

- 1a. Lower glume 1/2–3/5 length of lowest lemma; stolons bent zigzag, nodes hirsute ..... 1. *P. japonicus*  
 1b. Lower glume up to 1/2 length of lowest lemma; stolons if present straight, nodes glabrous.  
 2a. Spikelets 10–18 mm; upper glume 6–9 mm; panicle branches usually spiculate to base; culms up to 2 m tall ... 2. *P. australis*  
 2b. Spikelets 8–10 mm; upper glume 3.5–5 mm; panicle branches often bare around lowermost node; culms  
 4–6 m tall ..... 3. *P. karka*

**1. *Phragmites japonicus*** Steudel, Syn. Pl. Glumac. 1: 196. 1854.

日本苇 ri ben wei

*Phragmites japonicus* var. *prostratus* (Makino) L. Liu; *P. prostratus* Makino; *P. serotinus* Komarov.

Perennial with underground rhizomes and long overground stolons; stolons bent zigzag, nodes hirsute. Culms up to 2 m tall, 4–5 mm in diam., nodes pubescent. Leaf sheaths tinged purple upward; leaf blades 10–30 × 2–3 cm, margins scabrous, apex acuminate; ligule 0.2–0.6 mm, ciliolate, hairs ca. 0.1 mm. Panicle 20–30 × 5–8 cm; axis puberulous; pedicels 6–7 mm, pilose, hairs soft, up to 2 mm. Spikelets purplish, 8–12 mm, florets 3–4; glumes acute, lower glume 1/2–3/5 length of lowest lemma, ca. 5 mm, upper glume ca. 5.5 mm; lowest lemma linear-lanceolate, 6–10 mm; floret callus bare in lower 1/3, upper 2/3 with silky hairs 3/4 length of lemma; bisexual lemmas very narrowly lanceolate, 6–9 mm, apex acuminate.  $2n = 48$ .

Swamps and lakesides; 200–1000 m. Heilongjiang, Jilin, Liaoning [Japan, Korea, Russia (Far East, Kuril Islands)].

**2. *Phragmites australis*** (Cavanilles) Trinius ex Steudel, Nomencl. Bot., ed. 2, 1: 143. 1840.

芦苇 lu wei

*Arundo australis* Cavanilles, Anales Hist. Nat. 1: 100. 1799; *A. phragmites* Linnaeus; *Phragmites communis* Trinius.

Robust perennial from an extensive creeping rhizome; overground stolons sometimes present, straight, nodes glabrous. Culms up to 2 m or more tall, ca. 6 mm in diam., usually farinose below nodes, nodes glabrous or pubescent. Leaf sheaths light green, glabrous or thinly hairy; leaf blades usually drooping, up to 50 × 1–3 cm, smooth or margins scabrous, tapering to a filiform apex; ligule a minute membranous rim, ciliate, hairs 0.2–0.6 mm. Panicle 20–50 × ca. 10 cm, branches of lowermost whorl usually spiculate to base, densely hirsute at insertion; pedicels 2–4 mm, glabrous or pilose only at base. Spikelets 10–18 mm, florets 2–5; glumes acute, lower glume up to 1/2 length of lowest lemma, 3–5 mm, upper glume 6–9 mm; lowest lemma linear-lanceolate, 8–15 mm; floret callus with hairs equal to lemma; bisexual lemmas very narrowly lanceolate, 9–16 mm,

apex long attenuate. Fl. and fr. Jul–Nov.  $2n = 36, 44, 46, 48, 49, 50, 51, 52, 54, 84, 96, 120$ .

Moist places along river banks and lake margins, forming large colonies. Throughout China [cosmopolitan].

This is an extremely polymorphic, cosmopolitan reed with numerous chromosomal variants and ecotypes. Plants from the high Himalayas sometimes form short, leafy tufts with strongly distichous, short, pungent leaf blades. Similar variants occur elsewhere in the world in extreme conditions.

