ceolate, 2–3 mm, gray-green or purplish; glumes 0.5–1.2 mm with lower glume slightly shorter than the upper, hyaline, veinless or upper glume 1-veined, apex obtuse; lemma 2–3 mm, gray-green or purple, scaberulous, lower 1/4 of back pilose; awn 8–16 mm. Anthers ca. 0.8 mm. Fl. and fr. Jul–Oct. 2*n* = 40, 42.

Moist places in mountain valleys, riversides, forests; 900–3000 m. Anhui, Fujian, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan, Zhejiang [Afghanistan, Bhutan, India, Japan, Korea, Nepal, Pakistan, Philippines, Russia].

4. Muhlenbergia ramosa (Hackel ex Matsumura) Makino, J. Jap. Bot. 1(4): 13. 1917.

多枝乱子草 duo zhi luan zi cao

Muhlenbergia japonica Steudel var. *ramosa* Hackel ex Matsumura, Bot. Mag. (Tokyo) 11: 444. 1897; *M. frondosa* (Poiret) Fernald subsp. *ramosa* (Hackel ex Matsumura) T. Koyama & Kawano.

Plants with creeping scaly rhizomes; rhizomes 11–30 × ca. 0.2 cm. Culms usually erect, 30–120 cm tall, 1–2.5 mm thick, with many branches in upper part. Leaf sheaths loosely overlapping, glabrous; leaf blades 5–12 × 0.3–0.6 cm, flat, thinner, scabrid on both surfaces and margins; ligule ca. 0.5 mm, truncate. Panicle 10–18 cm, narrow; branches one or two per node, usually with spikelets to the base. Spikelets narrowly lanceolate, ca. 3 mm, purplish gray-green; glumes 1.5–2.2 mm with lower glume usually shorter than the upper, broadly lanceolate, 1-veined, apex acute to acuminate; lemma 2.5–3.1 mm, lower 1/4 of back pilose; awn 5–10 mm, gray-green or purple, scabrid. Anthers ca. 0.5 mm. Caryopsis ca. 0.5 mm, brown, narrowly oblong. Fl. and fr. Jul–Oct.

Open forest of mountain valleys, moist places on mountain slopes; 100–1300 m. Anhui, Fujian, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Shandong, Sichuan, Yunnan, Zhejiang [Japan].

5. Muhlenbergia hakonensis (Hackel ex Matsumura) Makino, J. Jap. Bot. 1(4): 13. 1917.

箱根乱子草 xiang gen luan zi cao

Muhlenbergia japonica Steudel var. *hakonensis* Hackel ex Matsumura, Bot. Mag. (Tokyo) 11: 444. 1897.

Plants with creeping scaly rhizomes; rhizomes 3–5 cm, ca. 2 mm thick. Culms erect, 40–80 cm tall, ca. 1 mm thick at base, slender, not branching in upper part. Leaf sheaths loose, glabrous; leaf blades 5.5–12 × 0.2–0.4 cm, flat, scabrid on both surfaces and margins or abaxial surface smooth; ligule 0.5–1 mm, truncate, lacerate. Panicle 15–23 × ca. 0.5 cm, narrow, branches one or two per node, sparse, appressed. Spikelets narrowly lanceolate, 4–5 mm, gray-green; glumes 3–4 mm, papery, subequal or lower glume slightly shorter than the upper, 1-veined, scaberulous along veins, apex acuminate; lemma 4–5 mm, pale with gray-green variegation, equal to spikelet, lower 1/4 of back pubescent; awn 5–9 mm, straight. Anthers 1.5–2 mm. Caryopsis ca. 3 mm, red-brown, terete, hilum narrowly ovate, 1/3 length of the caryopsis. Fl. and fr. Jul–Oct. 2*n* = 40.

Wet places on mountain slopes, roadsides. Anhui, Sichuan [Japan, Korea].

6. Muhlenbergia curviaristata (Ohwi) Ohwi, Bot. Mag. (Tokyo) 55: 397. 1941.

弯芒乱子草 wan mang luan zi cao

Muhlenbergia ramosa var. *curviaristata* Ohwi, Acta Phytotax. Geobot. 6: 292. 1937; *M. curviaristata* var. *nipponica* Ohwi; *M. tenuiflora* (Willdenow) Britton, et al. subsp. *curviaristata* (Ohwi) T. Koyama & Kawano.

Plants with creeping scaly rhizomes; rhizomes up to 10 cm, 2–3 mm thick. Culms erect, 60–100 cm tall, ca. 2 mm thick, not branching in upper part, smooth or puberulent below nodes. Leaf sheaths loose, glabrous or scaberulous; leaf blades 8–19 cm × 3–6 mm, flat, scabrid on both surfaces and margins; ligule 0.5–1 mm, apex truncate, lacerate. Panicle 15–35 × 0.5–1.5 cm, effuse or contracted; branches usually two per node, ascending, scabrid. Spikelets lanceolate, 3–3.5 mm, pale purplish; glumes membranous, 1-veined, scabrid on veins, apex acute; lower glume 1.5–2 mm, upper glume 2–2.5 mm; lemma equal to spikelet, 3–3.5 mm, glaucous and variegated with dark gray, lower 1/4 of back pilose; awn 5–10 mm, flexuose or erect, pale or sometimes purplish, scabrid. Anthers ca. 1 mm. Fl. and fr. Jul–Sep. 2*n* = 40.

