

## AMARANTHACEAE

苋科 xian ke

Bao Bojian (包伯坚)<sup>1</sup>; Steven E. Clemants<sup>2</sup>, Thomas Borsch<sup>3</sup>

Herbs, clambering subshrubs, shrubs, or lianas. Leaves alternate or opposite, entire, exstipulate. Flowers small, bisexual or unisexual, or sterile and reduced, subtended by 1 membranous bract and 2 bracteoles, solitary or aggregated in cymes. Inflorescences elongated or condensed spikes (heads), racemes, or thyrsoid structures of varying complexity. Bracteoles membranous or scarious. Tepals 3–5, membranous, scarious or subleathery, 1-, 3-, 5-, or 7(–23)-veined. Stamens as many as tepals and opposite these, rarely fewer than tepals; filaments free, united into a cup at base or ± entirely into a tube, filament lobes present or absent, pseudostaminodes present or absent; anthers (1- or)2-loculed, dorsifixed, introrsely dehiscent. Ovary superior, 1-loculed; ovules 1 to many; style persistent, short and indistinct or long and slender; stigma capitate, penicillate, 2-lobed or forming 2 filiform branches. Fruit a dry utricle or a fleshy capsule, indehiscent, irregularly bursting, or circumscissile. Seeds lenticular, reniform, subglobose, or shortly cylindrical, smooth or verruculose.

About 70 genera and 900 species: worldwide; 15 genera (one introduced) and 44 species (three endemic, 14 introduced) in China.

Morphology of the androecium, perianth (tepals), and the inflorescence has traditionally been used to circumscribe genera and tribes. Pseudostaminodia are interstaminal appendages with variously shaped apices. Filament appendages are the lateral appendages of filaments (one on each side). The basic structure of the inflorescence is the cyme (branchlets arising from the bracteole axils, the bracteoles serving as bracts for upper flowers), which can be reduced to one flower with two bracteoles and a bract. Units of dispersal vary considerably (capsules opening with lower part persistent, flower and bracteoles falling together, or cymose partial inflorescences breaking off above bract) and can be characteristic for genera. Several genera possess long trichomes serving dispersal at the base of the tepals.

*Digera arvensis* Forsskål (Fl. Aegypt.-Arab. 65. 1775) has been reported from Anhui. However, we have seen no specimens and are therefore unable to treat it in this account.

Kuan Ke-chien. 1979. Amaranthaceae. In: Kung Hsien-wu & T sien Cho-po, eds., Fl. Reipubl. Popularis Sin. 25(2): 194–241.

- 1a. Leaves alternate.
  - 2a. Ovary with 2 to many ovules.
    - 3a. Fruit a red berry, indehiscent ..... 1. *Deeringia*
    - 3b. Fruit a utricle or capsule, dehiscent by a lid ..... 2. *Celosia*
  - 2b. Ovary with 1 ovule.
    - 4a. Flowers bisexual; inflorescences heads; filaments at base connate into a cup; seed with aril ..... 3. *Allmania*
    - 4b. Flowers unisexual; inflorescences complex thyrsoid structures; filaments free; seed without aril ..... 4. *Amaranthus*
- 1b. Leaves opposite.
  - 5a. Flowers 2 or more in cymous partial inflorescence, sterile flowers present ..... 5. *Cyathula*
  - 5b. Flowers solitary, without any branching in axils of bracteoles, without sterile flowers.
    - 6a. Inflorescences heads or complex thyrsoid structures; anthers 1-loculed.
      - 7a. Inflorescences complex thyrsoid structures, flowers unisexual ..... 11. *Iresine*
      - 7b. Inflorescences condensed heads, flowers bisexual.
        - 8a. Stigma 1, capitate, pseudostaminodes present ..... 12. *Altermanthera*
        - 8b. Stigmas 2-lobed or forming 2 or 3 linear branches, pseudostaminodes absent.
          - 9a. Bracteoles with distal crest; filaments ± fused into a tube, lateral appendages absent ..... 13. *Gomphrena*
          - 9b. Bracteoles without crest; filaments united at base, lateral appendages absent ..... 14. *Philoxerus*
    - 6b. Inflorescences spikes; anthers 2-loculed.
      - 10a. Pseudostaminodes fringed or long fimbriate.
        - 11a. Midvein of bracteoles flexible, mucronate; a large woody climber ..... 15. *Stilbanthus*
        - 11b. Midvein of bracteoles spiny, long excurrent; an herb or a shrub ..... 9. *Achyranthes*
      - 10b. Pseudostaminodes triangular, subulate, oblong, or absent.
        - 12a. Fruit dehiscent by lid ..... 10. *Trichuriella*
        - 12b. Fruit indehiscent or irregularly circumscissile.
          - 13a. Tepals 1-veined, hairy ..... 6. *Aerva*
          - 13b. Tepals 3–7-veined, glabrous or hairy.
            - 14a. Pseudostaminodes absent (in Chinese species); utricles indehiscent, seeds smooth ..... 7. *Ptilotrichum*

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- 14b. Pseudostaminodes present, triangular; utricles irregularly bursting, seeds tuberculate ..... 8. *Psilotrichopsis*

## 1. DEERINGIA R. Brown, Prodr. 413. 1810.

浆果苋属 *jiang guo xian shu*

*Cladostachys* D. Don.

Herbs erect or scandent, or clambering shrubs. Leaves alternate, petiolate. Inflorescences racemes or spikes, axillary or terminal. Flowers bisexual or unisexual; each flower with 1 bract and 2 bracteoles. Tepals 5, rarely 4, scarious, glabrous. Stamens 5, rarely 4; filaments basally connate into a cup; anthers 2-loculed. Ovary ovoid or subglobose, 1-loculed; ovules few to many; stigmas 2 or 3, rarely 4, linear or terete, united at base; pseudostaminodes absent. Berry globose, broadly ellipsoid, or obovoid, thinly walled, indehiscent. Seeds few to many, shiny black or brownish black, circular or reniform, very finely verruculose or smooth.

About seven species: Africa (Madagascar), Asia, Australia; two species in China.

- 1a. Inflorescence a raceme; berry red; a clambering shrub ..... 1. *D. amaranthoides*  
 1b. Inflorescence a spike; berry white; an erect herb or subshrub ..... 2. *D. polysperma*

**1. *Deeringia amaranthoides*** (Lamarck) Merrill, Interpr. Herb. Amb. 211. 1917.

浆果苋 *jiang guo xian*

*Achyranthes amaranthoides* Lamarck, Encycl. 1: 548. 1785; *Cladostachys amaranthoides* (Lamarck) K. C. Kuan; *C. frutescens* D. Don.

Shrubs climbing. Stem 2–6 m tall, often with pendulous branches, hairy when young. Petiole 1–4 cm, glabrous; leaf blade ovate or ovate-lanceolate, at first sparsely villous, glabrescent, base acute, obtuse, rounded, or ovate-subtruncate, apex acuminate or acute, often unequal. Racemes axillary and terminal, arranged into complex thyrsoid structures; rachis pubescent. Bracts narrowly triangular, ca. 1.5 mm; bracteoles ovate, ca. 1 mm. Pedicel 2–3 mm. Flowers broadly spreading or reflexed at anthesis, glabrous, apex ?obtuse. Tepals light green or somewhat yellowish, tinged red in fruit, 1.5–2.5 mm. Filaments connate into a cup at base; stigmas 3, terete, reflexed in fruit. Berry red, globose, 4–7 mm in diam. Seeds 1–6, black, shiny, compressed-reniform. Fl. and fr. Oct–Mar.  $2n = 16$ .

Hillsides; 100–2200 m. Guangdong, Guangxi, Guizhou, Hainan, Sichuan, Taiwan, Xizang, Yunnan [Bhutan, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Sikkim, Thailand, Vietnam; Australia].

**2. *Deeringia polysperma*** (Roxburgh) Moquin-Tandon in Candolle, Prodr. 13(2): 236. 1849.

白浆果苋 *bai jiang guo xian*

*Celosia polysperma* Roxburgh, Fl. Ind. 2: 511. 1824; *Cladostachys polysperma* (Roxburgh) K. C. Kuan; *Deeringia indica* Zollinger ex Moquin-Tandon var. *pubescens* Schinz; *D. polysperma* var. *pubescens* (Schinz) Merrill.

Herbs erect or subshrubs, 1–2 m tall. Petiole glabrous; leaf blade ovate-lanceolate or oblong-lanceolate, 8–15 × 4–7 cm, apex acuminate or acute. Spikes axillary, solitary or paired, 3–12 cm. Tepals adnate to fruit. Filaments connate into a cup at base. Ovules more than 10; stigmas 2 or 3. Berry white, 4–5 mm in diam. Seeds reniform, ca. 0.7 mm in diam., finely verruculose. Fl. and fr. Jun–Dec.

Hillsides; low to medium elevations. Guangdong, Hainan, Taiwan [Malaysia, Philippines, Thailand, Vietnam].

## 2. CELOSIA Linnaeus, Sp. Pl. 1: 205. 1753.

青葙属 *qing xiang shu*

Shrubs, subshrubs, or annual herbs. Leaves alternate, petiolate; leaf blade ovate to linear, margin entire or nearly so. Inflorescences spicate, terminal or axillary. Flowers perfect; in axils of bracts, subtended by 2 bracteoles. Tepals 5, persistent, erect, spreading, colored, scarious, glabrous. Stamens 5; filaments connate into a cup at base, apical part free, linear; pseudostaminodes absent. Ovary 1-loculed; ovules 2 to many; style 1, persistent; stigma capitate, or 2- or 3-lobed. Utricles thinly walled, ovoid or globose, dehiscent by lid. Seeds black, lenticular.

Between 45 and 60 species distributed in subtropical and temperate regions of Africa, North and South America, and Asia; three species (one endemic) in China.

- 1a. Tepals blue, oblong-ovate ..... 3. *C. taitoensis*  
 1b. Tepals not blue, oblong-lanceolate.  
 2a. Spikes long cylindric, not branched; perianth white or pink ..... 1. *C. argentea*  
 2b. Spikes cristate or feathery, much branched; perianth red, purple, or yellow ..... 2. *C. cristata*

**1. *Celosia argentea*** Linnaeus, Sp. Pl. 1: 205. 1753.

青葙 *qing xiang*

*Celosia swinhoei* Hemsley.

Herbs annual, 30–100 cm tall. Stem erect, green or red, glabrous, often branched. Leaves green, often tinged red; petiole absent to 1.5 cm; leaf blade oblong-lanceolate, lanceolate, or lanceolate-linear, rarely ovate-oblong, 5–8 × 1–3 cm, base

attenuate, apex acuminate or acute. Spikes narrowly cylindrical or with a conic apex, 3–10 cm, not branched. Flowers dense. Bracts and bracteoles white, shiny, lanceolate, 3–4 mm, with midvein, apex acuminate. Tepals white, with a pink tip or nearly pink, then white, oblong-lanceolate, 6–10 mm, with midvein, apex acuminate. Filaments 5–6 mm, free part 2.5–3 mm; anthers purple. Ovary shortly stalked; style purple, 3–5 mm. Utricles ovoid, 3–3.5 mm, enveloped in persistent perianth. Seeds compressed-reniform, ca. 1.5 mm in diam. Fl. May–Aug, fr. Jun–Oct.  $2n = 36, 72, 84^*$ .