**3. *Phragmites karka*** (Retzius) Trinius ex Steudel, Nomencl. Bot., ed. 2, 1: 144. 1840.

卡开芦 ka kai lu

*Arundo karka* Retzius, Observ. Bot. 4: 21. 1786; *A. roxburghii* Kunth; *Phragmites cinctus* (J. D. Hooker) B. S. Sun; *P. roxburghii* (Kunth) Steudel; *Trichoon roxburghii* (Kunth) Wight.

Robust perennial from an extensive creeping rhizome. Culms very stout, often woody, 4–6 m tall, 1.5–2.5 cm in diam. Leaf sheaths greenish, glabrous; leaf blades erect-ascending, up to 80 × 2–3 cm, abaxial surface scabrous, apex stiff, long acuminate; ligule 0.5–1 mm, ciliolate. Panicle 30–50 × 10–20 cm; branches of lowermost whorl bare of spikelets toward base, ± glabrous at insertion. Spikelets 10–12 mm, florets 4–6; glumes lanceolate-elliptic, obtuse to acuminate, lower glume up to 1/2 length of lowest lemma, 2.5–4 mm, upper glume 3.5–5 mm; lowest lemma narrowly elliptic, 7–12 mm; floret callus with hairs 4–8 mm; bisexual lemmas linear-lanceolate, 8.5–10 mm, apex long attenuate. Fl. and fr. autumn.  $2n = 24, 36, 38, 48$ .

Warm swampy valleys and river banks; under 1000 m. Fujian, Guangdong, Guangxi, Hainan, Sichuan, Taiwan, Yunnan [Cambodia, India, Indonesia, Japan, Laos, Malaysia, Myanmar, New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Africa, N Australia, Pacific Islands].

This is a very robust species found in warm parts of the Old World. It has stiffer, more scabrous leaf blades and smaller spikelets with shorter callus hairs than *Phragmites australis*.

The name "*Arundo vallatoria* Linnaeus" (Herb. Amboin. 15. 1754) belongs here, but was not validly published (see Art. 34 Ex. 2 of the Saint Louis Code), and hence neither was the combination "*Phragmites vallatoria* (Linnaeus) Veldkamp" (Blumea 37: 233. 1992).

## 19. Tribe DANTHONIEAE

扁芒草族 bian mang cao zu

Wu Zhenlan (吴珍兰), Chen Shouliang (陈守良); Sylvia M. Phillips

Perennial or rarely annual, occasionally forming tall tussocks, culms usually solid. Leaf blades linear to setaceous; ligule a line of hairs (*Elytrophorus* membranous). Inflorescence an open or contracted panicle, sometimes spikelike or scanty and racemelike. Spikelets alike (except *Cortaderia*, *Elytrophorus*), laterally compressed, fertile florets several, uppermost florets reduced, disarticulating between florets; floret callus usually bearded, short and obtuse or elongate; glumes persistent (except *Schimus*), variable in length, shorter than lemmas to as long as spikelet, usually membranous, 1–9-veined, apex acute to acuminate; lemmas rounded on back, hyaline to leathery, glabrous, pilose or villous, hairs sometimes in tufts, (1–)3–11-veined, apex entire or 2-lobed, awnless or a

straight or geniculate awn with flat twisted column arising from apex or sinus, lobes often extended into bristles; palea well developed. Stamens (1–)3. Caryopsis usually ellipsoid, hilum short or long-linear. Leaf anatomy non-Kranz; microhairs slender, the apical cell ± as long as basal cell (replaced by long slender papillae in *Cortaderia*).  $x = 9$  or  $12$ .

Between 18 and 25 genera and ca. 300 species: tropical and temperate regions, mainly in S hemisphere, especially South Africa and Australia; four genera (one introduced) and six species (one introduced) in China.

- 1a. Tussock grass up to 3 m; leaf blade margins sharply serrulate; plants gynodioecious ..... 117. *Cortaderia*  
 1b. Tufted grasses up to 50 cm; leaf blade margins smooth or scabrous; plants bisexual.  
 2a. Spikelets in dense globose clusters along a long unbranched axis; lemmas 1–3-veined ..... 118. *Elytrophorus*  
 2b. Spikelets in a loose or contracted panicle; lemmas 5- or more-veined.  
 3a. Perennial; lemmas with conspicuous geniculate awn ..... 119. *Danthonia*  
 3b. Annual; lemmas awnless or mucronate ..... 120. *Schismus*

### 117. CORTADERIA Stapf, Gard. Chron., ser. 3, 22: 378. 1897, nom. cons.

蒲苇属 pu wei shu

Chen Shouliang (陈守良); Sylvia M. Phillips

*Moorea* Lemaire, nom. rej.