Grassy places on mountain slopes, forests, moist ground along roadsides; 900–1400 m. Hebei, Jilin, Liaoning [Japan].

23. Tribe CYNODONTEAE

虎尾草族 hu wei cao zu

Sun Bixing (孙必兴 Sun Bi-sin), Chen Shouliang (陈守良), Wu Zhenlan (吴珍兰); Sylvia M. Phillips

Annual or perennial herbs. Leaf blades linear to ovate; ligule a short membrane with ciliate or ciliolate margin. Inflorescence composed of racemes; racemes solitary, digitate or scattered along an axis, tough, unilateral (bilateral and axis fragile in *Lepturus*), persistent, or sometimes racemes very short, contracted into a cylindrical spikelike inflorescence and falling entire from main axis, or spikelets borne directly on main axis. Spikelets with 1 fertile floret, with or without additional sterile florets, disarticulating above glumes but not between florets or falling entire; glumes herbaceous, 1–3-veined (5–12-veined in *Lepturus*), shorter than floret or exceeding and enclosing it, sometimes lower glume absent; lemma membranous to leathery, keeled or rounded, 1–3-veined, lateral veins near margins and often ciliate, apex entire or 2–3(–5)-lobed, awned or awnless. Caryopsis sometimes with free pericarp. Leaf anatomy: Kranz PS type; microhairs short and stout. *x* = 9, 10.

About 60 genera: throughout the tropics and subtropics, extending into North America; 12 genera (three introduced) and 27 species (six introduced) in China.

1a. Spikelets sunk in cavities of rachis; rachis fragile; inflorescence a single bilateral raceme ..... 141. *Lepturus*
1b. Spikelets not in cavities; rachis tough; inflorescence not a single bilateral raceme.
2a. Inflorescences unisexual, plant monoecious or dioecious; female inflorescence a tough globular burr in inflated upper leaf sheaths ..... 149. *Buchloë*
2b. Inflorescences bisexual, all alike.
3a. Inflorescence cylindrical; racemes very short, borne along central axis, deciduous, or deciduous spikelets borne singly.
4a. Spikelets with long flexuous awns ..... 152. *Perotis*
4b. Spikelets awnless or mucronate.
5a. Spikelets 2 or more on short racemelets; glume with rows of hooked spines ..... 150. *Tragus*
5b. Spikelets borne singly on the central axis; glume smooth, glossy ..... 151. *Zoysia*
3b. Inflorescence not cylindrical; racemes digitate, scattered or solitary, persistent or rarely deciduous.
6a. Racemes borne along an axis.
7a. Lemma 3-awned; sterile floret and rachilla extension present ..... 148. *Bouteloua*
7b. Lemma acute; sterile floret and rachilla extension absent ..... 147. *Spartina*
6b. Racemes digitate, subdigitate or solitary.
8a. Fertile floret solitary.
9a. Raceme solitary; glumes longer than and enclosing floret ..... 145. *Microchloa*
9b. Racemes digitate; glumes shorter than the exposed floret ..... 146. *Cynodon*
8b. Fertile floret accompanied by male or sterile florets.
10a. Spikelets dark brown; upper glume with stout subapical awn ..... 144. *Eustachys*
10b. Spikelets pallid or purplish; upper glume at most with fine mucro.
11a. Lemma keeled, caryopsis subterete ..... 142. *Chloris*
11b. Lemma back flat, caryopsis dorsally compressed ..... 143. *Enteropogon*

141. LEPTURUS R. Brown, Prodr. 207. 1810.

细穗草属 xi sui cao shu

Wu Zhenlan (吴珍兰); Sylvia M. Phillips

Perennial, rarely annual. Culms stoloniferous or decumbent. Leaf blades linear or linear-lanceolate; ligule membranous, margin ciliate. Inflorescence a single cylindrical bilateral raceme; spikelets alternate, sessile, borne edgeways and sunken in hollows on opposite sides of articulated rachis, falling with adjacent rachis internode; rachis terminating in a spikelet. Spikelets dorsally compressed, florets 1 or 2, disarticulating above glumes and between florets, rachilla extension with apical rudimentary floret present; lower glume minute or suppressed; upper glume leathery, appressed to rachis, exceeding and covering the sunken florets, closely 5–12-veined, apex acute to caudately awned; lemma much shorter than upper glume, rounded on back, cartilaginous to hyaline, 3-veined, apex obtuse to acute; palea membranous, usually equal to lemma. Caryopsis ellipsoid, pericarp free. $x = 9$. Leaf anatomy: Kranz PS type, with short stout microhairs.

Eight to fifteen species: shores of Indian and W Pacific Oceans; one species in China.

Lepturus has characteristic, sunken spikelets within a fragile rachis, unique in the tribe, but the leaf anatomy is typically chloridoid. Its precise affinities are uncertain, and it is sometimes placed in its own tribe, *Leptureae*.

1. Lepturus repens (G. Forster) R. Brown, Prodr. 207. 1810.

细穗草 xi sui cao

Rottboellia repens G. Forster, Fl. Ins. Austr. 9. 1786; *Monerma repens* (G. Forster) P. Beauvois.