Hillsides, field margins, a common weed. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan, Zhejiang [Bhutan, Cambodia, Japan, Korea, India, Laos, Malaysia, Myanmar, Nepal, Philippines, Russia, Sikkim, Thailand, Vietnam; tropical Africa].

## 2. *Celosia cristata* Linnaeus, Sp. Pl. 1: 205. 1753.

鸡冠花 jī guān huā

*Celosia argentea* Linnaeus f. *cristata* (Linnaeus) Schinz; *C. argentea* var. *cristata* (Linnaeus) Kuntze.

Herbs annual. Stem erect. Leaves ovate, ovate-lanceolate, or lanceolate, 2–6 cm wide. Spikes often cristate, convolute, or

feathery; some small branches pyramidal-oblong. Bracts lanceolate, with midvein, apex acuminate. Tepals red, purple, yellow, or orange. Utricles ovoid, enveloped in persistent perianth. Seeds compressed-reniform. Fl. and fr. Jul–Sep.  $2n = 35^*, 36^*, 54^*$ .

Widely cultivated as an ornamental in China [cosmopolitan].

This taxon is usually regarded as a cultivated form of *Celosia argentea*. There are many ornamental cultivars in China.

## 3. *Celosia taitoensis* Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 230. 1911.

台湾青葙 tai wān qīng xiāng

Herbs erect. Stem tinged white, glabrous. Petiole ca. 2.5 cm; leaf blade lanceolate or linear-lanceolate, ca.  $19 \times 1.7$  cm, both surfaces glabrous, base attenuate, margin undulate, apex acuminate. Flowers very dense. Spikes terminal or axillary, ovate or ovate-cylindric, ca.  $4 \times 1.5$  cm, apex acuminate; very shortly stalked. Bracts and bracteoles ovate, ca. 4 mm, apex acuminate, with an awn abaxially. Tepals blue, oblong-ovate, ca. 5 mm, transparent, apex acuminate or acute. Filaments transparent, compressed; anthers narrowly oblong. Ovary obconic, ca. 1 mm; style ca. 3 mm. Seeds unknown.

• Taiwan (Taidong).

## 3. ALLMANIA R. Brown ex Wight, J. Bot. (Hooker) 1: 226. 1834.

砂苋属 shā xiān shù

Herbs annual. Stem erect or ascending. Leaves alternate, petiolate, linear to obovate, margin entire. Heads terminal or axillary, composed of 3–7-flowered cymes, stalked or sessile. Flowers bisexual; each flower with 1 bract and 2 bracteoles, scarious. Stamens 5; filaments basally connate into a short cup, pseudostaminodes absent; anthers 2-loculed. Ovary ovoid; ovule 1, erect; style filiform; stigma slightly 2-lobed. Utricles ovate, dehiscent by lid. Seeds black, subglobose, lenticular, with aril.

One species: tropical Asia.

## 1. *Allmania nodiflora* (Linnaeus) R. Brown ex Wight, J. Bot. (Hooker) 1: 226. 1834.

砂苋 shā xiān

*Celosia nodiflora* Linnaeus, Sp. Pl. 1: 205. 1753; *Allmania albida* R. Brown ex J. D. Hooker; *Chamissoa albida* (R. Brown) Moquin-Tandon; *C. nodiflora* (Linnaeus) Martius.

Herbs annual, erect or ascending, 10–50 cm tall. Stem branched from or near base, glabrous or obscurely pubescent. Petiole 2–10 mm; leaf blade obovate, oblong, or linear, 1.5–6.5 mm  $\times$  0.3–2.5 cm, both surfaces glabrous or adaxially pubescent, base attenuate, apex acute or obtuse, with a mucro. Heads

globose, becoming somewhat lengthened, with 3–7-flowered cymes; rachis 0.2–3.5 cm, glabrous or pubescent. Bracts and bracteoles ovate-lanceolate, 3–5 mm, white on margin and with green or purple (?red) midvein, apex long acuminate. Tepals obliquely spreading at anthesis, later erect, ovate-lanceolate or oblong-lanceolate, 4–5 mm. Stamens 5; filaments connate at base. Ovary ovoid, glabrous; style nearly as long as filaments. Utricles enclosed in persistent perianth, pale green, ovoid, 3–3.5 mm in diam., dehiscent by lid. Seeds 1.5–2 mm in diam. Fl. May–Jun, fr. Jul–Aug.  $2n = 32$ .

Sandy soils, sandy shores; below 200 m. Guangxi, Hainan [tropical Asia].

## 4. AMARANTHUS Linnaeus, Sp. Pl. 2: 989. 1753.

苋属 xiān shù

Herbs annual. Stem erect or decumbent. Leaves alternate, petiolate, margin entire. Flowers unisexual, on same plant or not, sessile, clustered at axils and at apex, in solitary or complex thyrsoid structures; each flower with 1 bract and 2 bracteoles, scarious. Tepals 5, rarely 1–4, erect or obliquely spreading, sometimes indurate at base after anthesis, green, equal or subequal, membranous. Stamens 5, rarely 1–4; filaments free, filiform, pseudostaminodes absent; anthers 2-loculed. Ovary with 1 erect ovule; style short or absent; stigmas 2 or 3, persistent, subulate or linear. Utricles globose or ovoid, laterally compressed, membranous, dehiscent by lid, dehiscing irregularly or falling off together with perianth and indehiscent. Seeds black or brown, globose or lenticular, without aril.

About 40 species: worldwide; 14 species (one endemic, at least eight introduced) in China.

AMARANTHACEAE

- 1a. Tepals 3, rarely 2 or 4; stamens 3; utricles indehiscent.  
 2a. Fruit indehiscent.  
   3a. Stem erect, somewhat branched; utricles very rugose ..... 13. *A. viridis*  
   3b. Stem ascending, much branched (frequently at base); utricles smooth or slightly rugose ..... 14. *A. blitum*  
 2b. Fruit circumscissile.  
   4a. Tepals 4, rarely 5 ..... 12. *A. blitoides*  
   4b. Tepals 3, rarely 2.  
     5a. Tepals conspicuously longer than fruit ..... 9. *A. tricolor*  
     5b. Tepals ca. as long as or shorter than fruit.  
       6a. Stamens longer than perianth; bracts conspicuously longer than perianth ..... 10. *A. albus*  
       6b. Stamens shorter than perianth; bracts ca. as long as or shorter than perianth ..... 11. *A. roxburghianus*  
 1b. Tepals 5; stamens 5, rarely 2 or 3; utricles usually dehiscent by lid.  
   7a. Stamens 2, rarely 3 ..... 8. *A. taishanensis*  
   7b. Stamens 5.  
     8a. Armed at leaf axils; bract often becoming 2 spines, rarely 1 ..... 7. *A. spinosus*  
     8b. Unarmed at leaf axils; bract not becoming spiny.  
       9a. Plants hairy.  
         10a. Fruit enveloped in persistent perianth ..... 5. *A. retroflexus*  
         10b. Fruit longer than perianth ..... 6. *A. hybridus*  
       9b. Plants glabrous or nearly so.  
         11a. Complex thyrsoid structures pendulous; bracts and bracteoles inconspicuously pointed at apex ..... 1. *A. caudatus*  
         11b. Complex thyrsoid structures erect; bracts and bracteoles conspicuously pointed at apex.  
           12a. Herbs high, to 2 m tall; leaf blade paler and pubescent on abaxial veins ..... 2. *A. patulus*  
           12b. Herbs short, 0.1–0.8 m tall; leaf blade not pale, glabrous.  
             13a. Tepals ca. as long as or longer than fruit; bracts ca. 2 × as long as perianth ..... 3. *A. hypochondriacus*  
             13b. Tepals distinctly shorter than fruit; bracts ca. 1.5 × as long as perianth ..... 4. *A. cruentus*

**1. *Amaranthus caudatus* Linnaeus, Sp. Pl. 2: 990. 1753.**

老枪谷 lao qiang gu

Stem erect, green, ca. 1.5 m tall, strong, angular, slightly branched or not, glabrous when mature. Petiole green, 1–15 cm, pilose; leaf blade green or red, rhombic-ovate or rhombic-lanceolate, 4–15 × 2–8 cm, both surfaces glabrous, base cuneate, margin entire or undulate, apex acuminate or obtuse. Complex thyrsoid structures terminal, pendulous, much branched, composed of many spikes. Bracts red, lanceolate, ca. 3 mm, transparent, with a midvein abaxially, apex apiculate. Tepals red, shorter than fruit, 2–2.5 mm, transparent, overlapping at margins, with a midvein; male segments oblong; female segments oblong-lanceolate. Stamens 5; stigmas 3, shorter than 1 mm. Utricles red above, subglobose, ca. 3 mm in diam., longer than perianth, circumscissile. Seeds light yellowish brown, subglobose. Fl. Jul–Aug, fr. Sep–Oct.  $2n = 32^*$ , 64.

Widely cultivated in China [native to neotropics; cultivated worldwide].

**2. *Amaranthus patulus* Bertoloni, Comm. Neap. 171. 1837.**

台湾莧 tai wan xian

Stem to 2 m tall, glabrous or somewhat soft pubescent. Petiole 3–8 cm; leaf blade ovate to rhombic-ovate, 6–12 × 4–7 cm, pale and soft pubescent on abaxial veins, adaxially glabrous, base cuneate, margin entire or slightly undulate, apex acute to subobtuse. Complex thyrsoid structures terminal and in apical axils, greenish, the terminal to 25 cm, much branched, composed of many lateral spikes. Bracts green, 2–4 mm, mem-

branous near base, long pointed. Tepals 5, oblong-lanceolate, slightly shorter than utricle, 1.5–2 mm, apex obtuse or slightly mucronulate. Stamens 5. Utricles compressed, circumscissile. Seeds black, shiny, ca. 1 mm in diam.

Waste places, roadsides. Taiwan [native to tropical America].

One of us (Clemants) prefers to treat this as a synonym of *Amaranthus cruentus*.

**3. *Amaranthus hypochondriacus* Linnaeus, Sp. Pl. 2: 991. 1753.**

千穗谷 qian sui gu

*Amaranthus hybridus* Linnaeus var. *hypochondriacus* (Linnaeus) Robinson; *A. hybridus* subsp. *hypochondriacus* (Linnaeus) Thellung.