Perennial, tussock-forming, gynodioecious (bisexual and female plants). Culms often tall. Leaf blades mainly basal, linear, flat or convolute; ligule a line of hairs. Inflorescence a large plumose panicle. Spikelets laterally compressed, with 2 to several florets, disarticulating above glumes and between florets; rachilla villous; glumes longer than lowest lemma, sometimes as long as spikelet, narrow, membranous, 1-veined; floret callus linear, hairy; lemmas lanceolate to ovate, hyaline, 3–7-veined, villous on back, entire or 2-dentate, awnless or with a terminal awn; palea glabrous or sometimes pilose; female plants with sterile anthers present. Lodicules hairy.

Twenty-seven species: mainly South America, also New Zealand and New Guinea; one species (introduced) in China.

**1. Cortaderia selloana** (Schultes & J. H. Schultes) Ascherson & Graebner, Syn. Mitteleur. Fl. 2: 325. 1900.

蒲苇 pu wei

*Arundo selloana* Schultes & J. H. Schultes, Mant. 3: 605. 1827.

Perennial forming large tussocks. Culms robust, 2–3 m tall. Leaf blades stiff, 50–200 cm, 4–10 mm wide, glaucous, margins sharply serrulate, apex acuminate; ligule 2–4 mm. Panicle 30–100 cm, silvery or sometimes pinkish; branches erecto-

patent in bisexual, patent in female plants. Spikelets dimorphic, florets 2–5; glumes linear or lanceolate, acuminate; lemmas 3-veined, gradually tapering to an entire apex continuing into a slender awn. Female spikelets: glumes 8–9 mm; lemmas 8–14 mm, densely silky villous; palea 2.5–3 mm; minute staminodes present. Male spikelets: glumes 9–18 mm; lemmas 11–17 mm, sparsely pilose; palea 4–6 mm.

Cultivated. Jiangsu, Taiwan, Zhejiang [native to South America].

This species is widely cultivated as an ornamental (Pampas Grass). The sharply serrulate leaf margins cut skin very easily.

### 118. ELYTROPHORUS P. Beauvois, Ess. Agrostogr. 67. 1812.

总苞草属 zong bao cao shu

Chen Shouliang (陈守良); Sylvia M. Phillips

Annual. Leaf blades linear, flat; ligule membranous. Inflorescence composed of dense globular spikelet clusters, spaced or confluent along an elongate central axis, outer spikelets of each cluster with an enlarged lower glume and the lower or all lemmas empty, forming a chaffy involucre of linear-acuminate scales. Spikelets ovate, strongly laterally compressed, florets several, usually disarticulating above glumes and between florets; glumes slightly shorter than lemmas, subequal, membranous, narrow, 1-veined, acuminate to a short awn-point; lemmas 3-veined, keeled, membranous, shortly ciliate on keel and margins, keel acuminately extended into an awn-point; palea winged on keels. Lodicules 1–2. Stamens 1–3. Caryopsis with embryo 1/2 its length and free pericarp.

Two species: tropical Africa, Australia, India; one species in China.

The relationships of this odd little genus are still unclear. Molecular studies show it is probably more closely related to a group known as the crinipoid *Danthonieae*, from Africa and India, than to *Danthonia* and *Schismus*.

**1. Elytrophorus spicatus** (Willdenow) A. Camus in Lecomte, Fl. Indo-Chine 7: 547. 1923.

总苞草 zong bao cao

*Dactylis spicata* Willdenow, Ges. Naturf. Freunde Berlin

Neue Schriften 3: 416. 1801; *Elytrophorus articulatus* P. Beauvois; *Sesleria spicata* (Willdenow) Sprengel.