Perennial, stoloniferous, often very widely spreading. Culms tough, 20–50 cm tall, much branched. Leaf sheaths usually keeled, glabrous; leaf blades stiff, flat or involute, glaucous, 3–20 cm, 2.5–5 mm wide, glabrous or adaxially pilose near ligule, margins scabrous, apex acuminate; ligule 0.3–0.8 mm. Raceme erect, 5–15 cm; spikelets sometimes paired on each internode toward raceme base; rachis scabrous-hispidulous, internodes 3–5 mm. Spikelets 10–12 mm, florets often 2; lower glume membranous, triangular, up to 0.8 mm or absent; upper glume narrowly lanceolate, as long as spikelet, leathery, scabrous, apex caudate-aristate; lower lemma broadly lanceolate, 3.7–4.5 mm, puberulous near base, cartilaginous in lower two-thirds, thinner and scabrous above, apex acute. Anthers 1.5–2 mm. Caryopsis strongly dorsally compressed, plano-convex, 1.6–2 mm. $2n = 54$.

Rocky and sandy seashores, especially coral sand. Taiwan [Japan (Ryukyu Islands), Indonesia, Malaysia, New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; E Africa, N Australia, Indian Ocean Islands, Pacific Islands (Polynesia)].

142. CHLORIS Swartz, Prodr. 25. 1788.

虎尾草属 hu wei cao shu

Sun Bixing (孙必兴 Sun Bi-sin); Sylvia M. Phillips

Annuals or perennials, with rhizomes or stolons. Basal leaf sheaths rounded or keeled; leaf blades linear, flat or folded; ligule a short ciliolate membrane. Inflorescence of racemes, digitate or occasionally in 2 or more whorls; spikelets shortly pedicelled or subsessile, closely imbricate, biseriate. Spikelets laterally compressed, florets 2–4, lowermost fertile, successive florets male or sterile and progressively reduced, disarticulating above glumes; glumes unequal, usually shorter than florets, lanceolate, membranous, 1-veined, acuminate to an awn-point; callus bearded; lemma of fertile floret keeled, lanceolate to obovate, cartilaginous to leathery, usually ciliate on margins and keel, apex entire or emarginate, subapically mucronate or awned; palea as long as lemma; subsequent florets similar to fertile floret or of different shape or vestigial. Caryopsis ellipsoid to subterete, pericarp free though sometimes reluctantly so. $x = 10$.

About 55 species: tropical and warm-temperate regions throughout the world; five species (one introduced) in China.

1a. Leaf blades obtuse; lowest lemma glabrous ..... 1. *C. pycnothrix*
1b. Leaf blades acute to tapering; lowest lemma hairy on margins.
2a. Lowest lemma with spreading 2.5–4 mm hairs on upper margins ..... 3. *C. virgata*
2b. Lowest lemma with 0.5–1.5 mm hairs on upper margins.
3a. Culms 1–3 m, stoloniferous perennial; spikelets 2-awned ..... 2. *C. gayana*
3b. Culms up to 1 m, tufted annuals (or weakly perennial); spikelets 3-awned.
4a. Sterile lemmas inflated; the lower 1–1.5 mm, nearly as long as wide ..... 4. *C. barbata*
4b. Sterile lemmas ± flattened; the lower 1.6–2 mm, longer than wide ..... 5. *C. formosana*

1. Chloris pycnothrix Trinius, Gramin. Unifl. Sesquifl. 234. 1824.

异序虎尾草 yi xu hu wei cao

Chloris anomala B. S. Sun & Z. H. Hu.

Annual or short-lived perennial, stoloniferous. Culms erect or geniculately ascending and rooting at lower nodes, 35–60 cm tall. Leaf sheaths keeled, glabrous; leaf blades flat or folded, 3–16 cm, 3–5 mm wide, glabrous, apex obtuse, often mucronulate; ligule 3–4 mm, white ciliate. Racemes digitate or in two close whorls, 7–13, ascending when young, spreading at maturity, 5–9 cm, feathery, purplish; rachis puberulous. Spikelets with 2 florets, 1- or 2-awned; glumes linear-lanceolate, acuminate-mucronate; lower glume 1–1.6 mm; upper glume 2–3.2 mm; lemma of fertile floret narrowly elliptic in side view, 2–3 mm, glabrous, scabrous in upper half, awn 9–25 mm; second floret reduced to a narrow 0.3–0.8 mm rudiment on a filiform rachilla, awn absent or erect, 3–7 mm. Fl. and fr. May–Nov.

Sunny open places, roadsides and hillsides; 400–1500 m. Yunnan [India, Myanmar, Sri Lanka; Africa, America, SW Asia].

This is a weedy annual, long present in Africa and America, but spreading in recent times in Asia.

The widely spreading, long-awned, feathery racemes and blunt leaf blades easily distinguish this from the other *Chloris* species in China.