Stem green or purple, 10–80 cm tall, branched, glabrous or slightly pilose. Petiole 1–7.5 cm, glabrous; leaf blade rhombic-ovate or oblong-lanceolate, 3–10 × 1.5–3.5 cm, glabrous, base cuneate, margin entire or undulate, apex acute or acuminate. Complex thyrsoid structures terminal, erect, cylindrical, ca. 25 cm, 1–2.5 cm in diam., branched or not, composed of many spikes; lateral spikes short, ca. 6 cm. Bracts green or purple, ovate, subulate, 4–5 mm, ca. 2 × as long as perianth, apex distinctly long pointed. Tepals green or purple, with a dark midvein, oblong, ca. as long as or longer than fruit, apex acute or acuminate. Stigmas 2 or 3. Utricles exceeding perianth, green, tinged purple above, rhomboid-ovoid, 3–4 mm, circumscissile. Seeds white, subglobose, ca. 1 mm in diam. Fl. Jul–Aug, fr. Aug–Sep.  $2n = 32$ .

Cultivated. Hebei, Jilin, Nei Mongol, Sichuan, Xinjiang, Yunnan [native to North America].

**4. *Amaranthus cruentus*** Linnaeus, Syst. Nat., ed. 10, 2: 1269. 1759.

老鸦谷 lao ya gu

*Amaranthus paniculatus* Linnaeus; *A. hybridus* Linnaeus subsp. *cruentus* (Linnaeus) Thellung; *A. hybridus* var. *paniculatus* (Linnaeus) Thellung.

Stem erect, green, glabrous. Petiole green; leaf blade rhombic-ovate or oblong-lanceolate, glabrous, base cuneate, margin entire or undulate, apex acuminate or acute. Complex thyrsoid structures erect; bracts and tepals distinctly long pointed at apex; bracts of female flowers ca.  $1.5 \times$  as long as segments; tepals conspicuously shorter than fruit. Utricles 3–4 mm in diam., circumscissile. Seeds subglobose. Fl. Jun–Jul, fr. Sep–Oct.  $2n = 30^*$ ,  $32^*$ ,  $34^*$ .

Widely cultivated in China [cosmopolitan].

**5. *Amaranthus retroflexus*** Linnaeus, Sp. Pl. 2: 991. 1753.

反枝苋 fan zhi xian

Stem erect, light green, 20–80 cm tall, stout, branched or not, slightly obtusely angulate, densely pubescent. Petiole light green, 1.5–5.5 cm, hairy; leaf blade ovate-rhombic or elliptic,  $5\text{--}12 \times 2\text{--}5$  cm, both surfaces shortly hairy, but densely hairy abaxially, base cuneate, margin entire and undulate, apex acute or notched, with a mucro. Complex thyrsoid structures terminal and axillary, erect, 2–4 cm in diam., including many spikes; terminal spikes longer than lateral ones. Bracts and bracteoles white, subulate, 4–6 mm, apex slenderly long pointed. Tepals white, oblong or oblong-obovate, 2–2.5 mm, membranous, with a green midvein, apex acute or notched, with a mucro. Stamens slightly longer than perianth. Stigmas 3, rarely 2. Utricles light green, ovoid, compressed, shorter than perianth, circumscissile. Seeds brown or black, subglobose, ca. 1 mm in diam., obtuse at margin. Fl. Jul–Aug, fr. Aug–Sep.  $2n = 32^*$ ,  $34^*$ ,  $102^*$ .

Waste places, field margins, roadsides. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Xinjiang, Zhejiang [native origin uncertain; now cosmopolitan].

One of us (Clemants) does not recognize the following varieties.

- 1a. Stem thick, obtusely angulate, densely pubescent; bracts long, 4–6 mm, apex long pointed ..... 5a. var. *retroflexus*  
 1b. Stem slender, less angulate, less hairy; bracts shorter, 3–4 mm, apex slightly obtuse ..... 5b. var. *delilei*

**5a. *Amaranthus retroflexus* var. *retroflexus***

反枝苋(原变种) fan zhi xian (yuan bian zhong)

Stem erect, stout, obtusely angulate, densely pubescent. Leaves ovate-rhombic or elliptic. Bracts white, 4–6 mm, apex long pointed.

Field margins, roadsides. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Xinjiang, Zhejiang [native origin uncertain; now cosmopolitan].

**5b. *Amaranthus retroflexus* var. *delilei*** (Richter & Loret) Thellung, Vierteljahres Nat. Ges. Zürich 52: 442. 1907.

短苞反枝苋 duan bao fan zhi xian

*Amaranthus delilei* Richter & Loret, Bull. Soc. Bot. France 13: 316. 1866; *A. retroflexus* subsp. *delilei* (Richter & Loret) Tzvelev.

Stem slender, less angulate, pilose. Leaves narrowing to petiole at base. Bracts 3–4 mm, slightly longer than perianth, apex obtuse.

Waste places. Hebei [probably native to North America; naturalized in S Africa, N Asia, and Europe].

**6. *Amaranthus hybridus*** Linnaeus, Sp. Pl. 2: 990. 1753.

绿穗苋 lü sui xian

Stem 30–50 cm tall, branched, pubescent. Petiole 1–2.5 cm, hairy; leaf blade ovate or ovate-rhombic,  $3\text{--}4.5 \times 1.5\text{--}2.5$  cm, abaxially pilose, adaxially nearly glabrous, base cuneate, margin undulate, apex acute or notched, with a mucro. Complex thyrsoid structures terminal, slender, somewhat drooping at apex and in spikes. Bracts and bracteoles subulate, lanceolate, 3.5–4 mm, distinctly long pointed, longer than perianth. Tepals oblong-lanceolate, ca. 2 mm, apex acute, with a mucro. Stamens nearly as long as or slightly longer than perianth; stigmas 3. Utricles ovoid, longer than perianth, ca. 2 mm, circumscissile. Seeds black, subglobose, ca. 1 mm in diam. Fl. Jul–Aug, fr. Sep–Oct.  $2n = 24$ ,  $32^*$ ,  $33$ ,  $34$ .

Farms, waste places, hillsides. Anhui, Fujian, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Zhejiang [Bhutan, Japan, Laos, Nepal, Sikkim, Vietnam; Europe, North and South America].

**7. *Amaranthus spinosus*** Linnaeus, Sp. Pl. 2: 991. 1753.

刺苋 ci xian

Stem erect, green or somewhat tinged purple, 30–100 cm tall, terete or obtusely angulate, much branched, glabrous or slightly pubescent. Petiole 1–8 cm, glabrous, 2-armed at base; leaf blade ovate-rhombic or ovate-lanceolate,  $3\text{--}12 \times 1\text{--}6$  cm, glabrous or slightly pubescent along veins when young, base cuneate, margin entire, apex obtuse, with a mucro. Complex thyrsoid structures terminal or axillary, 8–25 cm; terminal spike usually with all male flowers at or toward apex. Bracts becoming very sharply spiny in proximal part of spike. Tepals green, transparent at margin and with green or purple median band, apex acute, with a mucro; male flowers oblong, 2–2.5 mm; female flowers oblong-spatulate, ca. 1.5 mm. Filaments nearly as long as or slightly shorter than perianth. Stigmas 3(or 2). Utricles included in perianth, oblong, 1–1.2 mm, circumscissile slightly below middle. Seeds brownish black, subglobose, ca. 1 mm in diam. Fl. and fr. Jul–Nov.  $2n = 34$ ,  $68$ .

Waste places, gardens. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [probably native to neotropics, now cosmopolitan in warm-temperate and tropical regions].

**8. *Amaranthus taishanensis*** F. Z. Li & C. K. Ni, Acta Phytotax. Sin. 19: 116. 1981.

泰山苋 tai shan xian

Stem erect or decumbent, light green, sometimes light purple below, 10–30 cm tall, much branched, pubescent or nearly glabrous. Petiole 2–15 mm; leaf blade ovate-rhombic or elliptic, 0.5–3 cm × 3–15 mm, glabrous, abaxially greenish white, adaxially green, base cuneate, margin entire or slightly undulate, apex notched, with a mucro. Flowers unisexual, clustered at leaf axils. Bracts and bracteoles subulate, 1.2–1.5 mm, slightly longer than perianth. Tepals 5, membranous. Stamens 2, rarely 3, slightly longer than perianth; stigmas 3. Utricles oblong, 2–2.5 mm, nearly as long as perianth, indehiscent. Seeds reddish brown, ca. 1 mm.

• Roadsides, waste places, hillsides. Anhui, Shandong.

Li et al. (Acta Phytotax. Sin. 40: 383–384. 2002) believed this species to be conspecific with *Amaranthus polygonoides* Linnaeus, a North American species. However, one of us (Clemants) notes that further study might ally *A. taishanensis* with *A. blitum*, from which it seems to differ only by having five sepals. Wu Zhengyi (editor's note) agrees with Clemants.

**9. *Amaranthus tricolor*** Linnaeus, Sp. Pl. 2: 989. 1753.

苋 xian

*Amaranthus gangeticus* Linnaeus; *A. gangeticus* var. *angustior* Bailey; *A. mangostanus* Linnaeus.

Stem green or red, 80–150 cm tall, stout, often branched. Petiole green or red, 2–6 cm; leaf blade green, red, purple, or yellow, ovate, ovate-rhombic, or lanceolate, 4–10 × 2–7 cm, glabrous, base cuneate, margin entire or undulate, apex obtuse or notched, with a mucro. Flowers in dense clusters at leaf axils or in spike at apex; male and female flowers in same inflorescences. Bracts and bracteoles ovate-lanceolate, 2.5–3 mm, transparent, apex long pointed. Stamens 3. Stigmas 3. Utricles included in perianth, ovate-oblong, 2–2.5 mm, circumscissile. Seeds brownish black, subglobose or obovoid, ca. 1 mm in diam. Fl. May–Aug, fr. Jul–Sep.  $2n = 34^*$ , 68, 85\*.

Widely cultivated in China [probably native to tropical Asia; cultivated and naturalized throughout that region].

**10. *Amaranthus albus*** Linnaeus, Syst. Nat., ed. 10, 2: 1268. 1759.

白苋 bai xian

*Amaranthus gracilentus* H. W. Kung.

Stem erect or ascending, greenish white, 30–50 cm tall, branched from base, glabrous or strigose. Petiole 3–5 mm, glabrous; leaf blade obovate or spatulate, 0.5–2 cm, glabrous, base narrowing to petiole, margin slightly undulate, apex obtuse or notched, with a mucro. Flowers in axillary clusters or short terminal spikes. Bracts and bracteoles subulate, 2–2.5 mm, slightly rigid, apex acute. Tepals ca. 1 mm, shorter than bracts, membranous; male flowers oblong, apex acuminate; female ones oblong or subulate, apex short acuminate. Stamens longer than perianth; stigmas 3. Utricles brownish black, obovate, 1.2–1.5 mm, rugose, circumscissile. Seeds black to brownish black, subglobose, ca. 1 mm in diam. Fl. Jul–Aug, fr. Sep.  $2n = 32$ .

Roadsides, waste places, near houses. Hebei, Heilongjiang, Nei Mongol, Xinjiang [Japan, Russia; Europe, North America].