Culms tufted, erect, 10–50 cm tall. Leaf sheaths loose, glabrous; leaf blades up to 25 cm, 2–4 mm wide, often as long as the inflorescence, abaxial surface scabrous, adaxial surface his-

pidulous on veins, pilose near ligule; ligule 0.5–1 mm. Inflorescence 2–30 cm, globular spikelet clusters 3–7 mm in diam., discrete or confluent into a narrow cylinder. Spikelets broadly ovate, ca. 4 mm, florets 3–7; lower glume 1.5–2 mm; upper glume 1.5–2.5 mm; lemmas 2.5–3.5 mm (including awn), extended into an awn of variable length but commonly about as

long as lemma body; palea wings very variable in size and shape, often conspicuous, apex dentate. Anthers 1–3, 0.3–0.5 mm. Fl. and fr. May–Nov.

Wet places, often in rice fields. Hainan, Yunnan [Bhutan, India, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam; tropical Africa, Australia].

## 119. DANTHONIA Candolle in Lamarck & Candolle, Fl. Franç., ed. 3, 3: 32. 1805, nom. cons.

扁芒草属 bian mang cao shu

Wu Zhenlan (吴珍兰); Sylvia M. Phillips

*Sieglingia* Bernhardt, nom. rej.

Perennial. Culms tufted, erect, cleistogenes often present in culm sheaths. Leaf blades narrow, flat or rolled; ligule a line of hairs. Inflorescence an open or contracted panicle, sometimes reduced to a raceme. Spikelets large, wedge-shaped, laterally compressed, florets several, rachilla disarticulating above glumes and between florets; glumes subequal, as long as spikelet, membranous or papery, (1–)3–9-veined; floret callus short, obtuse; lemmas herbaceous or papery, 7–9-veined, pilose on margins or all over, apex 2-lobed, lobes acute or extended into slender awns; central awn arising from sinus, flat, column short, strongly twisted, bristle straight or sparsely twisted; palea equal to or shorter than its lemma. Lodicules 2, glabrous. Caryopsis with linear hilum up to 2/3 its length.

About 20 species: Asia, Europe, North and South America; two species in China.

*Danthonia* had a much broader circumscription in the past, including many species now placed in *Rytidosperma*. Species of *Rytidosperma* lack cleistogenes, and also differ from the above description in having lemma hairs in tufts, ciliate lodicules, and a punctiform hilum. Modern molecular studies have shown these two genera belong to different evolutionary lines. It is likely that the Himalayan species will be shown to be members of *Rytidosperma*, but some morphological characters are intermediate and the species have not yet been included in any molecular analysis. Further research is required to clarify their position.

1a. Glumes 10–12 mm, entire; lemma bifid to middle or below, tufts of hair at base of lobes; anthers 1.2–1.5 mm

..... 1. *D. cachemyriana*

1b. Glumes (10–)13–25 mm, denticulate or mucronate; lemma bifid above middle, variably hairy on upper back

and margins, hairs not or indistinctly tufted; anthers 3–5.5 mm ..... 2. *D. cumminsii*

**1. *Danthonia cachemyriana*** Jaubert & Spach, Ill. Pl. Orient. 4: 46. 1851.

扁芒草 bian mang cao

喀什米尔扁芒草 ka shi mi er bian mang cao

*Danthonia exilis* J. D. Hooker.

*Danthonia cachemyriana* Jaubert & Spach var. *minor* J. D. Hooker; *D. schneideri* Pilger; *D. schneideri* var. *minor* (J. D. Hooker) Karthikeyan.

Small densely tufted perennial, roots fibrous, basal sheaths soft, gray-brown. Culms up to 25 cm tall, cleistogenes absent. Leaf blades filiform, up to 6 cm, ca. 1 mm wide, glabrous, adaxial surface scabrous. Inflorescence a short contracted panicle or raceme, 2–4 cm; branches and pedicels scaberulous-puberulous. Spikelets with 3–5 florets; glumes 10–12 mm, pale green or purple-tinged, narrowly lanceolate, glabrous, acuminate; callus villous; lemma elliptic, deeply bifid to middle or below, 2.2–2.5 mm (to awn base), 5–7-veined, sparsely to densely pilose on back and tufts of hairs between veins across base of lobes, ciliate on margins, lobes long-acuminate into slender awns; central awn up to 1.5 cm with brown column, awns of lobes 4–5.5 mm. Anthers 1.2–1.5 mm. Lodicules ciliate, hairs ca. 0.5 mm. Caryopsis narrowly obovoid, ca. 1.5 mm; hilum linear-oblong, 2/5 caryopsis length. Fl and fr. Jul–Sep.