2. Chloris gayana Kunth, Révis. Gramin. 1: 293. 1830.

非洲虎尾草 fei zhou hu wei cao

Perennial, stoloniferous. Culms erect or ascending, usually rooting at lower nodes, ± flattened, hard, 1–1.5(–2) m tall. Leaf sheaths glabrous except mouth; leaf blades flat, 15–35 cm, 2–10 mm wide, scabrous, apex acuminate; ligule ca. 0.5 mm, with long hairs behind. Racemes digitate, 5–20, ascending to spreading, 4–11 cm, greenish brown; rachis scabrous. Spikelets with 3 or 4 florets, 2-awned; lower glume 1.5–2.5 mm; upper glume 2.5–4 mm including awn-point; lemma of fertile floret elliptic to oblanceolate in side view, 2.5–3.5 mm, shortly appressed-sericeous on lower margins, usually a tuft of hairs 0.5–1.5 mm on upper margins, keel glabrous or sparsely to densely sericeous; awn 2–6 mm; second floret usually male, narrowly lanceolate or cuneate, lemma ciliate on margins, body and awn a little shorter than fertile floret; third (and fourth) florets reduced to oblong or clavate awnless scales, less than 1 mm. $2n = 20, 30, 40$.

Open grassland and savanna; widely cultivated in warmer parts of China [native to Africa].

This is a forage grass, native to Africa, but now introduced and naturalized throughout the tropics and subtropics (Rhodes Grass). There are many different strains differing in habit, plant height, lemma pubescence, and awn length. It is usually a robust, strongly stoloniferous grass, but tufted forms also occur occasionally.

3. Chloris virgata Swartz, Fl. Ind. Occid. 1: 203. 1797.

虎尾草 hu wei cao

Chloris caudata Trinius ex Bunge.

Annual. Culms tufted, erect or geniculately ascending, slightly flattened, 15–100 cm tall. Basal leaf sheaths strongly keeled, glabrous; leaf blades flat or folded, 5–30 cm, 2–7 mm wide, glabrous, adaxial surface scabrous, apex acuminate; ligule 0.5–1 mm, glabrous or ciliate. Racemes digitate, 5–12, erect or slightly slanting, 2–10 cm, silky, pale brown or tinged pink or purple; rachis scabrous or hispid. Spikelets with 2 or 3 florets, 2-awned; lower glume 1.8–2.2 mm; upper glume 3–4 mm, acuminate; lemma of fertile floret obovate-lanceolate in side view, 2.8–3.5 mm, keel gibbous, conspicuously bearded on

upper margins with a spreading tuft of 2.5–3.5 mm silky hairs, margins, keel and flanks silky-ciliate or glabrous; awn 5–15 mm; second floret sterile, oblong, glabrous, awn 4–10 mm; third floret occasionally present, reduced to a small clavate scale, awnless. Fl. and fr. Jun–Oct. 2*n* = 14, 20, 26, 30, 40.

Common on stony slopes, steppe, sandy riversides, roadsides, fields, plantations, frequent on walls and roofs; sea level to 3700 m. Gansu, Hebei, Heilongjiang, Henan, Jiangsu, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Afghanistan, Bhutan, India, Myanmar, Nepal, Pakistan; Africa, America, SW Asia, Australia, Pacific Islands].

This is a widespread and very variable, weedy annual, recognized by the conspicuous tufts of spreading, silky hairs on the upper lemma margins, together with a digitate inflorescence of erect racemes. It extends from the tropics well into temperate regions where the summers are hot.

4. Chloris barbata Swartz, Fl. Ind. Occid. 1: 200. 1797.

孟仁草 meng ren cao

Andropogon barbatus Linnaeus, Mant. Pl. 2: 302. 1771, not Linnaeus (1759); *Chloris inflata* Link.

Annual or short-lived perennial. Culms loosely tufted, ascending or decumbent at base and rooting at lower nodes, 0.2–1 m tall. Leaf sheaths keeled, glabrous; leaf blades flat or folded, 10–40 cm, 4–8 mm wide, glabrous, apex acute; ligule short, ciliate. Racemes digitate, 5–15, erect or ascending, 3–8 cm, often somewhat flexuous and purplish; rachis scabrous. Spikelets with 3 or 4 florets, 3(–4)-awned; lower glume 1.2–1.5 mm; upper glume 1.7–2.5 mm, shortly mucronate; lemma of fertile floret elliptic in side view, 1.7–2.5 mm, pilose on keel, ciliate on upper margins with 1–1.5 mm hairs; awn 4.5–7 mm; upper florets sterile, lemmas empty, inflated, overlapping to form a knob at side of fertile floret; second lemma turbinate, truncate, 1–1.5 mm, glabrous or sparsely appressed-pilose on back, awn subequaling awn of fertile floret; third (and fourth) lemmas orbicular, awn somewhat shorter. Fl. and fr. Apr–May. 2*n* = 20, 40.

Sea coasts, offshore islands. Guangdong, Taiwan [India, Indonesia, Japan (Ryukyu Islands), Malaysia, Myanmar, New Guinea, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam; Africa, America, Australia, Pacific Islands].

This is a widespread species from tropical to warm-temperate regions of the world, found in weedy or disturbed places. It is tolerant of high salt concentrations. When young this grass is favored by cattle.