**11. *Amaranthus roxburghianus*** H. W. Kung, Fl. Illust. N. China 4: 19. 1935.

腋花苋 ye hua xian

Stem erect, light green, 30–65 cm, much branched, glabrous. Petiole 1–2.5 cm, slender; leaf blade ovate-rhombic, obovate, or oblong, 2–5 × 1–2.5 cm, base cuneate, margin undulate, apex notched, with a mucro. Flowers few, sparsely clustered at axils. Bracts and bracteoles subulate, ca. 2 mm, abaxially with a distinct midvein, apex long pointed. Tepals lanceolate, ca. 2.5 mm, apex acuminate, long pointed. Stamens shorter than perianth; stigmas 3. Utricles ovoid, subequal to perianth, ca. 3 mm, circumscissile. Seeds brownish black, subglobose, ca. 1 mm in diam. Fl. Jul–Aug, fr. Aug–Sep.

Field margins, waste places. Hebei, Henan, Gansu, Ningxia, Shaanxi, Shanxi, Sichuan, Xinjiang [India, Sri Lanka].

The names *Amaranthus gracilis* Desfontaines and *A. viridis* Desfontaines have been misapplied to this species. Further study is necessary to compare *A. roxburghianus* with *A. graecizans* Linnaeus.

**12. *Amaranthus blitoides*** S. Watson, Proc. Amer. Acad. Arts 12: 273. 1877.

北美苋 bei mei xian

Stem greenish white, 15–50 cm tall, divaricately branched from base, glabrous. Leaves dense; petiole 0.5–1.5 cm; leaf blade obovate or spatulate to oblong-ob lanceolate, 0.5–2.5 cm × 3–10 mm, base cuneate, margin entire, apex obtuse or acute, with a mucro. Flowers clustered at axils, shorter than petioles. Bracts and bracteoles lanceolate, ca. 3 mm, apex acute. Tepals 4 (or 5), green, ovate-lanceolate to oblong-lanceolate, 1–2.5 mm, apex acuminate and pointed. Stigmas 3. Utricles ellipsoid, longer than longest perianth segment, ca. 2 mm, circumscissile. Seeds black, slightly shiny, ovoid, ca. 1.5 mm in diam. Fl. Aug–Sep, fr. Sep–Oct.  $2n = 32$ .

Fields, roadsides. Beijing, Liaoning, Nei Mongol [native to North America].

**13. *Amaranthus viridis*** Linnaeus, Sp. Pl., ed. 2, 2: 1405. 1763.

皱果苋 zhou guo xian

*Euxolus viridis* (Linnaeus) Moquin-Tandon.

Stem erect, green or somewhat tinged purple, 40–80 cm tall, conspicuously angulate, slightly branched, glabrous. Petiole 3–6 cm, green or somewhat tinged purple; leaf blade ovate, ovate-oblong, or ovate-elliptic, 3–9 × 2.5–6 cm, base broadly cuneate or subtruncate, margin entire or slightly undulate, apex notched or rounded, with a pointed mucro. Complex thyrsoid structures terminal, 6–12 × 1.5–3 cm, branched, composed of spikes; spikes erect, slender, terminal ones longer than lateral ones; rachis 2–2.5 cm. Bracts and bracteoles lanceolate, shorter than 1 mm, apex pointed. Tepals oblong or broadly oblanceolate, 1.2–1.5 mm, apex acute. Stamens shorter than perianth; stigmas 3 or 2. Utricles green, longer than perianth, globose, slightly compressed, ca. 2 mm in diam., very rugose, inde-

hiscent. Seeds black or brownish black, subglobose, ca. 1 mm in diam. Fl. Jun–Aug, fr. Aug–Oct.  $2n = 34$ .

Fields, waste places. All provinces except for NW China and Xizang [pantropical].

**14. *Amaranthus blitum*** Linnaeus, Sp. Pl. 1: 990. 1753.

凹头苋 ao tou xian

*Amaranthus ascendens* Loiseleur-Deslongchamps; *A. lividus* Linnaeus; *A. lividus* var. *ascendens* (Lois) Thellung-Blom; *Euxolus ascendens* (Loiseleur-Deslongchamps) H. Hara.

Stem ascending, light green or purple, 10–30 cm tall, branched from base, glabrous. Petiole 1–3.5 cm; leaf blade ovate or ovate-rhombic, 1.5–4.5 × 1–3 cm, base cuneate, margin entire or slightly undulate, apex notched, with a mucro.

Flower clusters axillary, those of terminal clusters erect spikes or complex thyrsoid structures. Bracts and bracteoles oblong, shorter than 1 mm. Tepals light green, oblong or lanceolate, 1.2–1.5 mm, with a midvein adaxially, apex acute. Stamens slightly shorter than perianth; stigmas 3 or 2, falling off when utricles ripen. Utricles exceeding perianth, compressed-ovoid, ca. 3 mm, indehiscent, slightly rugose to nearly smooth. Seeds black to brownish black, circular, ca. 1.2 cm in diam. Fl. Jul–Aug, fr. Aug–Sep.  $2n = 34$ .

Fields, waste places. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Yunnan, Zhejiang [Japan, Laos, Nepal, Sikkim, Vietnam; N Africa, Europe, South America].

**5. CYATHULA** Blume, Bijdr. Fl. Ned. Ind. 548. 1826, nom. cons., not Loureiro (1790).

杯苋属 bei xian shu

Herbs or subshrubs. Stem erect or ascending. Leaves opposite, petiolate, margin entire. Flowers clustered in cymose partial inflorescences, 1–3 in each cluster, hermaphroditic, partly accompanied by sterile ones. Bracts ovate, membranous, often spiny. Tepals 5, nearly equal, membranous. Stamens 5; anther 2-loculed, oblong; filaments connate into a short cup at base, alternating with dentate or lacerate staminodes. Ovary obovoid; ovule 1, pendulous from a long funicle; style filiform, persistent; stigma capitate. Utricles included in persistent perianth, globose, ellipsoid, or obovoid, membranous, indehiscent. Seeds oblong or ellipsoid.

About 27 species distributed in Asia, Pacific Islands, Africa, and North and South America; four species in China.

*Cyathula semirosulata* Masamune (Trans. Nat. Hist. Soc. Taiwan 33: 111. 1943) was described from Hainan, but we have seen no specimens and are therefore unable to treat it in this account. Further revisionary study is necessary.

- 1a. Subshrubs, 10–20 cm; leaves elliptic ..... 4. *C. tomentosa*  
 1b. Herbs perennial; leaves rhombic-obovate, rhombic-oblong, broadly ovate, obovate-oblong, or elliptic.  
 2a. Stem ascending or erect; leaves rhombic-obovate or rhombic-oblong; flower clusters in racemes ..... 1. *C. prostrata*  
 2b. Stem erect; leaves not rhombic-obovate or rhombic-oblong; flower clusters in spikes.  
 3a. Leaves broadly ovate or obovate-oblong; flowers grayish black when dried; staminodes 0.6–1 mm ..... 2. *C. capitata*  
 3b. Leaves elliptic or narrowly elliptic, rarely obovate; flowers white when dried; staminodes 0.3–0.4 mm ... 3. *C. officinalis*

**1. *Cyathula prostrata*** (Linnaeus) Blume, Bijdr. Fl. Ned. Ind. 549. 1826.

杯苋 bei xian

*Achyranthes prostrata* Linnaeus, Sp. Pl., ed. 2, 1: 296. 1762; *Desmochaeta prostrata* (Linnaeus) Candolle; *Pupalia prostrata* (Linnaeus) C. Martius.

Herbs perennial, 30–50 cm tall. Roots slender. Stem ascending or erect, tinged red, obtusely quadrangular, branched, inflated at nodes. Petiole 1–7 mm, long hairy; leaf blade ovate-rhombic or rhombic-oblong, 1.5–6 × 0.6–3 cm, both surfaces densely hairy and ciliate, base rounded, apex obtuse, narrowed from middle. Racemes terminal, erect and straight, with 2 or 3 hermaphroditic and some unisexual flowers, unisexual flowers gradually decreasing upward, with only 1 perfect flower at apex; rachis densely pubescent; flower clusters shortly stalked. Bracts reflexed after anthesis, 1–2 mm, apex acuminate. Tepals of perfect flowers light green, ovate-oblong, 2–3 mm, abaxially villous, adaxially glabrous, apex acuminate, with a mucro. Stamens 5; filaments 1–2 mm, united part only ca. 1 mm; pseudostaminodes rectangular, apex truncate. Tepals of imperfect flowers and bracts yellow, ca. 1.5 mm, base villous, apex hooked. Utricles globose, ca. 0.5 mm in diam., glabrous. Seeds

brown, shiny, ovoid-oblong, very small, smooth. Fl. and fr. Jun–Nov.

Hillsides, riverbanks, roadsides. Guangdong, Guangxi, Hainan, Taiwan, Yunnan [Bhutan, Cambodia, India, Laos, Malaysia, Myanmar, Nepal, Philippines, Sikkim, Thailand, Vietnam; Africa, Pacific Islands].

**2. *Cyathula capitata*** Moquin-Tandon in Candolle, Prodr. 13(2): 329. 1849.

头花杯苋 tou hua bei xian

Herbs perennial, 50–100 cm. Roots brownish gray or brownish red, stout. Stem erect, dark purple or yellowish brown, nearly quadrangular, branched, pilose. Petiole 0.5–1.5 cm, pilose; leaf blade broadly ovate or obovate-oblong, 5–14 × 3–7 cm, papery, both surfaces pilose and ciliate, base cuneate, apex caudate. Flower clusters in dichasial inflorescences, globose or ellipsoid, 2–4 cm in diam., simple or clustered in spikes; rachis 2–4.5 mm, tomentose. Bracts 3–4 mm, glabrous, apex acuminate. Flower clusters at axils of bracts, with some perfect flowers and 1 or 2 unisexual ones. Tepals of perfect flowers dark purple, lanceolate, 3–4 mm, abaxially hairy at base, apex acuminate; imperfect ones yellow, lanceolate-subulate, ca. 3 mm, rigid, apex hooked. Filaments ca. 3 mm, pilose at base; pseudostaminodes rectangular, 0.6–1 mm, parted and

fimbriate at apex. Ovary hairy at base. Utricles grayish yellow, ovate-oblong, ca. 3 mm, glabrous. Seeds shiny, ellipsoid, ca. 2 mm, smooth. Fl. Aug, fr. Oct.

Hillsides; 1700–2300 m. Sichuan, Xizang, Yunnan [Bhutan, India, Nepal, Sikkim, Vietnam].

**3. *Cyathula officinalis*** K. C. Kuan, Acta Phytotax. Sin. 14(1): 60. 1976.

川牛膝 chuan niu xi

Herbs perennial, 50–100 cm tall. Stem erect, slightly quadrangular, much branched or strigose. Petiole 0.5–1.5 cm, densely strigose; leaf blade elliptic or narrowly elliptic, rarely obovate, 3–10 × 1.5–5.5 cm, abaxially densely strigose, adaxially long strigose, base cuneate or broadly cuneate, margin entire, apex acuminate. Flower clusters in terminal spikes, light green, nearly white when dried, 1–1.5 cm in diam. Bracts shiny, 4–5 mm, apex pointed or hooked. Tepals of perfect flowers lanceolate, 3–5 mm, apex acute, inner 3 slightly narrow. Filaments densely hairy at base; pseudostaminodes rectangular, 0.3–0.4 mm, dentate-lobed at apex. Ovary cylindrical or obovoid, 1.3–1.8 mm; style ca. 1.5 mm. Utricles light yellow, ellipsoid or obovoid, 2–3 × 1–2 mm. Seeds shiny, ellipsoid, 1.5–2 mm,

smooth. Fl. Jun–Jul, fr. Aug–Sep.