Rock crevices; 3800 m. Xizang [E Afghanistan, Kashmir, N Pakistan].

This is a grass of the NW Himalayas from the Hindu Kush to Kashmir.

**2. *Danthonia cumminsii*** J. D. Hooker, Fl. Brit. India 7: 282. 1896 [“1897”].

Tussocky perennial from a woody rootstock, basal sheaths leathery, yellowish. Culms 15–60 cm tall, cleistogenes absent. Leaf blades filiform, stiff, up to 35 cm, 1–2 mm wide, glabrous or abaxial surface pubescent. Inflorescence variable, 3–15 cm, a dense, narrow, many-spiculate panicle ranging to a few-spiculate raceme; branches and pedicels puberulous, sometimes a ring of hairs below spikelet. Spikelets with 4(–6) florets spaced on a filiform rachilla; glumes (10–)13–20 mm, gray-green or purple-tinged, elliptic-lanceolate, sometimes thinly hairy, denticulate or mucronate; callus villous; lemma elliptic, bifid above middle, often in upper 1/3, 4.2–8 mm (to awn base), 7–9-veined, thinly hairy on upper margins and across upper back or fringed on margins, hairs sometimes weakly tufted, infrequently short hairs also on lower back or marginal tufts toward base, lobes acuminate into slender awns; central awn 1.5–2.5 cm with dark brown column, awns of lobes 4.5–8 mm. Anthers 2.8–4.5 mm. Lodicules ciliate, hairs ca. 1 mm. Caryopsis narrowly elliptic-oblong, ca. 3 mm; hilum linear, 7/8 caryopsis length. Fl. and fr. May–Oct.

Alpine steppe-meadows, upland forests and stony ground near

streams; 3000–4500 m. Sichuan, Xizang, Yunnan [Bhutan, N India, Nepal, Pakistan].

This is a very variable species, especially in spikelet size and lemma indumentum, but it is not easily divided into infraspecific taxa.

Small-spiculate forms with purple glumes and larger, pallid forms sometimes grow together.

This is an important component of alpine pasture, providing good forage for yaks.

## 120. SCHISMUS P. Beauvois, Ess. Agrostogr. 73. 1812.

齿稃草属 chi fu cao shu

Wu Zhenlan (吴珍兰); Sylvia M. Phillips

Annuals or short-lived perennials, dwarf, densely tufted. Leaf blades linear, flat or involute; ligule a line of hairs. Inflorescence a contracted or spike-like panicle. Spikelets with several florets, laterally compressed, falling entire, or upper florets disarticulating separately and then lower florets, glumes, and pedicel falling tardily together; glumes as long as spikelet or almost so, subequal, membranous with hyaline margins, lanceolate, prominently 5–7-veined, acute to acuminate; lemmas ovate, rounded on back, membranous, 7–9-veined, pilose on back or margins, emarginate to 2-lobed, mucronate or not; palea equaling or subequaling lemma, hyaline. Lodicules 2, ciliate.

Five species: S Africa, C and SW Asia, Mediterranean region; introduced in America and Australia; two species in China.

- 1a. Apical lobes of lowest lemma narrowly triangular, clearly longer than wide; palea reaching slightly beyond base of lemma sinus, never exceeding middle of lobes ..... 1. *S. arabicus*  
 1b. Apical lobes of lowest lemma broadly triangular, not longer than wide; palea reaching at least middle of lobes, often as long as or longer than lemma ..... 2. *S. barbatus*

1. *Schismus arabicus* Nees, Fl. Afr. Austral. III. 422. 1841.