5. Chloris formosana (Honda) Keng ex B. S. Sun & Z. H. Hu, Fl. Reipubl. Popularis Sin. 10(1): 78. 1990.

台湾虎尾草 tai wan hu wei cao

Chloris barbata var. *formosana* Honda, Bot. Mag. (Tokyo) 40: 437. 1926.

Annual or short-lived perennial. Culms erect to decumbent and rooting at lower nodes, 20–70 cm tall. Leaf sheaths keeled, glabrous; leaf blades usually folded, 4–40 cm, 2–3 mm wide, glabrous, apex acute; ligule 0.5–1 mm, ciliate. Racemes digitate, 4–11, erect or somewhat lax, 3–8 cm, pallid or purplish; rachis puberulous. Spikelets with 3 florets, 3-awned; lower glume 1–2 mm; upper glume 2–3 mm, obtuse, mucronate; lemma of fertile floret elliptic in side view, 2.3–3 mm, with a lateral groove, this occasionally appressed-pilose, glabrous on keel, densely ciliate on upper margins with ca. 1 mm hairs; awn (2–) 4–6 mm; upper florets sterile, lemmas empty, flattened or only slightly inflated, overlapping to form a knob at side of fertile floret; second lemma oblanceolate, truncate, 1.6–2 mm, glabrous, awn 2.5–5 mm; third lemma similar to second but slightly smaller, awn 2–3 mm. Fl. and fr. Jul–Oct.

Sandy or gravelly soils near the sea. Fujian, Guangdong, Hainan, Taiwan [Vietnam].

143. ENTEROPOGON Nees in Lindley, Intr. Nat. Syst. Bot., ed. 2: 448. 1836.

肠须草属 chang xu cao shu

Sun Bixing (孙必兴 Sun Bi-sin); Sylvia M. Phillips

Perennials, rarely annuals. Culms slender or stout, ± compressed. Leaf blades linear to filiform, apex tapering; ligule ciliate. Inflorescence a single raceme or sometimes digitate; racemes unilateral, slender; spikelets sessile, imbricate, biseriate, awned. Spikelets dorsally compressed, narrow, not gaping, florets 2(or 3), lowermost floret fertile, 2nd male or neuter floret sometimes present, uppermost floret reduced to a rudimentary awned lemma at rachilla apex, disarticulating above glumes; callus bearded; glumes shorter or upper as long as florets, lanceolate to subulate, membranous, 1-veined, acute to shortly awned; lemma of fertile floret broadly rounded to almost flat on back, subleathery, 3-veined, midvein prominent, raised, scabrous, apex 2-toothed, awned. Caryopsis narrowly elliptic, dorsally compressed, pericarp free. *x* = 10.

Nineteen species: throughout the tropics; two species in China.

Enteropogon is closely related to *Chloris*. The flattened fertile floret and caryopsis are the most reliable distinguishing features.

1a. Racemes 3–10; plant stout, 100–150 cm tall ..... 1. *E. dolichostachyus*
1b. Raceme usually 1 (occasionally 2 or 3); plant slender, 30–60 cm tall ..... 2. *E. unispiceus*

1. Enteropogon dolichostachyus (Lagasca) Keng ex Lazarides, Austral. J. Bot., Suppl. Ser., 5: 31. 1972.

肠须草 chang xu cao

Chloris dolichostachya Lagasca, Gen. Sp. Pl. 5. 1816.

Perennial. Culms erect or geniculately ascending, sometimes rooting at lower nodes, (0.5–)1–1.5(–2) m tall. Leaf sheaths glabrous or tuberculate-hispid, especially on margin, pilose at mouth; leaf blades linear, flat or rolled, 15–45 cm, 4–15 mm wide, scabrous, often tuberculate-hispid near ligule, apex setaceous; ligule ca. 0.4 mm. Racemes digitate, 3–10, ascending at first, later divaricate or drooping, 10–20 cm; rachis

triquetrous, scabrous. Spikelets with 2 florets, 5–7 mm; lower glume linear-lanceolate, 2–3 mm; upper glume lanceolate, 3–5 mm, awn-pointed; lemma of fertile floret oblong-lanceolate, 3.5–5 mm, glabrous, scabrous along either side of midvein and toward apex; awn 8–16 mm; palea linear-lanceolate, narrower than lemma, keels scabrous; upper floret reduced to an oblong 0.8–1.8 mm lemma with 2–5 mm awn, appressed to fertile floret. Fl. and fr. Mar–Nov.

River valleys, fields, banks, roadsides, and thicket on hills; 200–1000 m. Hainan, S Taiwan, S Yunnan [Afghanistan, Bhutan, India, Indonesia, Malaysia, Myanmar, Nepal, New Guinea, Pakistan, Philippines, Sri Lanka, Thailand; N and NE Australia].

Enteropogon has traditionally been separated from *Chloris* on the basis of inflorescence form. *Enteropogon* has a single raceme, whereas *Chloris* has several digitate racemes. Thus this species has frequently been placed in *Chloris*. However, this inflorescence character is unreliable for separating the two genera, and a better separation is achieved on the basis of lemma and caryopsis compression, in which case this species falls within *Enteropogon*.

2. Enteropogon unispiceus (F. Mueller) W. D. Clayton, Kew Bull. 21: 108. 1967.

细穗肠须草 xi sui chang xu cao

Chloris unispicea F. Mueller, Fragm. 7: 118. 1870; *C. cheesemanii* Hackel ex Cheeseman; *Enteropogon gracilior* Rendle.