Waste places; above 1500 m. Guizhou, Hebei, Shanxi, Sichuan, Yunnan, Zhejiang [Nepal].

Further study is necessary to compare this taxon with *Cyathula capitata*, of which it may be no more than a cultivar.

**4. *Cyathula tomentosa*** (Roth) Moquin-Tandon in Candolle, Prodr. 13(2): 327. 1849.

绒毛杯苋 rong mao bei xian

*Achyranthes tomentosa* Roth, Nov. Sp. Ind. 167. 1821.

Subshrubs 10–20 cm tall. Stem and branches densely gray tomentose. Leaves elliptic, 5–7 × 2–5 cm, both surfaces densely tomentose, base rounded. Flower clusters in dense spikes, 1–2 cm in diam. Bracts shiny, apex pointed or hooked. Tepals of perfect flowers lanceolate, apex acute. Pseudostaminodes ca. 0.5 mm, hairy at margin, apex fimbriate. Utricles yellow, ellipsoid or obovoid. Seeds ellipsoid, smooth. Fl. Jun.

Waste places; 1800–2300 m. Guizhou, Xizang [Bhutan, India, Myanmar, Nepal, Sikkim].

## 6. *AERVA* Forsskål, Fl. Aegypt.-Arab. 170. 1775, nom. cons.

白花苋属 bai hua xian shu

*Ouret* Adanson, nom. rej.

Herbs or subshrubs. Stem erect, stoloniferous or climbing. Leaves alternate or opposite, margin entire. Flowers perfect, unisexual or dioecious, small or very small. Inflorescences spikes, terminal or axillary, simple or in complex thyrsoid structures. Bracts and bracteoles membranous, persistent or bracteoles falling off with perianth in fruit. Tepals 4 or 5, ovate or oblong, membranous or papery, lanose, with only 1 vein. Stamens 4 or 5; filaments subulate, unequal, united to short cup at base, alternating with pseudostaminodes, pseudostaminodes subulate to oblong; anthers 2-loculed. Ovary obovoid or subglobose, glabrous; style persistent; stigmas 2, capitate. Utricles ovoid, compressed, membranous, indehiscent or irregularly dehiscent (bursting), falling off with perianth. Seeds reniform-orbicular, lenticular, compressed.

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

1a. Inflorescences gray lanose; bracts, bracteoles, and abaxial surface of tepals pilose ..... 1. *A. glabrata*  
1b. Inflorescences white or purple sericeous; bracts, bracteoles, and abaxial surface of tepals puberulous ..... 2. *A. sanguinolenta*

**1. *Aerva glabrata*** J. D. Hooker, Fl. Brit. India 4: 728. 1885.

少毛白花苋 shao mao bai hua xian

Herbs perennial, 1–2 m tall. Stem erect or slightly stoloniferous, terete or angulate, simple or branched, gradually glabrous downward. Leaves opposite or alternate; petiole 2–10 mm, pubescent; leaf blade ovate, oblong, or lanceolate, 1–7 × 0.5–3 mm, base cuneate, both surfaces pubescent and ciliate, apex acute, with a mucro. Spikes terminal or axillary, 1–5 cm × 3–4 mm, lanose, in terminal complex thyrsoid structures. Flowers many, dense, ca. 2 mm. Bracts and bracteoles ovate, 1–1.5 mm, adaxially pilose. Tepals white, oblong, 2–2.5 mm, with a green midvein, adaxially glabrous, slightly hairy, apex acuminate. Stamens ca. 1 mm; pseudostaminodes triangular. Utricles ovate, ca. 2 mm, glabrous. Seeds black, reniform, ca. 1 mm. Fl. and fr. Apr–Oct.

Hillsides; above 2500 m. Guangdong, Guangxi, Guizhou, Yunnan [India, Myanmar].

**2. *Aerva sanguinolenta*** (Linnaeus) Blume, Bijdr. Fl. Ned. Ind. 547. 1826.

白花苋 bai hua xian

*Achyranthes sanguinolenta* Linnaeus, Sp. Pl., ed. 2, 1: 294. 1762; *A. scandens* Roxburgh; *Aerva scandens* (Roxburgh) Moquin-Tandon.

Herbs perennial. Stem erect or slightly stoloniferous, simple or branched. Leaves ovate-elliptic, oblong, or lanceolate, 1.5–8 × 0.5–3.5 cm. Inflorescences white or purple sericeous. Bracts, bracteoles, and tepals densely white lanose or puberulous abaxially. Tepals white or pink. Pseudostaminodes triangular. Utricles ovate, glabrous. Seeds reniform. Fl. Apr–Jun, fr. Aug–Oct.  $2n = 42$ .

Hillsides; 1100–2300 m. Guangdong, Guangxi, Guizhou, Hainan, Sichuan, Taiwan, Yunnan [Bhutan, Cambodia, India, Laos, Malaysia, Myanmar, Nepal, Philippines, Sikkim, Thailand, Vietnam].

*Aerva sanguinolenta* var. *minor* (Hance) H. S. Kiu (Guihaia 13: 105. 1993; *A. scandens* (Roxburgh) Moquin-Tandon var. *minor* Hance, J. Bot. 17: 14. 1879) was described from Guangdong, but we have seen no specimens and are therefore unable to treat it in this account. Further revisionary study is necessary. The species is used medicinally.

7. **PSILOTRICHUM** Blume, Bijdr. Fl. Ned. Ind. 544. 1826.

林地苋属 lin di xian shu

Herbs or shrubs. Stem pubescent, lanose, or glabrous. Leaves opposite, petiolate. Flowers perfect, arranged in terminal or axillary heads or spikes, flower solitary in axil of a bract, subtended by 2 bracteoles. Tepals 5, erect, membranous, becoming rigid or not after anthesis. Stamens 5; filaments unequal, united to a short cup at base, pseudostaminodes absent or very small; anthers 2-loculed. Ovary ellipsoid or globose; ovule 1, pendulous; style slender; stigma capitate or 2-lobed. Utricles enclosed in perianth, ellipsoid, indehiscent. Seed erect, lenticular, smooth.

About 14 species: Africa, SE Asia; three species (one endemic) in China.

- 1a. Subshrubs, 70–100 cm tall ..... 3. *P. yunnanense*  
 1b. Herbs, to 60 cm tall.  
 2a. Leaves lanceolate, elliptic, or obovate ..... 1. *P. ferrugineum*  
 2b. Leaves linear ..... 2. *P. erythrostachyum*

**1. *Psilotrichum ferrugineum*** (Roxburgh) Moquin-Tandon in Candolle, Prodr. 13(2): 279. 1849.

林地苋 lin di xian

Herbs annual, 5–60 cm tall. Stem branched from base, often tinged purple, with long internode, in leaf axils and young nodes often hairy. Petiole 3–12 mm; leaf blade lanceolate, elliptic, or obovate, 1.5–7.5 × 0.5–1.5 cm, glabrous, base acuminate, apex acute. Spikes terminal or axillary, often solitary, rarely paired; sessile or with thin rachis, 1–3 cm. Bracts ovate-lanceolate, ca. 1.5 mm; bracteoles ovate-triangular, ca. 0.5 mm, falling off with tepals and fruit. Flowers ca. 1 mm in diam. Tepals lanceolate, 2–2.5 mm, glabrous, with 3–5 strong veins abaxially, becoming rigid or not after anthesis. Stamens 0.5–0.75 mm. Styles persistent, ca. 0.5 mm. Utricles ellipsoid, 1–1.5 mm, compressed, transparent below. Seed black or blackish brown, shiny, ca. 1 mm. Fl. and fr. Jun–Aug.

Humid places, hillsides; 1000–2000 m. Hainan, Yunnan [Cambodia, India, Laos, Malaysia, Myanmar, Nepal, Philippines, Thailand, Vietnam; ?Africa].

*Psilotrichum ferrugineum* var. *hainanense* H. S. Kiu (Guihaia 13: 107. 1993) was described from Hainan, but we have seen no specimens and are therefore unable to treat it in this account. Further revisionary study is necessary.

- 1a. Leaves glabrous; petiole without wings;  
 utricles ellipsoid ..... 1a. var. *ferrugineum*  
 1b. Leaves pubescent on both surfaces;  
 petiole narrowly winged and pubescent;  
 utricles ovoid ..... 1b. var. *ximengense*

**1a. *Psilotrichum ferrugineum* var. *ferrugineum***

林地苋(原变种) lin di xian (yuan bian zhong)

*Achyranthes ferruginea* Roxburgh, Fl. Ind. 2: 502. 1824;  
*Psilotrichum trichotomum* Blume.

Petiole 3–12 mm, without wings; leaf blade lanceolate, elliptic, or obovate, glabrous. Utricles ellipsoid, compressed. Fl. and fr. Jun–Aug.

Humid places; 1000–2000 m. Hainan [Cambodia, India, Laos, Malaysia, Myanmar, Nepal, Philippines, Thailand, Vietnam; ?Africa].

**1b. *Psilotrichum ferrugineum* var. *ximengense*** Y. Y. Qian, Bull. Bot. Res., Harbin 8(3): 147. 1988.

西盟林地苋 xi meng lin di xian

Petiole narrowly winged, pubescent; leaf blade membranous, both surfaces pubescent and ciliate. Utricles ovoid.

- Hillsides; ca. 1200 m. Yunnan (Ximeng).

One of us (Clemants) questions whether this is the same as *Psilotrichum yunnanense*. Wu Zhengyi (editor's note) concurs.

**2. *Psilotrichum erythrostachyum*** Gagnepain, Bull. Soc. Bot. France 82: 476. 1935.

苋叶林地苋 xian ye lin di xian

Herbs annual, 15–30 cm tall. Stems branched; branches slender, glabrous. Leaves linear, 1–6 cm × 1–2 mm, with conspicuous midvein, glabrous. Inflorescences spicate, ca. 4 cm; peduncle long, ca. 10 cm. Bracts ovate, 1.5–2 mm, glabrous, apex acuminate; bracteoles ovate, ca. 0.8 mm, scarious. Tepals linear, 3–3.5 mm, glabrous, 5-veined. Styles persistent, 1.5–2 mm. Utricles ovoid, ca. 1.2 mm, irregularly circumscissile.

Hillsides. Hainan [Cambodia, Thailand, Vietnam].

**3. *Psilotrichum yunnanense*** D. D. Tao, Acta Phytotax. Sin. 35: 86. 1997.

云南林地苋 yun nan lin di xian

Subshrubs 70–100 cm high. Stems terete, usually densely pubescent or glabrous. Petiole 3–6 mm; leaf blade ovate-oblong or ovate-lanceolate, 3–5 × 1.5–2 cm, subleathery when dry, base cuneate, apex acute or subrounded. Inflorescence axillary or terminal spikes, 6–16 mm; peduncle minutely puberulent; bracts lanceolate. Tepals 4, yellowish green, lanceolate, puberulent, margin ciliate, apex acute. Stamens 5 or 6, ca. 2.5 mm. Style glabrous. Utricle compressed lenticulate, ca. 1 × 0.8 mm. Seeds purple, orbicular, reniform. Fl. Jul.

- Near streams, in forests; 900–2200 m. Yunnan.

8. **PSILOTRICHOPSIS** C. C. Townsend, Kew Bull. 29: 464. 1974.

青花苋属 qing hua xian shu

Herbs perennial. Leaves opposite. Inflorescences spicate, pedunculate. Flowers hermaphroditic, solitary in axils of bracts.

Tepals 5, slightly rigid after anthesis, 5-veined. Stamens 5, subulate; pseudostaminodes triangular, very small. Styles short; stigmas capitate. Utricles irregularly circumscissile (bursting). Seeds black, nearly reniform, verrucose (tuberculate).

Two species; China, Malaysia, Thailand; one species in China.

**1. *Psilotrichopsis curtisii*** (Oliver) C. C. Townsend var. ***hainanensis*** (F. C. How) H. S. Kiu, *Guihaia* 13: 106. 1993.

青花苋 qing hua xian

*Aerva hainanensis* F. C. How, *Acta Phytotax. Sin.* 8: 343. 1963; *Psilotrichopsis hainanensis* (F. C. How) C. C. Townsend.

Herbs perennial, 20–30 cm tall. Stem erect, few branched, long yellow lanose above. Leaves opposite; petiole 5–8 mm, pilose; leaf blade elliptic to oblong, 4.5–10 × 1.5–4 cm, membranous, both surfaces strigose, base cuneate, apex obtuse and

rounded, with a mucro. Spikes terminal, 0.8–2 cm, later arranged into short complex thyrsoid structures. Flowers small. Tepals 5, yellow, oblong, 2–2.5 mm, glabrous, with some veins extending to mucros. Stamens ca. 1 mm; filaments united to membranous cup below; pseudostaminodes triangular, very small. Ovary subglobose. Utricles compressed, ca. 1 mm. Seeds dark purple, reniform. Fl. and fr. Jul.

● Hillsides, riverbanks. Hainan.

*Psilotrichopsis curtisii* var. *curtisii* occurs in Malaysia.

## 9. *ACHYRANTHES* Linnaeus, Sp. Pl. 1: 204. 1753.

牛膝属 niu xi shu

Herbs or subshrubs. Stem with conspicuous nodes; branches opposite. Leaves opposite, petiolate. Spikes terminal or axillary, erect. Flowers reflexed or spreading, perfect, with 3 bracts; midvein of bracteoles spiny, long, excurrent. Tepals 4 or 5, membranous, apex awn-pointed, rigid in fruit. Stamens 5, rarely 4 or 2, shorter than perianth; filaments connate into a short cup at base, pseudostaminodes fringed; anthers 2-loculed. Ovary oblong; style linear, persistent; stigma capitate. Utricles ovoid-oblong, ovoid, or subglobose, falling off with tepals and bracteoles. Seed oblong, lenticular.

About 15 species: tropical and subtropical regions; three species in China.

The two species *Achyranthes aspera* and *A. bidentata* are highly variable. Further study might show *A. longifolia* to be merely a variant of *A. bidentata*.

*Achyranthes megaphylla* Y. H. Li (*Guihaia* 9: 26. 1989, not Standley, 1917) was described from Yunnan and *A. ogatae* Yamamoto (*Icon. Pl. Formosan.*, Suppl. 3: 23. 1927) was described from Taiwan. We have seen no specimens of either taxon and are therefore unable to treat them in this account. Further revisionary study is necessary.

- 1a. Leaves lanceolate or broadly lanceolate; pseudostaminodes inconspicuously dentate at apex ..... 3. *A. longifolia*  
 1b. Leaves obovate, elliptic, or oblong; pseudostaminodes ciliate or serrulate at apex.  
     2a. Leaves obovate, broadly obovate, or elliptic-oblong, apex obtuse with a mucro; bracteoles spiny, 2-winged at base; pseudostaminode long fimbriate and ciliate at apex ..... 1. *A. aspera*  
     2b. Leaves elliptic or elliptic-lanceolate, apex caudate; bracteoles spiny, 2-parted at base; pseudostaminode serrulate at apex ..... 2. *A. bidentata*

**1. *Achyranthes aspera*** Linnaeus, Sp. Pl. 1: 204. 1753.

土牛膝 tu niu xi

Herbs perennial, 20–120 cm tall. Stem quadrangular, pubescent; nodes slightly inflated; branches opposite. Petiole 0.5–1.5 cm, somewhat hairy; leaf blade broadly obovate or elliptic-oblong, 1.5–7 × 0.4–4 mm, papery, both surfaces hairy, base cuneate or rounded, margin entire or undulate, apex obtuse, with a mucro. Spikes terminal, erect, reflexed after anthesis, 10–30 cm; rachis angular, stout, densely hairy. Bracts lanceolate, 3–4 mm, apex acuminate; bracteoles spiny, shiny, 2.5–4.5 mm, rigid, base 2-winged; wings 1.5–2 mm, membranous, margin entire. Tepals lanceolate, 3.5–5 mm, with a vein. Stamens 2.5–3.5 mm; pseudostaminodes truncate or crenate at apex, fimbriate and ciliate. Utricles ovoid, 2.5–3 mm. Seeds brown, ovoid, ca. 2 mm. Fl. Jun–Aug, fr. Oct.  $2n = 42, 48, 84, 96$ .

Hillsides, waste places, roadsides, riverbanks; 800–2300 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Philippines, Sikkim, Sri Lanka, Thailand, Vietnam; Africa, SW Asia, Europe].

- 1a. Leaves abaxially silvery sericeous ..... 1d. var. *argentea*  
 1b. Leaves pubescent or subglabrous.  
     2a. Leaves apically acute, brownish red when dried ..... 1c. var. *rubrofusca*  
     2b. Leaves apically obtuse or mucronate, not brownish red when dried.  
     3a. Stem pubescent; leaves broadly obovate or elliptic-oblong, basally cuneate or rounded ..... 1a. var. *aspera*  
     3b. Stem densely white or yellow villous; leaves obovate, basally broadly cuneate ..... 1b. var. *indica*

**1a. *Achyranthes aspera* var. *aspera***

土牛膝(原变种) tu niu xi (yuan bian zhong)

Stem quadrangular, pubescent. Leaves broadly obovate or elliptic-oblong, densely pubescent or subglabrous, base cuneate or rounded, margin slightly undulate, apex obtuse or mucronate.

Hillsides, waste places; 800–2300 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan,

Zhejiang [Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Philippines, Sikkim, Thailand, Vietnam].

**1b. *Achyranthes aspera* var. *indica*** Linnaeus, Sp. Pl. 1: 204. 1753.

钝叶土牛膝 *dun ye tu niu xi*

*Achyranthes obtusifolia* Lamarck.

Stem densely white or yellow villous. Leaves obovate, 1.5–6.5 × 2–4 cm, densely hairy, base cuneate, margin undulate, apex obtuse, often with a mucro.

Roadsides, riverbanks. Guangdong, Sichuan, Taiwan, Yunnan [India, Sri Lanka].

**1c. *Achyranthes aspera* var. *rubrofusca*** (Wight) J. D. Hooker, Fl. Brit. India 4: 730. 1885.

禾叶土牛膝 *he ye tu niu xi*

*Achyranthes rubrofusca* Wight, Icon. Pl. Ind. Orient. 5(2): 3, t. 1778. 1852.

Leaves brownish red when dried, elliptic-ovate, 2–9 × 1–4 cm, both surfaces hairy, densely so abaxially, base cuneate, margin slightly undulate, apex acute.

Roadsides. Fujian, Hunan, Taiwan, Yunnan [India].

**1d. *Achyranthes aspera* var. *argentea*** C. B. Clarke in J. D. Hooker, Fl. Brit. India 4: 730. 1885.

银毛土牛膝 *yin mao tu niu xi*

*Achyranthes argentea* Thwaites, Enum. 249. 1861, not Lamarck (1785).

Stem quadrangular, pilose or glabrescent. Leaves green, broadly obovate or elliptic-oblong, abaxially silvery sericeous, apex acute.

Hillsides. Sichuan [India; Africa, SW Asia, Europe].

**2. *Achyranthes bidentata*** Blume, Bijdr. Fl. Ned. Ind. 545. 1826.

牛膝 *niu xi*

Herbs perennial, 70–120 cm tall. Stem green or tinged purple, angulate or quadrangular, appressed or spreading pubescent, or nearly glabrous; branches opposite. Petioles 0.5–3 cm, hairy; leaf blade elliptic or elliptic-lanceolate, rarely oblanceolate, 4.5–12 × 2–7.5 cm, both surfaces annexed or spreading pubescent, base cuneate or broadly cuneate, caudate. Spikes terminal or axillary, 3–5 cm; rachis 1–2 cm, white hairy. Flowers dense, ca. 5 mm. Bracts reflexed after anthesis, broadly ovate, 2–3 mm, apex acuminate; bracteoles 2.5–3 mm, spiny, base 2-parted, apex curved. Tepals shiny, lanceolate, 3–5 mm, with a midvein, apex acute. Stamens 2–2.5 mm; pseudostaminodes slightly serrulate, apex rounded. Utricles yellowish brown, shiny, oblong, 2–2.5 mm, smooth. Seeds light brown, oblong, ca. 1 mm. Fl. Jul–Sep, fr. Sep–Oct.  $2n = 42, 84^*$ .

Hillsides; 200–1800 m. Anhui, Fujian, Hebei, Hunan, Guangxi, Guizhou, Hubei, Jiangsu, Shaanxi, Shanxi, Sichuan, Taiwan, Xizang, Zhejiang [Bhutan, India, Indonesia, Japan, Korea, Laos, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Russia, Sikkim, Thailand, Vietnam].

- 1a. Plants sparsely hairy; flowers sparse in long spikes; tepals 3-veined ..... 2b. var. *japonica*  
1b. Plants hairy or subglabrous; flowers dense in spikes; tepals with a midvein ..... 2a. var. *bidentata*

**2a. *Achyranthes bidentata* var. *bidentata***

牛膝(原变种) *niu xi* (yuan bian zhong)

Plants hairy or subglabrous. Leaves elliptic or elliptic-lanceolate. Spikes terminal or axillary, densely flowered. Tepals with a midvein.

Hillsides; 200–1800 m. Fujian, Hebei, Guangxi, Guizhou, Hubei, Jiangsu, Shaanxi, Shanxi, Sichuan, Taiwan, Xizang, Zhejiang [Bhutan, India, Indonesia, Korea, Laos, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Russia, Sikkim, Thailand, Vietnam].

**2b. *Achyranthes bidentata* var. *japonica*** Miquel, Ann. Mus. Bot. Lugduno-Batavi 2: 132. 1865.

少毛牛膝 *shao mao niu xi*

*Achyranthes japonica* (Miquel) Nakai.

Spikes longer; flowers laxly arranged; spines of bracts shorter than perianth. Tepals 3-veined. Pseudostaminodes irregularly dentate or slightly 2-lobed, apex truncate.

Anhui, Hunan, Taiwan, Zhejiang [Japan].

**3. *Achyranthes longifolia*** (Makino) Makino, Bot. Mag. (Tokyo) 28: 180. 1914.

柳叶牛膝 *liu ye niu xi*

*Achyranthes bidentata* Blume var. *longifolia* Makino, Bot. Mag. (Tokyo) 12: 51. 1898.

Herbs perennial. Stem green or tinged purple, angulate or quadrangular; branches opposite. Petioles hairy; leaf blade lanceolate or broadly lanceolate, 10–20 × 2–5 cm, apex caudate. Spikes terminal or axillary; rachis white hairy. Flowers dense. Bracteoles reflexed after anthesis, acerose, ca. 3.5 mm, ciliate. Tepals shiny, lanceolate, with a midvein, apex acute. Pseudostaminodes indistinctly dentate at apex. Utricles yellowish brown, shiny, oblong, smooth. Seeds light brown, oblong.

Hillsides; below 1200 m. Guangdong, Guizhou, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Laos, Thailand, Vietnam].

This species is similar to *Achyranthes bidentata*, but differs in having leaves lanceolate or broadly so, 10–20 × 2–5 cm, caudate at the apex; bracteoles acerose, ca. 3.5 mm, ciliate at the margin; and pseudostaminodes indistinctly dentate at the apex.

## 10. TRICHURIELLA Bennet, Indian J. Forest. 8: 86. 1985.

针叶菟属 *zhen ye xian shu*

*Trichurus* C. C. Townsend (1974), not Clements (1896).

## AMARANTHACEAE

Herbs perennial. Leaves and branches opposite, rarely whorled. Flowers hermaphroditic, with 1 bract and 2 bracteoles, axillary or clustered into spikes. Bracts and bracteoles small, membranous. Tepals 4, persistent, lanceolate, subulate. Stamens 4 or 5, united at base; pseudostaminodes triangular or nearly quadrangular (subulate), alternate with stamens. Styles very short; stigma very short, 2-parted. Utricles dehiscent by lid. Seeds ovoid.

One species: SE Asia.

**1. *Trichuriella monsoniae*** (Linnaeus f.) Bennet, Indian J. Forest. 8: 86. 1985.

针叶苋 zhen ye xian

*Illecebrum monsoniae* Linnaeus f., Suppl. Pl. 161. 1782; *Achyranthes monsoniae* (Linnaeus f.) Persoon; *A. setacea* Roth; *Aerva monsoniae* (Linnaeus f.) C. Martius; *Celosia monsoniae* (Linnaeus f.) Retzius; *Trichurus monsoniae* (Linnaeus f.) C. C. Townsend.

Herbs perennial, 5–50 cm tall. Stem branched from base; branches ascending or stoloniferous, white lanose. Leaves opposite or nearly whorled, sessile, grayish green, subulate, linear,

1–2.5 cm × ca. 1 mm, abaxially white lanose, adaxially glabrous, base attenuate, sometimes vaginate. Spikes terminal, narrowly ovate or terete, 0.5–2.5 cm, 3–5 mm in diam., white lanose; rachis very short or absent. Bracts and bracteoles lanceolate, 1–2 mm, abaxially white lanose. Tepals 4, light red, subulate-lanceolate, ca. 2 mm, white lanose. Stamens 4 or 5, shorter than perianth; pseudostaminodes subulate, membranous. Utricles ovoid, 1.5–2 mm, circumscissile at apex. Seeds brown, slightly shiny, ovoid, 1–1.5 mm, smooth. Fl. Apr–Aug, fr. Aug–Nov.

In sand at seashores; sea level. Hainan [India, Myanmar, Sri Lanka, Thailand, Vietnam].

## 11. IRESINE P. Browne, Civ. Nat. Hist. Jamaica, 358. 1756, nom. cons.

血苋属 xue xian shu

Herbs erect or climbing subshrubs. Leaves opposite, margin entire or serrate. Flowers perfect or unisexual on different plants, very small, solitary or clustered in spikes and again arranged into complex thyrsoid structures. Bracts and bracteoles often shiny, membranous. Tepals 5, membranous, long hairy or nearly glabrous, base not rigid. Stamens 5; pseudostaminodes very small or absent in female flowers. Ovary compressed; style very short or absent; stigmas 2, rarely 3, subulate; ovule 1, pendulous. Utricles globose, compressed, indehiscent. Seeds shiny, lenticular or reniform.

About 70 species: tropical Asia, North and South America, Pacific Islands; one species (introduced) in China.

**1. *Iresine herbstii*** Hooker ex Lindley, Gard. Chron. 1864: 654. 1864.

血苋 xue xian

Herbs perennial, 1–2 m tall. Stem often tinged red, stout, branched. Petiole 2–3 cm, annexed hairy or nearly glabrous; leaf blade purple with lighter bands along main veins, broadly ovate to suborbicular, 2–6 cm in diam., annexed hairy, base truncate, margin entire, apex retuse or 2-lobed. Complex

thyrsoid structures terminal or axillary, composed of many spikes. Bracts and bracteoles persistent, greenish white or yellowish white, ovate, 1–1.5 mm, glabrous. Flowers small, unisexual on different plants. Tepals greenish white or yellowish white, oblong, ca. 1 mm. Ovary globose, compressed; style very short.

Widely cultivated. Guangdong, Guangxi, Hainan, Jiangsu, Shanghai, Yunnan [native to South America (Brazil)].

## 12. ALTERNANTHERA Forsskål, Fl. Aegypt.-Arab. 28. 1775.

莲子草属 lian zi cao shu

Herbs annual or perennial, ascending or creeping; stem much branched. Leaves opposite, margin entire. Flowers perfect, in sessile or peduncled heads, solitary in axils of bracts. Bracts and bracteoles persistent, membranous. Tepals 5, often unequal, membranous. Stamens 2–5; filaments connate into a tube or a cup at base; anthers 1-loculed; pseudostaminodes entire, dentate, or lacinate. Ovary globose or ovoid; ovule 1, pendulous; style short or long; stigma capitate. Utricles globose or ovoid, indehiscent, falling off with perianth. Seeds lenticular, vertical.

About 200 species: mainly in North and South America, widely naturalized elsewhere; five species (four introduced) in China.

*Alternanthera purpurea* Y. T. Chang & M. J. Lai (Landscape Architecture [Taipei] [1] (4): 125. 1990, not Pynaert, 1879) was described from Taiwan. We have seen no specimens of this taxon and are therefore unable to treat it in this account. Further revisionary study is necessary.

- 1a. Heads with a peduncle, axillary ..... 5. *A. philoxeroides*  
 1b. Heads all sessile, axillary, rarely terminal.  
   2a. Tepals abaxially glabrous.  
     3a. Stamens 3; midvein of tepals not spiny at apex ..... 1. *A. sessilis*  
     3b. Stamens 5; midvein of tepals becoming spiny at apex ..... 2. *A. pungens*  
   2b. Tepals abaxially hairy.

- 4a. Stem ascending or erect; pseudostaminodes ca. as long as stamens ..... 3. *A. betzickiana*  
 4b. Stem prostrate; staminodes ca. 1/2 as long as stamens ..... 4. *A. paronychioides*

**1. *Alternanthera sessilis*** (Linnaeus) R. Brown ex Candolle, Cat. Pl. Horti Monsp. 77. 1813.

蓬子草 *lian zi cao*

*Gomphrena sessilis* Linnaeus, Sp. Pl. 1: 225. 1753; *Alternanthera denticulata* R. Brown; *A. nodiflora* R. Brown; *Illecebrum sessile* (Linnaeus) Linnaeus.

Herbs perennial, 10–45 cm tall. Stem ascending or creeping, green or somewhat tinged purple, striped, hairy, across nodes with a transverse row of hairs. Petiole 1–4 mm, glabrous or pilose; leaf blade linear-lanceolate, oblong-obovate, or ovate-oblong, 1–8 × 0.2–2 cm, glabrous or pilose, base attenuate, margin entire or slightly serrate, apex acute or obtuse. Heads 1–4, axillary, sessile, at first globose, later cylindrical, 3–6 mm in diam. Flowers dense; rachis densely white hairy. Bracts and bracteoles white, glabrous, apex acuminate; bracts ovate-lanceolate, ca. 1 mm; bracteoles subulate, 1–1.5 mm. Tepals white, ovate, 2–3 mm, glabrous, with a vein, apex acuminate or acute. Stamens 3; filaments ca. 0.7 mm, connate into a cup at base; anthers oblong; pseudostaminodes subulate, shorter than stamens, margin entire, apex acuminate. Style very short; stigma shortly parted. Utricles enclosed in perianth, dark brown, obovoid, 2–2.5 mm. Seeds ovoid. Fl. May–Jul, fr. Jul–Sep.  $2n = 34, 40$ .

Roadsides, gardens, swamps. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Zhejiang, Yunnan [Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Philippines, Sikkim, Thailand, Vietnam].

**2. *Alternanthera pungens*** Humboldt et al., Nov. Gen. Sp. 2: 206. 1818.

刺花蓬子草 *ci hua lian zi cao*

*Achyranthes repens* Linnaeus; *Alternanthera repens* (Linnaeus) Link.

Herbs annual. Stem diffuse, creeping, much branched, 20–30 cm tall, densely rigidly hairy. Petiole 3–10 mm, glabrous or hairy; leaf blade ovate, obovate, or elliptic-obovate, 1.5–4.5 × 0.5–1.5 cm, unequal in each pair, glabrous or annexed pilose, base acuminate, apex obtuse. Heads sessile, 1–3, axillary, white, globose or oblong, 5–10 mm. Bracts lanceolate, ca. 4 mm, spiny at apex; bracteoles lanceolate, 3–4 mm, apex acuminate, without spines. Tepals unequal, outer 2 lanceolate, ca. 5 mm, 3-veined below, rigid after anthesis, midvein stretching into spines; central segment elliptic, 3–3.5 mm, compressed; inner 2 small, enclosing ovary. Stamens 5; filaments 0.5–0.8 mm; pseudostaminodes shorter than filaments, entire or irregularly dentate. Style very short. Utricles brown, broadly ellipsoid, 1–1.5 mm. Fl. May, fr. Jul.

Roadsides. Fujian, Sichuan [native to South America; naturalized in Bhutan, Myanmar, Thailand, ?other parts of Indo-China, Australia, and United States].

One of us (Clemants) notes that the name *Alternanthera pungens* has been misapplied here and that this taxon should instead be treated as *A. caracasana* Humboldt et al.

**3. *Alternanthera betzickiana*** (Regel) G. Nicholson, Ill. Gard. Dict. 59. 1884.

锦绣苋 *jin xiu xian*

*Telanthera betzickiana* Regel, Ind. Sem. Hort. Petrop. 1862: 28. 1862; *Alternanthera ficoidea* (Linnaeus) R. Brown var. *betzickiana* (Regel) Backer; *A. ficoidea* var. *versicolor* (Lemaire) L. B. Smith & Downs; *A. versicolor* (Lemaire) Regel; *T. ficoidea* (Linnaeus) Moquin-Tandon var. *versicolor* Lemaire.

Herbs perennial, 20–50 cm tall. Stem erect or creeping, much branched, apical part quadrangular, basal part cylindrical, hairy at apex and nodes. Petiole 1–4 mm, slightly hairy; leaf blade green or red, or tinged red or yellow, oblong, oblong-ovate, or spatulate, 1–6 × 0.5–2 mm, hairy when young, glabrescent, base acuminate, margin undulate, apex acute or obtuse, with a mucro. Heads 2–5, terminal or axillary, 5–10 mm, sessile. Bracts and bracteoles ovate-lanceolate, 1.5–3 mm, abaxially glabrous or long hairy, apex acuminate. Tepals white, ovate-oblong; outer segments 3–4 mm, densely hairy; middle segment shorter, pilose or glabrous; inner segment short, narrow, pilose or glabrous. Stamens 5; filaments 1–2 mm; anthers linear; pseudostaminodes fasciated, 3–5-parted at apex. Ovary glabrous; style ca. 0.5 mm. Fruit undeveloped. Fl. Aug–Sep.

Cultivated in nearly all the large cities of China [native to South America; cultivated throughout SE Asia].

One of us (Clemants) indicates that this is best treated as *Alternanthera ficoidea* var. *betzickiana*.

**4. *Alternanthera paronychioides*** A. Saint-Hilaire, Voy. Distr. Diam. 2: 439. 1833.

华蓬子草 *hua lian zi cao*

Herbs perennial. Stem densely barbellate hairy, glabrescent. Leaf blade oblanceolate or spatulate, 1.5–2 × 0.3–0.5 cm, abaxially barbellate hairy, apex obtuse to rounded. Heads sessile, ovoid to globose, often hairy at base. Tepals white, ovate-oblong, scarious, hairy along veins, outer 3 segments: 3-veined in proximal half, inner 2 somewhat laterally compressed, 1-veined, apex acute to mucronate. Stamens 5; anthers yellow, ellipsoid; staminodes 3- or 4-toothed, ca. 1/2 as long as stamens; stigma capitate. Utricle brown, obcordate.

Guangdong, Hainan, Taiwan [native to tropical America].

**5. *Alternanthera philoxeroides*** (C. Martius) Grisebach, Abh. Königl. Ges. Wiss. Göttingen 24: 36. 1879.

喜旱蓬子草 *xi han lian zi cao*

*Bucholzia philoxeroides* C. Martius, Nov. Actorum Acad. Caes. Leop.-Carol. Nat. Cur. 13(1): 107. 1825; *Achyranthes philoxeroides* (C. Martius) Standley; *Telanthera philoxeroides* (C. Martius) Moquin-Tandon.

Herbs perennial. Stem ascending from a creeping base, 55–120 cm, branched; young stem and leaf axil white hairy; old ones glabrous. Petiole 3–10 mm, glabrous or slightly hairy; leaf

blade oblong, oblong-obovate, or ovate-lanceolate, 2.5–5 × 0.7–2 cm, glabrous or ciliate, adaxially muricate, base attenuate, margin entire, apex acute or obtuse, with a mucro. Heads with a peduncle, solitary at leaf axil, globose, 0.8–1.5 cm in diam. Bracts and bracteoles white, 1-veined, apex acuminate; bracts ovate, 2–2.5 mm; bracteoles lanceolate, ca. 2 mm. Tepals white, shiny, oblong, 5–6 mm, glabrous, apex acute. Filaments 2.5–3

mm, connate into a cup at base; pseudostaminodes oblong-linear, ca. as long as stamens. Ovary obovoid, compressed, with short stalk. Fruit not known. Fl. May–Oct.  $2n = 100^*$ .

Cultivated, waste places. Beijing, Fujian, Guangxi, Hebei, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Zhejiang [native to South America (Brazil)].

### 13. GOMPHRENA Linnaeus, Sp. Pl. 1: 224. 1753.

千日红属 qian ri hong shu

Herbs or subshrubs. Leaves opposite, rarely alternate. Flowers perfect, clustered in heads. Bracteoles with distal crest. Tepals 5, equal or not, long hairy or glabrous. Stamens 5; filaments united into a tube or cup at base, lateral appendages present, 3-parted at apex, pseudostaminodes absent; anthers 1-loculed, with a pendulous ovule; stigmas 2 or 3, linear, or stigma 2-parted. Utricles globose or oblong, compressed, indehiscent. Seeds shiny, lenticular.

About 100 species: mainly in North and South America and Pacific Islands, naturalized elsewhere; two species (one introduced) in China.

- 1a. Stem gray strigose; tepals not rigid after anthesis; inflorescences purplish red, light purple, or white ..... 1. *G. globosa*  
 1b. Stem white villous; tepals rigid after anthesis; inflorescences silvery ..... 2. *G. celosioides*

#### 1. *Gomphrena globosa* Linnaeus, Sp. Pl. 1: 224. 1753.

千日红 qian ri hong

Herbs annual, erect, 20–60 cm tall. Stem stout, branched; branches slightly quadrangular, gray strigose, slightly inflated at nodes. Petiole 1–1.5 cm, long gray hairy; leaf blade oblong or oblong-obovate, 3.5–13 × 1.5–5 cm, papery, long white hairy and ciliate, narrowing toward base, margin undulate, apex acute or obtuse. Heads terminal, 1–3, usually purple, sometimes light purple or white, 2–2.5 cm in diam. Bracts 2, opposite, green, ovate or cordate, 1–1.5 cm, gray hairy; bracts white, purple at apex, ovate, 3–5 mm; bracteoles purple, triangular-lanceolate, much longer than bracts, 1–1.2 cm. Tepals not rigid after anthesis, lanceolate, 5–6 mm, outside densely white lanose, apex acuminate. Filaments connate into a tube, 5-parted at apex. Styles linear, shorter than tube of stamens; stigmas 2, furcate. Utricles subglobose, 2–2.5 mm in diam. Seeds brown, shiny, reniform. Fl. and fr. Jun–Sep.

Widely cultivated. Fujian, Guangxi, Guizhou, Hebei, Hubei, Shanxi, Sichuan, Xinjiang, Zhejiang [native to neotropics; cultivated and naturalized throughout tropical Asia].

#### 2. *Gomphrena celosioides* C. Martius, Nov. Actorum Acad. Caes. Leop.-Carol. Nat. Cur. 13(1): 301. 1825.

银花苋 yin hua xian

Herbs annual, erect. Stem white villous. Petiole 1–1.5 cm, long gray hairy; leaf blade oblong or oblong-obovate, papery, long white hairy and ciliate, narrowing toward base, margin undulate, apex acute or obtuse. Heads silvery; bracteoles purple, triangular-lanceolate, much longer than bracts. Tepals rigid after anthesis. Filaments connate into a tube, 5-parted at apex. Styles linear, shorter than tube of stamens; stigmas 2, furcate. Utricles subglobose. Fl. and fr. Feb–Jun.  $2n = 26$ .

Roadsides, waste places. Hainan, Taiwan [pantropical].

One of us (Clemants) questions whether this is the same as *Gomphrena serrata* Linnaeus.

### 14. PHILOXERUS R. Brown, Prodr. 416. 1810.

安旱苋属 an han xian shu

Herbs creeping, glabrous or slightly tomentose. Leaves opposite, margin entire. Flowers perfect, densely clustered in heads. Heads terminal or axillary, globose or terete. Bracts papery; bracteoles keeled, without distal crest. Tepals 5, with short claw at base. Stamens 5; filaments subulate, connate into a cup at base, lateral appendages absent, pseudostaminodes absent; anthers 1-loculed. Ovary ovoid, compressed; style very short; stigma 2-parted; ovule 1, pendulous. Seeds shiny, lenticular.

About 15 species: W Africa, E Asia, E North and South America, Pacific Islands; one species in China.

#### 1. *Philoxerus wrightii* J. D. Hooker in Bentham & J. D. Hooker, Gen. Pl. 3: 40. 1880.

安旱苋 an han xian

*Blutaparon wrightii* (J. D. Hooker) J. A. Mears.

Herbs dwarf, 2–5 cm tall. Stem caespitose, much branched, glabrous. Petiole 2–3 mm, glabrous; leaf blade obovate-spatulate, 4–8 × 2–3 mm, glabrous, base attenuate, apex obtuse.

Heads terminal, small, 5–7 mm, with a short rachis. Bracts and bracteoles ovate, 1.5–1.7 mm, with 1 or 3 veins, apex obtuse. Filaments connate into a tube at base, united part ca. as long as free part. Style persistent, slender; stigma subulate. Utricles enclosed in perianth, ovoid, compressed, membranous. Seeds brown. Fl. May–Aug.

Rocky shores; sea level. Taiwan [Japan].

**15. STILBANTHUS** J. D. Hooker, Hooker's Icon. Pl. 13: 67. 1879.

巨菟藤属 ju xian teng shu

Climbers large, woody, with pendulous branches. Leaves opposite. Spikes terminal or axillary from uppermost nodes, often paniced, on pendulous peduncles; midvein of bracteoles flexible, mucronate. Tepals 5, rigid. Stamens 5; filaments shortly connate at base, alternating with pseudostaminodes, pseudostaminodes oblong, long fimbriate; anthers 2-loculed. Ovary oblong, compressed; style slender; stigma minute. Fruit oblong, 1-seeded, indehiscent.

One species: Asia.

**1. *Stilbanthus scandens*** J. D. Hooker, Hooker's Icon. Pl. 13: 67. 1879.

巨菟藤 ju xian teng

Branchlets soft, sparsely tomentose. Leaves opposite; petiole 1.2–2.5 cm; leaf blade broadly elliptic, 4–7 × 2.5–4.5 cm, sparsely tomentose especially at margin, apex acuminate. Flowers perfect, large. Inflorescences terminal or axillary spikes, 3–5 cm, less branched; rachis hairy. Bracts persistent, ovate, ca. 2.6 mm, bracteoles equaling bracts, falling off with

perianth in fruit. Tepals straight, ovate-lanceolate, ca. 4.5 mm, enlarging to 9 mm in fruit, hairy at apex. Stamens 5; filaments linear, hairy, shortly connate at base, alternating with oblong, fimbriate pseudostaminodes; anthers 2-loculed. Ovary oblong, compressed, ca. 4.5 × 3 mm; style ca. 3.5 mm, slender, hairy at base; stigmas minute. Utricles oblong, ca. 3.5 mm, hairy at apex. Seeds shiny.

Forests; 900–2300 m. Guangxi, Yunnan [Bhutan, India, Myanmar, Sikkim].

AMARANTHACEAE