齿稃草 chi fu cao

*Schismus barbatus* (Linnaeus) Thellung subsp. *arabicus* (Nees) Maire & Weiller.

Annual. Culms tufted, 5–15 cm tall. Leaf sheaths glabrous; leaf blades up to 10 cm, glabrous or pilose on adaxial surface; ligule 0.5–1 mm. Inflorescence subspicate, 1–4 cm, 5–10 mm wide. Spikelets 5–7 mm, florets 5–8; glumes about as long as spikelet, lanceolate, acuminate, lower glume 4.5–6.5 mm, 5–7-veined, upper glume 5–7 mm, 3–5-veined; lemmas elliptic-ovate, 2.5–4 mm, 7–9-veined, pilose below middle with pointed hairs, deeply 2-lobed, lobes (of lowest lemma) 1–2 mm, narrowly triangular, clearly longer than wide, apex acuminate, with or without mucro from sinus; palea reaching only slightly beyond base of lemma sinus, never exceeding middle of apical lobes. Anthers 0.2–0.4 mm. Fl. and fr. Mar–Jul.  $2n = 12$ .

Arid open places. Xinjiang, W Xizang [Afghanistan, NW India, Mongolia, Pakistan, Russia (Altai)]; N Africa, C and SW Asia, SE Europe; introduced in America and Australia.

2. *Schismus barbatus* (Linnaeus) Thellung, Bull. Herb. Boissier, sér. 2, 7: 391. 1907.

髯毛齿稃草 ran mao chi fu cao

*Festuca barbata* Linnaeus, Demonstr. Pl. 3. 1753; *F. minuta* Hoffmann; *Schismus marginatus* J. D. Hooker; *S. minutus* (Hoffmann) Roemer & Schultes.

Annual. Culms tufted, 5–25 cm tall. Leaf sheaths loosely pilose toward ligule; leaf blades 1–5 cm, often pilose on adaxial surface near base; ligule ca. 0.5 mm. Inflorescence subspicate, 1–4 cm, 5–10 mm wide. Spikelets 5–6 mm, florets 5–10; glumes slightly shorter than spikelet, lanceolate, acute, lower glume 4–5 mm, 5–7-veined, upper glume 4–6 mm, 5-veined; lemmas broadly ovate, 1.8–2.5 mm, 9-veined, pilose below middle often with minutely clavate hairs, 2-lobed, lobes (of lowest lemma) 0.2–0.4 mm, broadly triangular, not longer than wide, apex acute, with or without mucro from sinus; palea reaching at least middle of apical lobes, often as long as or longer than lemma. Anthers 0.2–0.4 mm.  $2n = 12$ .

Dry open places. Xizang [Afghanistan, NW India, Turkmenistan]; N and S Africa, C and SW Asia, S Europe; introduced in America and Australia.

## 20. Tribe ARISTIDEAE

三芒草族 san mang cao zu

Chen Shouliang (陈守良), Lu Shenglian (卢生莲); Sylvia M. Phillips

Perennials, or occasionally annuals. Leaf blades narrow, often convolute; ligule a line of hairs. Inflorescence a contracted or open panicle. Spikelets all alike, with 1 floret, bisexual without rachilla extension, laterally compressed or terete, disarticulating above glumes; glumes usually longer than floret, persistent, membranous to scarios, 1–5-veined, apex acute to acuminate or mucronate; floret callus pungent to obtuse, bearded; lemma usually terete, cartilaginous becoming indurated at maturity, margins tightly convolute and enclosing the palea, 1–3-veined, veins converging at apex, extending directly into 3 awns, or more often combining into a single 3-branched awn raised upon a twisted column, laterals sometimes reduced or rarely suppressed, awn branches scabrid or all or only the central branch plumose; palea less than 1/2 length of lemma, often obscure, hyaline or membranous. Stamens 3, rarely 1. Caryopsis terete or fusiform, tightly enclosed within toughened lemma, embryo 1/3 its length; hilum linear. Leaf anatomy: either Kranz PS (*Stipagrostis*) or a form of Kranz unique to *Aristida*; microhairs absent or 1-celled, rarely 2-celled.  $x = 11, 12$ .