Perennial. Culms tufted, delicate, wiry, rooting at lower nodes, densely branched above base, 30–60 cm tall. Leaf sheaths glabrous or tuberculate-pilose, pilose at mouth; leaf blades linear, inrolled or flat, glaucous, 10–15 cm, 1–2 mm wide, scabrous, sometimes tuberculate-pilose on adaxial surface, apex finely acuminate; ligule ca. 0.3 mm. Raceme 1(–4), 4.5–11 cm; rachis triquetrous, scaberulous. Spikelets with 2 florets; lower glume lanceolate, 1.5–3.5 mm, acute; upper glume elliptic-oblong, 3.5–5.5 mm, mucronate; lemma of fertile floret oblong-lanceolate, ca. 3.5 mm, smooth or scabrous above middle; awn 5–10 mm; palea narrowly lanceolate, scabrous on upper part; upper floret reduced to a rudimentary ca. 0.5 mm lemma with 1.3–1.5 mm awn, loosely appressed to fertile floret. Fl. and fr. Sep. $2n = 20$.

Dry open slopes. S Taiwan [Australia (Queensland), Cook Island].

144. EUSTACHYS Desvaux, Nouv. Bull. Sci. Soc. Philom. Paris 2: 188. 1810.

真穗草属 zhen sui cao shu

Sun Bixing (孙必兴 Sun Bi-sin); Sylvia M. Phillips

Annuals or perennials. Leaf sheaths strongly keeled; leaf blades linear, flat or folded, apex often obtuse; ligule a ciliate rim. Inflorescence digitate; racemes unilateral, slender; spikelets sessile, tightly pectinate-imbricate, biseriate. Spikelets laterally compressed, florets 2, lower floret fertile, upper floret reduced to a small empty lemma, disarticulating above glumes; glumes about as long as florets, broad, membranous, 1-veined; lower glume awnless; upper glume with an oblique, stout, subapical awn; callus pubescent; lemma of fertile floret dark brown, keeled, broad, cartilaginous to leathery, 3-veined, hairy on veins, apex acute to emarginate, awnless or with a fine, subapical awn-point; palea nearly as long as lemma, keels scabrous or ciliolate; upper floret cuneate or obovate, glabrous. Caryopsis ellipsoid, trigonous, pericarp reluctantly free.

Eleven species: tropics and subtropics, mainly in the New World; one species in China.

Eustachys is closely related to *Chloris*. The chief difference is the broad, subapically awned upper glume. The racemes of brown, very tightly packed spikelets, lacking conspicuous awns, impart a distinctive appearance different from *Chloris*.

1. Eustachys tenera (J. Presl) A. Camus, Rev. Bot. Appl. Agric. Colon. 5: 208. 1925 [*"tener"*].

真穗草 zhen sui cao

Cynodon tener J. Presl in C. Presl, Reliq. Haenk. 1: 291. 1830; *Chloris tenera* (J. Presl) Scribner; *Eustachys obtusifolia* A. Camus.

Plant stoloniferous. Culms slender, in flabellate tufts along the rooting stolons, laterally compressed, 15–30 cm tall. Leaf sheaths strongly keeled, keel scabrous, overlapping at base; leaf blades broadly linear, flat or folded, 1.5–7 cm, 3–5 mm wide, midvein on abaxial surface and margins scabrous, apex obtuse; ligule ca. 1 mm. Racemes 3–6, 4–7 cm; rachis triquetrous, scabrous on angles. Spikelets 1–1.2 mm, florets 2; glumes boat-shaped, keeled, scabrous on vein, ca. 1 mm; lower glume subacute; upper glume truncate, awn 0.3–0.5 mm; lemma of fertile floret broadly boat-shaped, ca. 1.2 mm, leathery, pilose along keel and incurving margins; palea obovate, narrower than lemma, keels scabrous; upper lemma much reduced, cuneate, lying within concave back of palea of fertile floret. Caryopsis brownish, plump, ca. 0.7 mm. Fl. and fr. Jun–Nov.

Grasslands, thickets, open weedy places, at low altitudes. Guangdong, Hainan, Taiwan [Indonesia, Malaysia, New Guinea, Philippines, Thailand, Vietnam].

This species is used as a lawn grass.

145. MICROCHLOA R. Brown, Prodr. 208. 1810.

小草属 xiao cao shu

Sun Bixing (孙必兴 Sun Bi-sin); Sylvia M. Phillips

Perennial, or sometimes annual. Culms tufted, slender. Leaves mostly basal; leaf blades narrow, often convolute; ligule short, ciliate from a membranous base. Inflorescence a single raceme; raceme unilateral, very slender, scarcely wider than culm, falcate

when dry; spikelets sessile, biseriate, closely imbricate; rachis crescentic in section. Spikelets small, lightly dorsally compressed, narrowly subterete, floret 1 without prolonged rachilla or sterile florets, disarticulating above glumes; glumes subequal, as long as spikelet and enclosing floret, firmly membranous, 1-veined, margins infolding, apex acute, both or only upper deciduous; lower glume keeled; upper glume rounded; lemma shorter than glumes, ovate, keeled, thinly membranous, 3-veined, ciliate on veins, apex acute or minutely emarginate and mucronulate; palea subequal to lemma, keels ciliate. Caryopsis ellipsoid. $x = 10$.

Six species: throughout the tropics; one species in China.

1. Microchloa indica (Linnaeus f.) P. Beauvois, Ess. Agrostogr., Expl. Pl., 13. 1812.

小草 xiao cao

Perennial, or sometimes annual. Culms tufted, usually densely, very slender, wiry, up to 60 cm tall. Basal leaf sheaths disintegrating into fibers; leaf blades very narrowly linear, 1–6 cm, ca. 1 mm wide, adaxial surface usually with long scattered hairs, margins scabrous, midrib and submarginal veins thickened, apex obtuse; ligule 0.1–0.3 mm. Raceme (3–)5–20(–25) cm, falcate when dry; rachis shortly ciliate on margins or glabrous. Spikelets light green, lanceolate, 1.6–4 mm, acute; lower glume slightly asymmetrical; lemma 1.5–3 mm, mucronate. Caryopsis ca. 1 mm. Fl. and fr. Jul–Oct.

Dry open places, on very stony soils, rock crevices; sea level to 2500 m. Guangdong, Hainan, Yunnan [throughout the tropics].

1a. Plants up to 25 cm tall; raceme 0.8–1 mm wide; spikelets 1.6–3 mm ..... 1a. var. *indica*
1b. Plants 25–60 cm tall; raceme 1–1.5 mm wide; spikelets 2.5–4 mm ..... 1b. var. *kunthii*

1a. Microchloa indica var. **indica**

小草(原变种) xiao cao (yuan bian zhong)

Nardus indica Linnaeus f., Suppl. Pl., 105. 1782 [“1781”].

Plants sometimes annual, delicate, up to 25 cm tall. Raceme (3–)5–8(–10) cm, 0.8–1 mm wide. Spikelets 1.6–3 mm.

Dry open places inland, sandy places near the sea; sea level to 2500 m. Fujian, Guangdong, Hainan, Yunnan [throughout the tropics; probably introduced in America, rare in Australia].

1b. Microchloa indica var. **kunthii** (Desvaux) B. S. Sun & Z. H. Hu, Fl. Reipubl. Popularis Sin. 10(1): 88. 1990.

长穗小草 chang sui xiao cao

Microchloa kunthii Desvaux, Mém. Soc. Agric. Angers 1: 179. 1831.

Plants perennial, slightly stouter, base often fibrous, 22–60 cm tall. Raceme (7–)15–20(–25) cm, 1–1.5 mm wide. Spikelets 2.5–4 mm.

Dry open places, especially in rock fissures. Yunnan [throughout the tropics, except Australia].

146. CYNODON Richard in Persoon, Syn. Pl. 1: 85. 1805, nom. cons.

狗牙根属 gou ya gen shu

Sun Bixing (孙必兴 Sun Bi-sin); Sylvia M. Phillips

Capriola Adanson, nom. rej.; *Dactilon* Villars, nom. rej.

Perennials, rhizomatous or stoloniferous, sometimes sward forming. Culms slender to robust, leafy, internodes short. Leaf blades broadly linear to filiform, flat; ligule membranous or ciliate. Inflorescence digitate or sometimes 2 or more closely spaced whorls; racemes unilateral, slender; spikelets sessile, imbricate, biseriate; rachis flat or semiterete. Spikelets strongly laterally compressed, floret 1, with or without rachilla extension (very rarely 2nd floret present), narrowly ovate, awnless, disarticulating above glumes; glumes subequal, shorter or as long as floret, narrow, herbaceous, 1-veined or upper glume 3-veined, apex acuminate, both or only lower glume persistent; lemma keeled, boat-shaped, cartilaginous, 3-veined, usually pubescent on keel, apex entire, awnless. Caryopsis ellipsoid, laterally compressed. $x = 9, 10$.

Ten species: tropics of the Old World, especially Africa, one species pantropical extending into warm-temperate regions; two species in China.

1a. Rhizomes absent; racemes 5–10 cm; leaf sheath mouth glabrous or pilose; anthers ca. 0.5 mm ..... 1. *C. radiatus*
1b. Rhizomes present; racemes 2–6 cm; leaf sheath mouth bearded; anthers more than 1 mm ..... 2. *C. dactylon*

1. Cynodon radiatus Roth ex Roemer & Schultes, Syst. Veg. 2: 411. 1817.

弯穗狗牙根 wan sui gou ya gen

Cynodon arcuatus J. Presl in C. Presl; *C. dactylon* var. *intermedius* (Rangachari & Tadulingham) C. E. C. Fischer; *C. intermedius* Rangachari & Tadulingham.

Perennial, stoloniferous, widely spreading, without rhizomes. Culms slender, 20–50(–80) cm tall. Leaf sheaths glabrous or pilose at mouth; leaf blades broadly linear, 2.5–10(–15) cm, 3–6 mm wide, glaucous, glabrous, apex acute; ligule ca. 3 mm, membranous, ciliolate on upper edge. Racemes digitate, usually 4–8, 5–10 cm, flexuous, slightly drooping; spikelets overlapping by 1/3–1/2 their length. Spikelets 1.8–2.5 mm; rachilla extension ca. 1 mm, without reduced floret at apex; glumes lanceolate, about half as long as floret, 1-veined, keel scabrous, thickened; lower glume ca. 1 mm; upper glume 1–1.4 mm; lemma as long as spikelet, pilose along keel and lateral veins, hairs sometimes clavate, apex subacute; palea glabrous, keels smooth or rarely scaberulous. Anthers 0.5–0.7 mm. Caryopsis trigonous, laterally compressed. Fl. and fr. Jul–Nov. $2n = 36$.

Sunny open places, roadsides. Guangdong (offshore islands), Hainan, Taiwan [Bhutan, India, Indonesia, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam; N Australia; Madagascar].

The club-shaped tips to the lemma hairs can be seen only under a microscope. This species is easily confused with *Cynodon dactylon*, from which it differs mainly in the absence of rhizomes. It is genetically isolated from all other species of *Cynodon*.

2. Cynodon dactylon (Linnaeus) Persoon, Syn. Pl. 1: 85. 1805.

狗牙根 gou ya gen

Perennial, stoloniferous, also with slender scaly rhizomes, sward forming. Culms slender, 10–40 cm tall. Leaf sheaths bearded at mouth, otherwise glabrous or thinly pilose; leaf blades linear, short and narrow, 1–12 cm, 1–4 mm wide, usually glabrous, apex subacute; ligule a line of hairs. Racemes digitate, (2–)3–6, 2–6 cm, straight or gently curved, rather stiff, spreading; spikelets overlapping by 1/2–2/3 their length. Spikelets 2–2.7 mm; rachilla extension ca. 1 mm, sometimes with minute rudimentary floret at apex; glumes linear-lanceolate, often purplish, usually more than half as long as floret, 1.5–2 mm, 1-veined, keel scabrous, thickened; lemma as long as spikelet, silky villous along keel, hairs straight, otherwise glabrous or lateral veins thinly villous, apex subacute; palea glabrous, keels scaberulous. Anthers more than 1 mm. Caryopsis subterete, scarcely laterally compressed. Fl. and fr. nearly all the year. 2*n* = 18, 36.

Open disturbed situations, roadsides, field margins, cultivated as a lawn grass; sea level to 2500 m. Fujian, Gansu, Guangdong, Hainan, Hubei, Jiangsu, Shaanxi, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [tropical and warm-temperate regions of the world].

This is the most widely used lawn grass in warm parts of the world, and it is also an important pasture grass (Bermuda Grass). It is extremely variable and it will readily hybridize with some other *Cynodon* species.

1a. Spikelet with 1 bisexual floret ..... 2a. var. *dactylon*
1b. Spikelet with 2 bisexual florets ..... 2b. var. *biflorus*

2a. Cynodon dactylon var. **dactylon**

狗牙根(原变种) gou ya gen (yuan bian zhong)

Panicum dactylon Linnaeus, Sp. Pl. 1: 58. 1753.

Spikelets 2–2.5 mm, with 1 bisexual floret. Fl. and fr. most of the year. 2*n* = 18, 36.

Open disturbed situations, roadsides, field margins, and cultivated as a lawn grass; sea level to 2500 m. Fujian, Guangdong, Hainan, Hubei, Jiangsu, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [tropical and warm-temperate regions of the world].

2b. Cynodon dactylon var. **biflorus** Merino, Fl. Galicia 3: 310. 1909.

双花狗牙根 shuang hua gou ya gen

Fibichia umbellata Koeler var. *biflora* Beck.

Spikelets 2.5–2.7 mm, with 2 bisexual florets; rachilla between florets ca. 1 mm. Fl. and fr. May–Oct.

Fujian, Jiangsu, Taiwan, Zhejiang [described from Europe].

Specimens occur sporadically throughout the range of the species in which the rudimentary second floret at the end of the rachilla extension is better developed. In rare cases it may even enclose anthers or be bisexual and only a little smaller than the lower floret. Such spikelets often occur on plants with mainly normal inflorescences and are of negligible taxonomic significance.

147. SPARTINA Schreber, Gen. Pl. 43. 1789.

米草属 mi cao shu

Sun Bixing (孙必兴 Sun Bi-sin); Sylvia M. Phillips

Perennials, usually with wide spreading scaly rhizomes. Culms erect, robust. Leaf blades long, tough; ligule a line of hairs. Inflorescence of racemes, these subdigitate or disposed along an axis, few to many; spikelets appressed or pectinate; rachis triquetrous, terminating in a naked point. Spikelets strongly laterally compressed, lanceolate or narrowly oblong, floret 1, without rachilla extension, disarticulating below glumes and falling entire; glumes unequal, keeled; lower glume shorter than floret; upper glume longer than floret, papery, 1–3-veined, sometimes additional veins present, apex narrowly acute to shortly awned; lemma keeled, firm with wide membranous margins, lateral veins obscure, apex subacute; palea equaling or exceeding lemma. Lodicules often absent. Caryopsis fusiform, embryo nearly as long as caryopsis. *x* = 10.

Seventeen species: both coasts of the Americas, