide or sometimes more. Leaf blade glaucescent, linear-needlelike, (3–)3.5–4(–4.5) cm × ca. 1 mm, glabrous except margin short ciliate, apex short awned; summer leaf blade ca. 2 cm × 2 mm, needlelike. Inflorescences unbranched or short branched near apex, (9–)12–15 cm; peduncles glabrous; spike 3–5 cm, with 7–12 spikelets, rachis velvety white pubescent; spikelets 1-flowered; bracts 5, 5–6 mm, ovate, glabrous, apex awned; first bractlet 8–9 mm, margin wide membranous, apex long aristate. Calyx 1–1.2 cm, tube apically sparsely pubescent between ribs; limb white, 3.5–4 mm, glabrous, 10-lobed, veins dark purple. Corolla pink.

* Dry slopes. W Xinjiang.

4. ***Acantholimon kokandense*** Bunge ex Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 3(1): 99. 1875.

浩罕彩花 hao han cai hua

Shrublets. Cushions 20–40 cm wide or sometimes more. Branches of current year 3–7 mm. Leaf blade glaucescent, linear-needlelike, rigid, puberulent or glabrescent when young; summer leaf blade (1–)1.5–2(–2.5) cm × (0.5–)0.8 mm; spring leaf blade 4–7 × ca. 1 mm, very shallowly obdeltate in cross section, apex short awned. Inflorescences unbranched; peduncle 3–6 cm, densely pubescent; spike 1.5–2 cm, with 4–7 spikelets or sometimes with only a single terminal spikelet; spikelets 1-flowered; bracts oblong-ovate, 5–6 mm, glabrous or sparsely puberulent, apex acuminate; first bractlet 7–8 mm, apex acute, short acuminate, subobtuse, or rarely 2-lobed. Calyx 1–1.2 cm, tube apically sparsely pubescent between ribs; limb white, 4–4.5 mm, glabrous, veins dark purple and extending to apex of lobes. Corolla pink. Fl. Jun–Aug, fr. Jul–Sep.

Dry slopes or valleys; 2000–2700 m. Xinjiang [Kyrgyzstan].

5. ***Acantholimon borodinii*** Krasnov, Enum. Pl. Tian Shan Orient. 128. 1887.

细叶彩花 xi ye cai hua

Shrublets. Cushions 20–25 cm wide. Branches of current year 2–5 mm. Leaf blade pale glaucous, similar in spring and summer, linear-needlelike to linear, 5–7 × 0.5–0.6 mm, subcomplanate in cross section, rigid, glabrous, apex short awned. Inflorescences unbranched; peduncle ca. 2 cm, densely pubescent; spike to 1.5 cm, with 4–7 (or 8) spikelets; spikelets 2-flowered; bracts broadly ovate to oblong-ovate, ca. 4 mm, densely pubescent, apex subrounded to truncate and mucronate; first bractlet ca. 6 mm, often densely pubescent, apex mucronate. Calyx (6–)7–8 mm, tube densely velvety; limb white, ± velvety, apically 10-lobed, veins dark purple and extending to apex of lobes or nearly so. Corolla pink. Fl. Jun–Jul, fr. Jul–Aug.

High slopes with grasslands; 2100–2900 m. W Xinjiang [Kyrgyzstan].

6. *Acantholimon roborowskii* Czerniakowska, Trudy Bot. Inst. Acad. Nauk SSSR, Ser. 1, Fl. Sist. Vyss. Rast. 3: 2. 1937.

新疆彩花 xin jiang cai hua

Shrublets. Cushions 50–100 cm wide. Leaf blade glaucous, linear, 7–11(–12) × 0.6–0.9 mm, subcomplanate in cross section, rigid, glabrous, apex awned. Inflorescences unbranched, peduncle practically lacking; spike with 2 or 3 spikelets; spikelets 1 (or 2)–flowered; bracts ovate, densely pubescent, apex subrounded; first bractlet 6–7 mm, densely pubescent. Calyx 6–7 mm, tube densely velvety; limb white, 10-lobed. Corolla pink. Fl. Jul, fr. Jul–Aug.

* Slopes. SW Xinjiang.

Acantholimon roborowskii is very similar to *A. borodinii*, and the status of these species needs further study.

7. *Acantholimon lycopodioides* (Girard) Boissier in A. de Candolle, Prodr. 12: 632. 1848.

石松彩花 shi song cai hua

Statice lycopodioides Girard, Ann. Sci. Nat. Bot., sér 3, 2: 330. 1844.

Shrublets densely pulvinate. Cushions 30–100 cm wide. Leaf blade glaucous, linear, (1–)1.5–3 cm × 1–2(–3) mm, rigid, glabrous, apex short awned. Inflorescences unbranched, 3–4(–5) cm, densely pubescent; spikes dense, distichous, with 5–8 spikelets; spikelets 2 or 3 flowered; bracts broadly ovate, 4–5 mm, pubescence very short; first bractlet 6–7 mm, broadly membranous, pubescence very short, apex with a very short awn. Calyx 6–8 mm, funnelform, tube densely velvety between ribs; limb white with red-purple, pubescent or glabrescent veins. Corolla pink to pinkish. Fl. Jul–Aug, fr. Aug–Sep.

Rocks and dry slopes; 2500–3000 m or sometimes higher. NW Xinjiang [Afghanistan, India, Kashmir, Pakistan, Tajikistan].

8. *Acantholimon popovii* Czerniakowska, Trudy Bot. Inst. Akad. Nauk SSSR, Ser. 1, Fl. Sist. Vyss. Rast. 3: 264. 1937.

乌恰彩花 wu qia cai hua

Shrublets loosely pulvinate. Branches 3–5 mm. Leaf blade green to pale glaucous, similar in spring and summer, linear, 1–2 cm × 0.8–1(–1.5) mm, subcomplanate in cross section, glabrous, apex short awned. Inflorescences unbranched; peduncle 4.5–6 cm, densely pubescent; spikes usually subcapitate, with 2–4 spikelets; spikelets 2- or 3-flowered; bracts broadly ovate, 4–5 mm, densely pubescent, apex acute and mucronate; first bractlet 8–9 mm, apex obtuse, veins purple. Calyx 1–1.2 cm, tube densely velvety along ribs; limb white, ± velvety along veins, 10-lobed, veins dark purple and slightly projecting beyond apices. Corolla pink. Fl. Jun–Aug, fr. Jul–Sep.

* Grassy tablelands; ca. 2200 m. Xinjiang (Kashi Diqu, Wuqia Diqu).

9. *Acantholimon hedinii* Ostenfeld in Hedin, S. Tibet 6(3): 48. 1922.

彩花 cai hua

Acantholimon diapensioides Boissier var. *longifolia* O. Fedtschenko.

Shrublets densely pulvinate. Cushions 20–70 cm wide. Branchlets very slow growing; branches of current year very short, with only a few densely appressed leaves. Leaf blade pale glaucous, lanceolate to linear, 4–8 × 0.6–0.8 mm, very shallowly obdeltate to subcomplanate in cross section, glabrous, apex acute to acuminate and short awned. Inflorescences without a rachis; spikelets (1 or)2 or 3, clustered in leaf axils at base of current year's branches, 1- or 2-flowered; bracts broadly ovate, ca. 3 mm, densely pubescent or glabrous, apex acuminate and usually mucronate; first bractlet ca. 6 mm, densely pubescent, apex acuminate. Calyx ca. 7–8.5 mm, tube densely velvety; limb white with dark purple veins, veins extending to apices or slightly projecting. Corolla pink. Fl. Jun–Aug, fr. Jul–Sep.

High grasslands; 3000–4700 m. SW Xinjiang [Kyrgyzstan, Tajikistan].

10. *Acantholimon diapensioides* Boissier in A. de Candolle, Prodr. 12: 624. 1848.

小叶彩花 xiao ye cai hua

Shrublets densely pulvinate. Cushions 30–70(–120) cm wide. Branchlets very slow growing; branches of current year very short, inconspicuous, with only a few densely appressed leaves. Leaf blade usually pale glaucous, lanceolate to linear, 1.5–4(–5) × 0.6–0.9 mm, subcomplanate in cross section, glabrous, apex acute to obtuse. Inflorescences without a rachis; spikelets (1 or)2 or 3, clustered in leaf axils or at base of current year's branches, 1- or 2-flowered; bracts broadly ovate, ca. 3 mm, glabrous, apex acute; first bractlet 4.5–5 mm, glabrous, apex acute. Calyx 5–6.5 mm, tube sparsely velvety between ribs or glabrescent; limb white or pale rose, glabrous, apically 10-lobed or almost truncate, veins dark purple and not reaching lobe apices. Corolla light red.

Grassy slopes; 2700–4800 m. SW Xinjiang [Afghanistan, Pakistan, Tajikistan].

Acantholimon diapensioides is similar to *A. hedinii* and *A. tianschanicum* but differs by smaller leaves that lack a mucro and smaller calyx with veins not extending to lobe apices.

11. *Acantholimon tianschanicum* Czerniakowska, Trudy Bot. Inst. Acad. Nauk SSSR, Ser. 1, Fl. Sist. Vyss. Rast. 3: 262. 1937.

天山彩花 tian shan cai hua

Shrublets densely pulvinate. Cushions 20–30 cm wide. Branchlets very slow growing; branches of current year very short, inconspicuous, with few densely appressed leaves. Leaf blade usually pale glaucous, lanceolate to linear, 3–7 × 0.8–1.2 mm, very shallowly obdeltate to subcomplanate in cross

section, apex acuminate and conspicuously awned. Inflorescences without a rachis; spikelet 1–3-flowered, borne in leaf axil or at base of current year's branch; bracts broadly ovate, ca. 3 mm, glabrous, apex acute; first bractlet 5–6 mm, glabrous, apex acute. Calyx 7–8 mm, tube sparsely velvety along ribs or glabrescent; limb dark purple, glabrous, obscurely 10-lobed to subtruncate, veins extending to apex. Corolla light purple to light red. Fl. Jun–Sep, fr. Jul–Oct.

Slopes of alpine grasslands; 2000–4000 m. SW Xinjiang [Kyrgyzstan, Tajikistan].

Acantholimon tianschanicum is similar to *A. hedinii*, and its status as a distinct species needs further study.

5. **IKONNIKOVIA** Linczevski in Komarov, Fl. URSS 18: 745. 1952.

伊犁花属 yi li hua shu

Shrublets dwarf. Branches many, thick. Leaves crowded at branch apices, in a rosette. Inflorescences axillary; spikes terminal and axillary or only terminal, densely arranged into 4–11 spikelets; lateral spikes subsessile; bracts longer than first bractlet, margin broadly membranous and wider than herbaceous part, apex rigidly and thickly cuspidate; each flower subtended by a bractlet; first bractlet similar to bracts but slightly shorter. Calyx subtubular; tube upright basally, indistinctly herbaceous along ribs, membranous between ribs; limb scarious and narrowly campanulate, lobes erect. Corolla basally connate, petals patent. Stamens slightly adnate to corolla base. Ovary linear cylindrical, apex attenuate. Styles 5, free, basal half verrucose; stigmas depressed capitate. Capsule linear-oblong.

One species: China and Kazakstan.

1. *Ikonnikovia kaufmanniana* (Regel) Linczevski in Komarov, Fl. URSS 18: 381. 1952.

伊犁花 yi li hua

Statice kaufmanniana Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 6: 300. 1880; *Goniolimon kaufmannianum* (Regel) Voss; *Limonium kaufmannianum* (Regel) Kuntze.

Shrublets herblike, 14–35(–50) cm tall. Branchlets 1–6 (–10) cm, densely covered with persistent petioles. Leaf blade linear-lanceolate, lanceolate, or oblanceolate, 3–7(–10) × 0.6–1.5(–2.5) cm, glaucous and sometimes abaxially purplish, base attenuate into a wide petiole, margin undulate, apex acuminate and stiffly mucronate. Inflorescences 1 or 2 from each rosette, arising from sub-basal leaves; peduncle and

rachis scaly; rachis with a terminal and 1–3 or more lateral spikes, rarely with only 1 terminal spike; lateral spikes axillary from scales, slightly arcuate; spikelets (2 or)3(or 4)-flowered; bracts broadly ovate to elliptic-ovate, 0.9–1.1 cm, apex cuspidate; first bractlet apex with 1 or 2 cusps. Calyx 8–9 mm, pubescent along ribs, tube ca. 1 mm in diam.; limb pale yellow to pale brownish yellow; lobes erect, ca. 2 mm, narrow, apex aristate, sometimes lobulate between lobes, veins never reaching margin. Corolla purple, lobes apically retuse. Fl. Jun–Aug, fr. Jul–Sep.

Lower slopes and base of mountains. Xinjiang (Yili River basin) [Kazakstan].

6. **GONIOLIMON** Boissier in A. de Candolle, Prodr. 12: 632. 1848.

驼舌草属 tuo she cao shu

Herbs perennial. Caudex thickened, ± woody, stems usually many from 1 crown near ground. Leaves crowded on caudex or on branch apices of caudex, in a rosette. Inflorescences usually 1 or 2 from rosette, axillary, 1–3 × branched; spikes on apical part or at apex of rachis branches, composed of 2–13 or more spikelets arranged distichously; spikelet 2–5-flowered; bracts and first bractlet with a membranous margin wider than herbaceous parts, apex rigidly and thickly cuspidate; first bractlet shorter than bracts. Calyx funnellform; tube upright or basally oblique, indistinctly herbaceous along ribs, scarious between ribs; limb white, dry membranous, expanded, apically 5- or 10-lobed. Corolla basally fused, apically free and expanded. Stamens adnate to base of corolla. Ovary oblong to ovoid-oblong, apex acute. Styles 5, free, basal half papillate; stigmas depressed capitate. Capsule oblong to ovoid-oblong.

About 20 species: N Africa, Asia, Europe; four species in China.

- 1a. Spikes compactly crowded into 1 or more capitate or conical inflorescences; calyx lobes often irregularly dentate 4. *G. eximium*
1b. Spikes loosely arranged, never crowded into a terminal capitate inflorescence; calyx lobes entire.
2a. Bracts 3–5 mm; spikelets loosely arranged, ± distinct from each other 3. *G. callicomum*

- 2b. Bracts 7–8 mm; spikelets densely arranged, at least near each other.
 3a. Leaf blade 2.5–6 cm; petiole with a conspicuous wide green margin; branches of rachis distinctly 2- or 3-edged or narrowly-winged 1. *G. speciosum*
 3b. Leaf blade 10–20 cm; petiole without a green margin; branches of rachis terete or slightly compressed, obtusely angled, without wings or edges 2. *G. dschungaricum*

1. *Goniolimon speciosum* (Linnaeus) Boissier in A. de Candolle, Prodr. 12: 634. 1848.

驼舌草 tuo she cao

Herbs 10–50 cm tall. Petiole wide, margin greenish; leaf blade obovate, oblong-obovate, or broadly lanceolate, usually 2.5–6 × ca. 3 cm including petiole, rigid, base attenuate, apex short acuminate to acute. Inflorescences corymbose or paniculate; rachis 2 or 3 (or 4) × branched, conspicuously longitudinally 2- or 3-edged or winged and becoming 2- or 3-angular; spikes with 2–9(–11) spikelets; spikelets ± crowded, 2–5-flowered; bracts broadly ovate to elliptic-obovate, 7–8 mm, apex 1-cuspidate; first bractlet similar to bracts but usually apically 2- or 3-cuspidate. Calyx (6–)7–8 mm, tube ca. 1 mm in diam.; lobes entire, veins dark purple, sometimes yellowish, and never reaching middle of limb. Corolla purple. Fl. Jun–Jul, fr. Jul–Aug.

Nei Mongol, Xinjiang [Kazakhstan, Mongolia, Russia].

- 1a. Inflorescences without a main axis except for peduncle; calyx lobes apically obtuse 1a. var. *speciosum*
 1b. Inflorescences with a main axis; calyx lobes apically short acuminate to acute 1b. var. *strictum*

1a. *Goniolimon speciosum* var. *speciosum*

驼舌草(原变种) tuo she cao (yuan bian zhong)

Statice speciosa Linnaeus, Sp. Pl. 1: 275. 1753; *Limonium speciosum* (Linnaeus) Kuntze.

Inflorescences without a main axis except for peduncle; rachis dichotomously branched; spikes with 5–9(–11) spikelets. Calyx lobes apically obtuse.

Nei Mongol (Hulongbei Plateau), N Xinjiang [Kazakhstan, Mongolia, Russia].

This widespread variety is extremely variable in height, leaf shape, inflorescence type, and bract margin.

1b. *Goniolimon speciosum* var. *strictum* (Regel) Peng, Fl. Reipubl. Popularis Sin. 60(1): 24. 1987.

直杆驼舌草 zhi gan tuo she cao

Statice speciosa var. *stricta* Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 6: 387. 1880; *Goniolimon strictum* (Regel) Linczevski.

Stem ca. 30 cm tall. Inflorescences with main axis, straight, branches slender; spikes with 2–5(–7) loosely arranged spikelets. Calyx lobes apically short acuminate to acute.

* Sunny rocky slopes. Xinjiang (Yili Basin).

2. *Goniolimon dschungaricum* (Regel) O. & B. Fedtschenko, Consp. Fl. Turkest. 5: 179. 1913.

大叶驼舌草 da ye tuo she cao

Statice dschungarica Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 6: 386. 1880; *Goniolimon tarbagataicum* Gamajunova.

Herbs 50–90 cm tall. Petiole without a green margin; leaf blade oblong-lanceolate, broadly lanceolate, or oblanceolate, (6–)10–20(–22) × (2–)3–4(–5) cm including petiole, thin, base attenuate, apex usually acuminate. Inflorescences paniculate, rachis 2 or 3 × branched; branches terete to slightly compressed, obtusely angled, without wings, never conspicuously 2- or 3-angular; spikes with 7–11 densely arranged spikelets; spikelet 3- or 4-flowered; bracts broadly ovate, 7–8 mm, apex 1-cuspidate; first bractlet apically 2- or 3-cuspidate. Calyx 7–8 mm, tube ca. 1 mm in diam.; lobes entire, apex acute, veins dark purple and sometimes yellowish, never reaching middle of limb. Corolla purple. Fl. Jun–Jul, fr. Jul–Aug.

Montane grasslands; 1400–2000 m. NW Xinjiang [Kazakhstan].

3. *Goniolimon callicomum* (C. A. Meyer) Boissier in A. de Candolle, Prodr. 12: 633. 1848.

疏花驼舌草 shu hua tuo she cao

Statice callicoma C. A. Meyer, Mém. Acad. Imp. Sci. St.-Petersbourg, Sér. 6, Sci. Math., Second Pt. Sci. Nat. 4: 212. 1841; *Limonium callicomum* (C. A. Meyer) Kuntze; *S. argentea* Pallas ex Sievers.

Herbs 10–40(–50) cm tall. Petiole margin green; leaf blade usually lanceolate to oblanceolate, (2–)4–10 × 0.5–1 (–1.8) cm including petiole, thin, base attenuate, apex acuminate. Inflorescences paniculate or subcymose, rachis 2 or 3 × branched; branches and branchlets 2- or 3-angular; spikes loosely arranged, each with (3–)5–7 loosely arranged spikelets, ± distinct from each other; spikelets (1 or)2- or 3-flowered; bracts broadly ovate, 3–5 mm, apex cuspidate; first bractlet similar to bract but slightly wider and with apex 2- or 3-cuspidate. Calyx 6.5–7.5 mm, tube ca. 1 mm in diam.; lobes entire, apex short acuminate, veins dark purple and never reaching middle of limb. Corolla light purple. Fl. Jun–Jul, fr. Jul–Aug.

Dry sandy and rocky flats; 400–500 m. NW Xinjiang [Kazakhstan, Mongolia, Russia].

4. *Goniolimon eximium* (Schrenk) Boissier in A. de Candolle, Prodr. 12: 634. 1848.

团花驼舌草 tuan hua tuo she cao

Statice eximia Schrenk in Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 13. 1841; *Goniolimon orthocladum* Ruprecht; *Limonium eximium* (Schrenk) Kuntze; *S. eximia* var. *turkestanica* Regel; *S. speciosa* Linnaeus var. *crispa* Regel.

Herbs 5–70 cm tall. Petiole margin wide, green; leaf blade oblanceolate, lanceolate, or obovate, (3–)5–14(–16) × (0.6–)1–3.5(–5) cm, thin, base attenuate, apex acuminate. Inflorescences capitate or conical, main rachis stout, sometimes with thick crisped wings; branches 1–5, thick, short; spikes with (3–)7–11(–13) spikelets; spikelets 3–5-flowered; bracts ovate-oblong, 8–9 mm, apex cuspidate; first bractlet similar to bract but apex 1–3-cuspidate. Calyx 7–8 mm, tube 1.2–1.5 mm in diam., lobes irregularly dentate, veins purple and reaching to or extending beyond middle of limb. Corolla light purple. Fl. Jun–Aug, fr. Jul–Sep.

Grassy slopes; 1400–2700 m. Xinjiang (Tian Shan to NW Xinjiang) [Kazakstan, Mongolia].

Statice speciosa var. *lepidota* Regel is not included in synonymy because the variety appears to be based on more than one taxon. Collections from the Selimu Lake area may be *Goniolimon speciosum*, but those from Tian Shan may be *G. eximium*.

Further study is needed to determine whether *Goniolimon orthocladum* and *G. eximium* are conspecific or distinct species.

7. LIMONIUM Miller, Gard. Dict. Abr. ed. 4, 4. 1754, nom. cons.

补血草属 bu xue cao shu

Statice Linnaeus.

Herbs or shrublets, stems often suppressed and forming caudex. Leaves alternate, often crowded into sessile rosettes, less often spaced along stems. Inflorescences usually much branched, often flat topped, rarely capitate or spike-like; ultimate branches forming spikes with (1 or)2–13 rarely more distichously arranged spikelets; spikelets 1–5-flowered; bracts distinctly shorter than first bractlet, margin membranous; bractlet margin usually broadly membranous. Calyx funnelform, obconic, or tubular, base straight or oblique, indistinctly herbaceous along ribs, scarious between ribs; limb scarious, inflated, or expanded, apically 5- or 10-lobed. Corolla basally connate, apically free and expanded. Stamens adnate to corolla base. Ovary obovoid, apex acute. Styles 5, free, glabrous; stigmas elongated to filiform, terete. Capsule obovoid.

About 300 species: worldwide; 22 species in China.

Limonium macrorhabdos (Boissier) Kuntze var. *thomsonii* C. B. Clarke was described from W Tibet but may have been collected from Ladakh. Although the taxon occurs near the border with China, no definite records are known from China.

1a. Shrubby; leaves congested on upper parts of stems.

2a. Stems densely covered with dark brown or black rigid scales; leaves without auriform sheaths; inflorescences corymbose 4. *L. wrightii*

2b. Stems covered with lightly colored scarious scales; leaves with 2 auriform membranous sheaths; inflorescences interrupted spicate 22. *L. suffruticosum*

1b. Herbs; leaves only in a basal rosette or basal and along branches.

3a. Calyx not oblique at base, usually 2–3.5 mm but if longer then limb not expanded.

4a. Leaves on main branches of inflorescences clasping, rounded or reniform 18. *L. otolepis*

4b. Leaves on branches not clasping, not rounded nor reniform.

5a. Inflorescences without or only with a few simple sterile branches; first bractlet herbaceous.

6a. Leaf blade 2.5–5 × 1–2 cm; calyx 6.5–7 mm 17. *L. callianthum*

6b. Leaf blade (5–)10–30(–40) × 3–8(–10) cm; calyx to 4 mm 21. *L. gmelinii*

5b. Inflorescences with many branched sterile branches; first bractlet membranous.

7a. Leaves oblong-ovate to oblong-spatulate, 1–3.5 × 0.5–2 cm, early deciduous 19. *L. coralloides*

7b. Leaves spatulate to obovate-spatulate, (5–)10–15(–25) × 2–6(–15) cm, persistent when flowering 20. *L. myrianthum*

3b. Calyx abruptly oblique at base, usually 5–8 mm but even if shorter always funnelform.

8a. Stems 1 (rarely more), erect, apically branched, ultimate branches each with a globose inflorescence; calyx limb without conspicuous lobes 6. *L. flexuosum*

8b. Stems many, erect or prostrate, often branched from base, many branches sterile; calyx limb with well developed lobes.

9a. Calyx limb yellow to orange; corolla golden or orange-yellow.

10a. Sterile branches (2 or)3–5, clustered in axils of membranous scales on node of rachis 16. *L. chrysocomum*

10b. Sterile branches 1 in axils of scales or at forks of inflorescences.

11a. Inflorescences with many dichotomous branches and flexuous rachises.

12a. Peduncle and rachis of inflorescences without clustered hairs 12. *L. aureum*

12b. Peduncle and rachis of inflorescences with dense clustered hairs 13. *L. potaninii*

11b. Inflorescences with straight nonflexuous rachises.

13a. Plants 10–15 cm tall; branches densely verrucose; calyx 5–6 mm 14. *L. dielsianum*

- 13b. Plants 20–40 cm tall; branches smooth or only young branches verrucose; calyx 8–10 cm.
 14a. Sterile branches 2- or 3-branched; spikelets 2 or 3 per spike 11. *L. lacostei*
 14b. Sterile branches very long, many branched; spikelets 5–7 per spike 15. *L. reznitzenkoanum*
- 9b. Calyx limb purple, pink, or white; corolla yellow, rose, pale lilac, or purple-violet.
 15a. Stems prostrate; inflorescences with well-developed bracts on basal forks 7. *L. congestum*
 15b. Stems erect; inflorescences without bracts.
 16a. Caudex with dense white membranous scales; corolla rose-violet or purple-violet.
 17a. First bractlet densely hirsute; root bark fissured into brown fibers 9. *L. tenellum*
 17b. First bractlet glabrous or slightly hirsute; root bark never fissured 10. *L. kaschgaricum*
 16b. Caudex without white membranous scales; corolla yellow, pale lilac, or pale purple.
 18a. Calyx lobes apically distinctly acuminate, with a persistent awn; petiole basally to 2 mm wide 8. *L. leptolobum*
 18b. Calyx lobes never awned; petiole wider than 2 mm.
 19a. Limb less than half as long as calyx 1. *L. sinense*
 19b. Limb half as long as calyx.
 20a. Corolla pale lilac or pale purple 3. *L. franchetii*
 20b. Corolla yellow or pale yellow.
 21a. Spike axis almost complanate 2. *L. bicolor*
 21b. Spike axis terete 5. *L. dichroanthum*

1. *Limonium sinense* (Girard) Kuntze, Revis. Gen. Pl. 2: 396. 1891.

补血草 bu xue cao

Statice sinensis Girard, Ann. Sci. Nat. Bot., sér. 3, 2: 329. 1844; *S. fortunei* Lindley.

Herbs perennial, 15–60 cm tall. Taproot red-brown; bark never peeling. Caudex often thickened; stems many from 1 crown. Leaves basal, persistent to anthesis; petiole wide; leaf blade obovate-oblong, oblong-lanceolate, or lanceolate, 4–12(–22) × 0.4–2.5(–4) cm including petiole, base attenuate, apex usually obtuse to acute. Inflorescences 3–5(–10) from same leaf rosette, ascending to erect, corymbose or paniculate, main axis 4-angular and 4-sulcate; sterile branches few, simple, on basal part or at forks of rachis; spikes with 2–6(–11) spikelets, axis 2-angular; spikelets 2- or 3(or 4)-flowered; bracts ovate, 2–2.5 mm; first bractlet 5–5.5 mm. Calyx funnelform, 5–6(–7) mm; tube ca. 1 mm in diam.; limb white, 2–2.5 mm wide, 3.5–4.5 mm in diam.; lobes apically obtuse to rarely acute. Corolla yellow. Fl. Jun–Nov (N of Chang Jiang) and Apr–Dec (S of Chang Jiang).

Wet sandy and salty shales adjacent to the ocean. Fujian, Guangdong, Guangxi, Hebei, Jiangsu, Liaoning, Shandong, Taiwan, Zhejiang [Japan (Ryukyu Islands), Vietnam].

2. *Limonium bicolor* (Bunge) Kuntze, Revis. Gen. Pl. 2: 395. 1891.

二色补血草 er se bu xue cao

Statice bicolor Bunge, Enum. Pl. China Bor. 55. 1833; *S. bungeana* Boissier; *S. florida* Kitagawa; *S. sinensium* Gandoger; *S. varia* Hance.

Herbs perennial, 20–50 cm tall. Taproot red-brown to dark brown; bark unbroken. Caudex simple or 2–4-branched, covered with persistent petioles. Leaves basal, rarely 1–3 along

axis of inflorescences, usually conspicuous to anthesis; petiole wide; leaf blade spatulate to oblong-spatulate, 3–15 × 0.3–3 cm including petiole, base attenuate, apex ± rounded. Inflorescences solitary or 2–5, each from a different leaf rosette, paniculate; main axis usually 3- or 4-angular, sometimes sulcate, or rarely cylindrical at base; sterile branches usually simple, on basal part or at forks of rachis; spikes with 3–5(–9) spikelets, axis 2-angular; spikelets 2- or 3(–5)-flowered; bracts oblong-ovate, 2.5–3.5 mm, herbaceous part ovate to oblong; first bractlet 6–6.5 mm. Calyx funnelform, 6–7 mm; tube ca. 1 mm in diam.; limb pink to pale purple, becoming white, 3–3.5 mm in diam., 6–7 mm in diam. in apical flowers; lobes short and wide, apex rounded to rarely fugaciously soft awned. Corolla yellow. Fl. May–Jul, fr. Jun–Aug.

Calcareous or sandy soil. Gansu, Hebei, Heilongjiang, N Henan, N Jiangsu, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi [Mongolia].

3. *Limonium franchetii* (Debeaux) Kuntze, Revis. Gen. Pl. 2: 395. 1891.

烟台补血草 yan tai bu xue cao

Statice franchetii Debeaux, Acta Soc. Linn. Bordeaux 31: 348. 1876; *Limonium subviolaceum* Q. Z. Han & S. D. Zhao; *L. teretiscaposum* S. D. Zhao; *S. tchefouensis* Gandoger.

Herbs perennial, 25–60 cm tall. Taproot often thick, red-brown to black-brown; bark unbroken. Caudex thickened, simple or rarely 2- or 3(–6)-branched, densely covered with persistent petioles. Leaves basal, occasionally 1–6 on basal part of main axis of inflorescences, persistent to anthesis; petiole broad; leaf blade obovate-oblong to oblong-lanceolate including petiole, 3–6(–15) × 1–2(–3) cm, base attenuate, apex rounded to obtuse. Inflorescences corymbose or paniculate; main axis usually simple, rarely 2 or 3(–6), stout, cylindrical,

without angles and grooves; sterile branches few, usually simple, on basal part and at forks of rachis; spikes with (3–)5–7 spikelets; spikelets 2- or 3-flowered; bracts obovate, 3.5–4.5 mm, usually curved and apically 2- or 3-lobed after anthesis, herbaceous part obovate to obovate-spatulate; first bractlet 7–8 mm. Calyx funnelform, 7–8 mm; tube ca. 1.5 mm in diam.; limb pale purple, becoming white, 3.5–4 mm wide, 7–8 mm in diam.; lobes wide and short, apex rounded and usually fugaciously aristate. Corolla pale lilac to pale purple. Fl. May–Jul, fr. Jun–Aug.

* Sandy slopes around seashores. N Jiangsu, S Liaoning, E Shandong.

4. *Limonium wrightii* (Hance) Kuntze, Revis. Gen. Pl. 2: 396. 1891.

海芙蓉 hai fu rong

Shrublets herblike. Stems and branches thick, usually 10–15 cm tall; old branches densely covered with dark brown to black scales from persistent petiole bases. Leaves clustered on apical parts of young branches; petiole basally enlarged, nearly clasping; leaf blade oblanceolate to spatulate-oblong, 2–4 cm × 4–7 mm including petiole, fleshy, base attenuate, apex rounded. Inflorescences axillary, 7–16 cm, corymbose, rachis 2 or 3-dichotomously branched; sterile branches often on basal part of rachis; spikes with 5–11 spikelets; spikelets 2–4-flowered; bracts broadly ovate, 2–2.5 mm, apex acute; first bractlet broadly elliptic, ca. 5 mm, apex rounded. Calyx funnelform, 5–6 mm; tube ca. 1 mm in diam.; limb usually plicate and slightly extended, lobes apically triangular. Fl. Aug–Sep, fr. Sep–Oct.

Taiwan [Japan].

1a. Calyx limb white; corolla pale purple 4a. var. *wrightii*
1b. Calyx limb pale yellow; corolla yellow . 4b. var. *luteum*

4a. *Limonium wrightii* var. *wrightii*

海芙蓉 (原变种) hai fu rong (yuan bian zhong)

Statice wrightii Hance, Ann. Sci. Nat. Bot., sér. 5, 5: 236. 1866; *Limonium arbusculum* (Maximowicz) Makino; *L. wrightii* var. *roseum* H. Hara; *S. arbuscula* Maximowicz.

Calyx limb white. Corolla pale purple.

In rock clefts along seashore. Taiwan [Japan].

Medicinal.

4b. *Limonium wrightii* var. *luteum* (H. Hara) H. Hara, Enum. Spermatoph. Jap. 1: 99. 1948.

黄花海芙蓉 huang hua hai fu rong

Limonium arbusculum (Maximowicz) Makino var. *luteum* H. Hara, J. Jap. Bot. 21: 19. 1947.

Calyx limb pale yellow. Corolla yellow.

In rock clefts along seashore. Taiwan [Japan].

5. *Limonium dichroanthum* (Ruprecht) Ikonnikov-Galitzky ex Linczevski in Komarov, Fl. URSS 18: 428. 1952.

淡花补血草 dan hua bu xue cao

Statice dichroantha Ruprecht, M. Acad. Imp. Sci. Saint P. ersbourg, Sér. 7, 14(4): 69. 1869.

Herbs perennial, 20–70 cm tall, glabrous except for bractlets and calyces. Stems 2–8, straight, subterete, dichotomously branched at base; branches flexuous, terete. Leaves all basal; leaf blade oblong to oblong-spatulate, 2–4 × 0.8–1.0 cm, glaucous. Inflorescences corymbose, with few sterile branches; spikes 2 or 3, dense, on apical part of stem, with 5–11 spikelets; spikelets 4–7(–11)-flowered; bracts obovate, 3–4 mm, glabrous or slightly pubescent, margin scarios; first bractlet membranous, pubescent. Pedicel 1–1.5 mm. Calyx white to pale yellow, funnelform, 5–7 mm, densely pubescent; lobes short triangular, apex awned. Corolla yellow. Fl. Jul, fr. Jul–Aug.

Dry slopes. W Xinjiang [Kyrgyzstan].

6. *Limonium flexuosum* (Linnaeus) Kuntze, Revis. Gen. Pl. 2: 395. 1891.

曲枝补血草 qu zhi bu xue cao

Statice flexuosa Linnaeus, Sp. Pl. 1: 276. 1753.

Herbs perennial, 10–30(–45) cm tall. Taproot red-brown to black-brown; bark unbroken. Caudex slightly thickened. Leaves basal and 1–5 on main axis of inflorescences, persistent at anthesis; petiole broad; leaf blade oblong-oblanceolate, obovate-oblong, or sometimes lanceolate, (2–)4–7(–12) × 0.5–1.3(–2) cm including petiole, base attenuate, apex acute to obtuse. Inflorescences usually solitary, corymbose or paniculate forming a capitulum; rachis 2–4 × branched, without or with very few simple sterile branches, apical part of main axis obtusely angular; spikes 2 or 3 clustered on apex of branch, each with 7–9(–13) spikelets; spikelets 2- or 3-flowered; bracts broadly ovate, 2.5–3.5 mm, herbaceous part ovate to oblong; first bractlet 4.5–5 mm. Calyx funnelform, 5–6 mm; tube ca. 1 mm in diam.; limb white, usually plicate, 3–4 mm in diam.; lobes indistinct. Corolla pale purple. Fl. Jun–Aug, fr. Jul–Aug.

Grasslands; 600–700 m. NE Nei Mongol [Mongolia, Russia (E Siberia)].

7. *Limonium congestum* (Ledebour) Kuntze, Revis. Gen. Pl. 2: 395. 1891.

密花补血草 mi hua bu xue cao

Statice congesta Ledebour, Fl. Altaic. 1: 437. 1829.

Herbs perennial, 5–20 cm tall. Taproot slender. Caudex absent. Basal leaves many; petiole as long as blade; leaf blade oblong-ovate to lanceolate, (0.5–)1–4 cm × (3–)5–10 mm, base attenuate, apex rounded to short acute. Inflorescences 5–25; peduncle prostrate; branches basal, angulate, basal forks with 1 or 2 leaves; spikes dense, distichous, with 10–20 spikelets; spikelets 2–5-flowered; bracts to 2 mm, broadly obovate; first bractlet ca. 4 mm, broadly membranous at apex. Calyx funnelform, 3–4.5 mm; tube pubescent; limb white, rose, or rose-purple, lobes acute. Corolla pale yellow. Fl. Jun–Jul, fr. Jul–Aug.

Gravel slopes and sand dunes; 2300–2700 m. NW Xinjiang (Altay Shan) [Mongolia, Russia].

8. *Limonium leptolobum* (Regel) Kuntze, Revis. Gen. Pl. 2: 395. 1891.

精河补血草 jing he bu xue cao

Statice leptoloba Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 6: 385. 1880; *S. leptoloba* var. *subaphylla* Regel.

Herbs perennial, 20–45 cm tall. Taproot red-brown; bark unbroken. Caudex enlarged with age. Leaves basal, persistent to anthesis; petiole slender, basally 0.5–2 mm wide; leaf blade spatulate to lanceolate-obovate, (1.2–)2–6 × 0.5–1.5 cm including petiole, base attenuate, apex obtuse to rounded. Inflorescences 2–15, corymbose forming a capitulum; rachis dichotomously 4–6 × branched; sterile branches few, simple; spikes short, 2 or 3 clustered on apical part of branch, each spike with 3–7(–9) spikelets; spikelets 2- or 3(or 4)-flowered; bracts ovate to obovate, 2.5–3 mm; first bractlet 5.5–6 mm. Calyx funnelform, 6.5–8 mm; tube ca. 1 mm in diam.; limb pale purple to pink, becoming white; lobes apically plicate and acuminate, rarely extended and obtuse, with a persistent arista. Corolla yellow. Fl. May–Jul, fr. Jul–Aug.

Semideserts and hilly areas; 300–1200 m. N Xinjiang [Kazakhstan].

Limonium michelsonii Linczevski, which is probably a hybrid between *L. leptolobum* and *L. hoeltzeri* (Regel) Ikonnikov-Galitzky, may also occur in China.

9. *Limonium tenellum* (Turczaninow) Kuntze, Revis. Gen. Pl. 2: 396. 1891.

细枝补血草 xi zhi bu xue cao

Statice tenella Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 5: 203. 1832.

Herbs perennial, 5–30 cm tall. Taproot dark brown, thick; bark broken and peeling off, exposing inner brown fibers. Caudex woody, thickened, divergent stems many from 1 crown, densely covered with white membranous scales and persistent petiole bases. Leaves small, basal, persistent to anthesis; petiole slender; leaf blade spatulate, oblong-spatulate, or linear-lanceolate, 0.5–1.5 cm × 1–3.5 mm including petiole, base attenuate, apex rounded to obtuse. Inflorescences usually numerous, arising from different leaf rosettes, corymbose, main axis slender; rachis 4–7 × dichotomously branched, flexuous, with most branches sterile; spikes terminal on some branches, with (1 or)2–4 spikelets; spikelets 2- or 3(or 4)-flowered; bracts broadly ovate, 1.5–3 mm; first bractlet 6–7 mm, densely hirsute when young, glabrescent. Calyx funnelform, 8–9 mm; tube 1–1.3 mm in diam.; limb pale purple, becoming white when dry; lobes apically obtuse to acute. Corolla pale purple. Fl. May–Jul, fr. Jul–Aug(–Sep).

Desert grasslands; 800–1200 m. Nei Mongol, Ningxia [Mongolia].

10. *Limonium kaschgaricum* (Ruprecht) Ikonnikov-Galitzky, Trudy Bot. Inst. Akad. Nauk SSSR. Ser. 1, Fl. Sist. Vyss. Rast. 2: 255. 1936.

喀什补血草 ka shi bu xue cao

Statice kaschgarica Ruprecht, Mem. Acad. Imp. Sci. Saint P 闾 ersbourg, S 闾 . 7, 14(4): 69. 1869.

Herbs perennial, (5–)10–25 cm tall. Taproot stout, dark brown; bark unbroken. Caudex woody, thickened; stems many, compact from 1 crown, densely covered with white membranous scales and persistent petiole bases. Leaves basal, persistent to anthesis; petiole narrow; leaf blade oblong-spatulate, oblong-oblancheolate, or sometimes linear-lanceolate, 1–2.5 cm × (1–)2–6 mm including petiole, base attenuate, apex rounded to acuminate. Inflorescences usually numerous, arising from different leaf rosettes, corymbose; rachis 4–7 × dichotomously branched, flexuous, with most branches sterile; spikes terminal on branchlets, with 3–5(–7) spikelets; spikelets 2- or 3-flowered; bracts broadly ovate (1–)2–3 mm; first bractlet 5.5–6.5 mm, glabrous or slightly minutely hispid. Calyx funnelform, 6–8.5(–10.5) mm; tube 1–1.3 mm in diam.; limb pale purple, becoming white when dry; lobes apically acute. Corolla pale purple-red. Fl. Jun–Jul, fr. Jul–Aug.

Deserts; 1300–3000 m. SW Xinjiang [Kyrgyzstan].

Limonium kaschgaricum may be represented in China by both var. *kaschgaricum* and var. *hoeltzeri* (Regel) R. Kamelin. The latter occurs in E Tian Shan of Kyrgyzstan.

11. *Limonium lacostei* (Danguy) Kamelin, Novon 3: 261. 1993.

灰杆补血草 hui gan bu xue cao

Statice lacostei Danguy, J. Bot. (Morot), sér. 2, 1(3): 53. 1908; *Limonium roborowskii* Ikonnikov-Galitzky.

Herbs perennial, 20–40 cm tall. Taproot stout, dark brown. Caudex thickened, dichotomously branched; branches thick, subterete to complanate, densely covered with white membranous scales and persistent petiole bases. Leaves in fascicles at branch apex, usually withered by anthesis; petiole narrow; leaf blade spatulate, obovate-spatulate, or oblong-ovate, (0.7–)1–1.5(–2.5) cm × 2–4(–6) mm, base attenuate, apex obtuse to acute. Inflorescences grayish green, 1 per leaf rosette, corymbose, main axis rigid and erect, complanate to 2 edged; rachis 2–4 × branched, with most branches sterile, apical young branches verrucose; spikes terminal, solitary, with (1 or)2 or 3 spikelets; spikelets 2- or 3-flowered; bracts ovate, 2.5–3 mm; first bractlet 7.5–8.5(–9) mm. Calyx funnelform, (8–)8.5–9.5(–10) mm; tube ca. 1 mm in diam.; limb yellow with reddish and pubescent veins; lobes apically acute. Corolla yellow to orange-yellow. Fl. Jun–Jul, fr. Jul–Aug.

Gravel deserts on mountain slopes, alluvial fans on rocky slopes; 1300–1700(–4000) m. SW Xinjiang, NW Xizang [Kashmir, Pakistan].

12. *Limonium aureum* (Linnaeus) Hill, Veg. Syst. 12: 37. 1767.

黄花补血草 huang hua bu xue cao

Statice aurea Linnaeus, Sp. Pl. 1: 276. 1753; *Limonium erythrorrhizum* Ikonnikov-Galitzky ex Linczevski.

Herbs perennial, 4–25(–30) cm tall, glabrous. Taproot red-brown to dark brown; bark unbroken. Caudex thickened, usually enlarged and woody with age, becoming many headed, usually covered with red-brown scales and persistent petioles. Leaves basal, rarely 1 or 2 along basal part of peduncle, usually withering by anthesis; petiole narrow; leaf blade oblong-lanceolate to oblanceolate, 1.5–3(–5) cm × 2–5(–15) mm including petiole, base attenuate, apex rounded, obtuse, or rarely acute. Inflorescences 2 to several, arising from different rosettes, paniculate; rachis usually 4–7 × dichotomously branched, flexuous, often densely verrucose, with basal branches sterile; spikes terminal on apical branches, with 3–5(–7) spikelets; spikelets 2- or 3-flowered; bracts broadly ovate, 2.5–3.5 mm; first bractlet 5.5–6 mm. Calyx funnellform, 5.5–6 mm; tube ca. 1 mm in diam.; limb golden to orange-yellow; lobes usually with projecting veins, awned to mucronate. Corolla orange. Fl. Jun–Aug, fr. Jul–Aug.

C Gansu, Nei Mongol, Ningxia, N Shaanxi, Shanxi [Mongolia, Russia (E Siberia)].

13. *Limonium potaninii* Ikonnikov-Galitzky, Trudy Bot. Inst. Akad. Nauk SSSR, Ser. 1, Fl. Sist. Vyss. Rast. 2: 256. 1936.

星毛补血草 xing mao bu xue cao

Limonium aureum (Linnaeus) Hill var. *potaninii* (Ikonnikov-Galitzky) Peng.

Herbs perennial, 25–40 cm tall, densely pubescent and with clusters of stellate hairs on peduncles and rachises. Stems many, base dichotomously branched and covered with brown scales. Leaves basal; leaf blade oblong-obovate to oblong-spatulate, 2–3 cm × 8–10 mm, apex subrounded with a short awn. Inflorescences several; rachis dichotomously branched, densely verrucose and with stellate hairs, with many sterile branches and triangular scales on base of branchlets. Spikes terminal, with 5–7(–9) spikelets; spikelets 2- or 3-flowered; bracts rounded, to 3 mm, scarios, pubescent; first bractlet 5–6 mm, scarios, glabrous or pubescent, margin broadly membranous. Calyx funnellform, 6.5–7 mm; tube densely pubescent; limb pale yellow to golden; lobes short, apex obtuse, emarginate, and without an awn or mucro. Corolla orange-yellow. Fl. Jul–Aug, fr. Aug.

* Loess slopes and sandy places; 1700–3000 m. C and SW Gansu, E Qinghai, N Sichuan.

14. *Limonium dielsianum* (Wangerin) Kamelin, Novon 3: 261. 1993.

八龙补血草 ba long bu xue cao

Statice dielsiana Wangerin, Repert. Spec. Nov. Regni Veg. 17: 399. 1921; *Limonium aureum* Linnaeus var. *dielsianum* (Wangerin) Peng.

Herbs perennial, 10–20 cm tall. Stems several, flexuous, base branched and covered with brown scales. Leaves basal; leaf blade spatulate, apex rounded, with a short awn. Inflorescences several; rachis dichotomously branched, thick, mostly straight, glabrous but verrucose near apices; spikes terminal, with several spikelets; spikelets 2-flowered;

bracts ovate, to 2.5 mm, scarios, glabrous; first bractlet subrounded, to 5.5 mm, margin broadly membranous. Calyx funnellform, 8–8.5 mm; tube densely pubescent; limb sulfurous; lobes broadly triangular, apex long awned. Corolla yellow. Fl. Jul, fr. Aug.

* Dry gravel flats and slopes. W Gansu, Qinghai.

15. *Limonium reznitzenkoanum* Linczevski in Komarov, Fl. URSS 18: 434. 1952.

新疆补血草 xin jiang bu xue cao

Herbs perennial, to 40 cm tall. Caudex woody, thick, with many heads, densely covered with persistent petiole bases. Leaves all basal, many; petiole 2 × or more as long as blade; leaf blade oblong-spatulate, 3–6 cm × 4–6 mm, base attenuate, apex rounded, with a short acumen. Inflorescences 10–12, straight, base many branched; sterile branches many, long, with many branchlets; spikes 2 or 3, capitate at apex, with 5–7 spikelets; spikelets 2–4-flowered; bracts broadly ovate, 3–4 mm, glabrous; first bractlet lemon yellow, to 1–1.2 cm, membranous except at base, glabrous. Calyx funnellform, ca. 1 cm; tube densely pubescent; limb lemon-yellow, lobes acute. Corolla orange-yellow. Fl. Jul.

Rocky slopes. NW Xinjiang [Kazakstan (Saur Mts.)].

16. *Limonium chrysocomum* (Karelin & Kirilov) Kuntze, Revis. Gen. Pl. 2: 395. 1891.

簇枝补血草 cu zhi bu xue cao

Herbs perennial. Taproot thick, grayish brown to dark brown; bark sometimes broken, with exposed red-brown fibers. Caudex thickened, woody, with short-clumped woody branches; branches densely covered with white membranous scales and persistent petioles, with 1 terminal bud or several buds and many heads. Leaf blade linear-lanceolate to oblong-spatulate, 1–1.5(–2.5) cm × 1–4 mm including petiole, base attenuate, apex acuminate, obtuse, or rounded. Inflorescences capitate to spicate-capitate, unbranched, 1 borne on every leaf rosette; peduncle and rachis simple, flexuous to straight, ± verrucose or not verrucose, nodes with a narrowly triangular to linear-triangular white membranous scale; sterile branches axillary in scales, needlelike, straight or curved, usually simple or rarely short branched, hidden or exposed; spikes (1 or)2 or 3, crowded, terminal, with (1 or)2–10 spikelets; spikelets (1 or)2–5(–10)-flowered; bracts ovate, (2–)4–5 mm; first bractlet 8–10(–12) mm. Calyx funnellform; limb fleshy yellow, lobes apically acuminate to obtuse. Corolla orange. Fl. Jun–Jul, fr. Jul–Aug.

Xinjiang [Kazakstan, Mongolia, Russia].

Limonium chrysocomum is a variable species that has been variously interpreted. Peng (Fl. Reipubl. Popularis Sin. 60(1): 39–40. 1987) recognized four varieties (*chrysocephalum*, *chrysocomum*, *sedoides*, and *semenovii*). Kamelin (Novon 3: 261–262. 1993) recognized two subspecies with subsp. *chrysocomum* having three varieties (*chrysocomum*, *chrysocephalum*, and *sedoides*). Grubov (Novon 4: 31. 1994) treats *L. semenovii* as a separate species with two varieties (*chrysocephalum* and *sedoides*).

1a. First bractlet glabrous or partly covered

with hairs ca. 0.5 mm; main axis or sterile branches verrucose 16a. subsp. *chrysocomum*
1b. First bractlet densely covered with hairs to ca. 1 mm; main axis and sterile branches not verrucose 16b. subsp. *semenovii*

16a. *Limonium chrysocomum* subsp. *chrysocomum*

簇枝补血草(原变种) cu zhi bu xue cao (yuan bian zhong)

Statice chrysocoma Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 429. 1842; *Limonium chrysocomum* var. *chrysocephalum* (Regel) Peng; *L. chrysocomum* var. *pubescens* Linczevski; *L. chrysocomum* var. *sedoides* (Regel) Peng; *L. sedoides* (Regel) Kuntze; *L. semenovii* (Herder) Kuntze var. *chrysocephalum* (Regel) Grubov; *L. semenovii* var. *sedoides* (Regel) Grubov; *S. chrysocephala* Regel; *S. schrenkiana* Fischer & C. A. Meyer; *S. sedoides* Regel.

Main axis of inflorescences 2–20(–25) cm tall, ± verrucose, internodes 0.5–2 cm; sterile branches 0.1–1.5(–3) cm, shorter than scales to 6 × length of scales, patent, slender, straight, simple or short branched, often verrucose; bracts and first bractlet glabrous or partly minutely hispid with hairs ca. 0.5 mm. Calyx 5–12 mm; tube ca. 1.5 mm in diam.

Rocky slopes. N and NW Xinjiang [Kazakstan, Mongolia, Russia].

16b. *Limonium chrysocomum* subsp. *semenovii* (Herder) Kamelin, Novon 3: 261. 1963.

大簇补血草 da cu bu xue cao

Statice semenovii Herder in Herder & Regel, Bull. Soc. Imp. Naturalistes Moscou 41(1): 398. 1868; *Limonium chrysocomum* var. *semenovii* (Herder) Peng; *L. semenovii* (Herder) Kuntze.

Main axis of inflorescences 20–40 cm tall, not verrucose, internodes 2–4 cm; sterile branches (1–)2–3.5(–5.5) cm, usually 4–7 × scale length or more, patent, straight or curved, simple or short branched; bracts and first bractlet densely minutely hispid, hairs ca. 1 mm, rarely glabrous. Calyx 8.5–11 mm; tube ca. 1.3 mm in diam.

Rocky hills and slopes. Xinjiang [Kazakstan, Mongolia].

17. *Limonium callianthum* (Peng) Kamelin, Novon 3: 262. 1993.

美花补血草 mei hua bu xue cao

Limonium drepanostachyum Ikonnikov-Galitzky subsp. *callianthum* Peng, Guihaia 3: 292. 1983.

Herbs perennial, 30–40 cm tall. Taproot red-brown. Caudex thickened, densely covered with persistent petiole bases. Leaves basal; leaf blade obovate-spatulate to spatulate, 2.5–5 × 1–2 cm including petiole, base attenuate, apex rounded to obtuse. Inflorescences usually solitary, paniculate; rachis terete, generally 3–5 × branched, without or with few sterile branches; spike 1, terminal, with (2–)5–8(–10) spikelets; spikelets 2–4-flowered; bracts broadly ovate, 1.5–2.5 mm, glabrous; first bractlet oblong ovate, 4.5–5.5 mm, glabrescent to partly pubescent.

Calyx tubular-campanulate, 6.5–7 mm, densely pilose; tube ca. 1.3 mm in diam.; limb pale grayish purple to nearly white, lobes minute, veins dark purple. Corolla blue-purple. Fl. Jul–Sep, fr. Aug–Sep.

* Base of mountains at low altitude. SW Xinjiang.

18. *Limonium otolepis* (Schrenk) Kuntze, Revis. Gen. Pl. 2: 396. 1891.

耳叶补血草 er ye bu xue cao

Statice otolepis Schrenk, Bull. Cl. Phys.-Math. Acad. Sci. Saint-Petersbourg 1: 362. 1843.

Herbs perennial, 30–90(–120) cm tall. Rhizomes dark red-brown, apical part usually erect and becoming a thickened caudex. Leaves basal and on inflorescence, withered by anthesis, basal ones with a narrow petiole; leaf blade obovate-spatulate, 3–6(–8) × 1–2(–3) cm including petiole, base attenuate, apex obtuse to rounded; other leaves sessile, broadly ovate to reniform, base clasping, leaving ringlike scars after abscising. Inflorescences 1 or several from different leaf rosettes; rachis 4–7 × branched; branchlets slender, numerous, basal ones sterile; spikes arranged along apical part and terminal on slender branches, with 2–5(–7) spikelets; spikelets 1(or 2)-flowered; bracts broadly ovate, ca. 1 mm, membranous except base; first bractlet ca. 2 mm. Calyx obconical, 2.2–2.5 mm; tube glabrous or slightly pubescent along 1 side; limb white. Corolla pale blue-purple. Fl. Jun–Jul, fr. Jul–Aug.

Saline soil; 300–1400 m. Gansu, N Xinjiang [N Afghanistan, Kazakstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

19. *Limonium coralloides* (Tausch) Linczevski in Komarov, Fl. URSS 18: 451. 1952.

珊瑚补血草 shan hu bu xue cao

Statice coralloides Tausch, Syll. Pl. Nov. 2: 255. 1828; *Limonium decipiens* (Ledebour) Kuntze; *S. aphylla* Poirlet; *S. decipiens* Ledebour.

Herbs perennial, 25–50 cm tall. Caudex woody, many headed. Leaves basal, usually withered by anthesis; petiole wide; leaf blade oblong-obovate to oblong-spatulate, 1–3.5 × 0.5–2 cm including petiole, base attenuate, apex usually rounded. Inflorescences often numerous, arising from different leaf rosettes, large, paniculate; rachis 5–7 × branched, with sterile basal branches; branchlets slender, short, numerous, densely verrucose; verrucae with apically clustered hairs when young, later glabrescent and foveolate; spikes arranged on apical or terminal part of branchlets, with 3–5(–7) spikelets loosely arranged; spikelets 1(or 2)-flowered; bracts broadly ovate to subrounded, ca. 1 mm, membranous at least on apical half; first bractlet ca. 2 mm. Calyx obconical to almost narrowly funnelform, 2.5–3 mm; tube densely pubescent; limb white. Corolla pale blue-purple. Fl. Jul–Aug, fr. Aug–Sep.

Saline sandy soil, river banks; 500–1200 m. Xinjiang (Altay Shan) [Kazakstan, Mongolia, Russia (Siberia)].

20. *Limonium myrianthum* (Schrenk) Kuntze, Revis. Gen. Pl. 2: 395. 1891.

繁枝补血草 fan zhi bu xue cao

Statice myriantha Schrenk in Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 14. 1841; *S. latissima* Karelin & Kirilov.

Herbs perennial, 40–100 cm tall. Caudex woody, with many rosettes. Leaves thickened, hard, persistent to anthesis; petiole long, both sides sometimes involute; leaf blade spatulate to obovate-spatulate, (5–)10–15(–25) × 2–6(–15) cm including petiole, base abruptly constricted, cuneate, apex usually truncate to rounded. Inflorescences paniculate, main axis terete, rachis 3–5 × branched, basal branches sterile; spikes arranged on apical part of branchlets, with 3–7(–9) spikelets; spikelets 1(or 2)-flowered; bracts broadly ovate to subrounded, ca. 1 mm, apical half or more membranous; bractlets slender, numerous, polished or verrucose, verrucae sometimes apically with white clustered hairs, first bractlet ca. 2 mm. Calyx narrowly funnellform, pubescent along outer ribs or sometimes glabrous; limb white. Corolla pale blue-purple. Fl. Jun–Aug, fr. Jul–Aug.

Saline wastelands, lake shores; 400–1100 m. N Xinjiang [Kazakstan, Kyrgyzstan, Mongolia].

21. *Limonium gmelinii* (Willdenow) Kuntze, Revis. Gen. Pl. 2: 395. 1891.

大叶补血草 da ye bu xue cao

Statice gmelinii Willdenow, Sp. Pl. 1: 1524. 1798; *Limonium pycnanthum* (K. Koch) Kuntze; *S. glauca* Willdenow ex Schultes; *S. gmelinii* var. *scoparia* (Pallas ex Willdenow) Schmalhausen; *S. pycnantha* K. Koch; *S. scoparia* Pallas ex Willdenow.

Herbs perennial, 30–70(–100) cm tall. Taproot stout, dark purplish brown. Caudex thickened, with 1–3 heads, densely covered with persistent petiole bases. Leaves basal, hard, persistent to anthesis; petiole distinct; leaf blade oblong-obovate, elliptic, or ovate, (5–)10–30(–40) × 3–8(–10) cm including petiole, base attenuate, apex usually obtuse to rounded. Inflorescences usually solitary, large, corymbiform

or paniculate; main axis cylindrical, polished; rachis 3 or 4 × branched; branchlets slender, erect; sterile branches usually absent or simple and solitary on forks; spikes with 2–7 spikelets, densely clustered on upper part of branchlets; spikelets 1- or 2(or 3)-flowered; bracts broadly ovate, 1–1.5 mm, margin narrowly membranous; first bractlet 2–2.5 mm, margin membranous. Calyx obconical; tube basally and adaxially pubescent along ribs; limb pale purple or white. Corolla blue-purple. Fl. Jul–Sep, fr. Aug–Sep. $2n = 18$.

Saline wastelands. N Xinjiang [Kazakstan, Kyrgyzstan, Mongolia, Russia; Europe].

22. *Limonium suffruticosum* (Linnaeus) Kuntze, Revis. Gen. Pl. 2: 396. 1891.

木本补血草 mu ben bu xue cao

Statice suffruticosa Linnaeus, Sp. Pl. 1: 276. 1753.

Shrublets dwarf, caespitose. Branches growing 1–3.5(–8) cm per year, old ones covered with persistent membranous sheaths. Leaves fleshy; petiole slender, base expanded, nearly clasping, becoming marginally membranous sheath with 2 erect and 1 auriculate scale; leaf blade oblong-spatulate to lanceolate-spatulate, 1–4.5(–7) cm × 2–7(–10) mm including petiole, base attenuate, apex rounded. Inflorescences axillary on young branches, 5–35 cm; peduncle and rachis cylindrical; rachis 1 or 2 × branched, without sterile branches; spikes (1 or 2) or 3, clustered or capitate, arranged on nodes or terminal on rachis branches, with 2–5(–7) spikelets; spikelets 2- or 3(–5)-flowered; bracts broadly ovate, 1–1.5 mm, glabrous; first bractlet broadly ovate to subrounded, 2–3 mm, glabrous. Calyx obconical, 3–4 mm; tube ± pubescent or glabrous; limb white. Corolla pale purple to blue-purple. Fl. Aug–Oct, fr. Sep–Oct. $2n = 18$.

Saline soils; 400–1300 m. N Xinjiang [Afghanistan, Kazakstan, Kyrgyzstan, SW Mongolia, Russia, Uzbekistan; SW Asia, Europe].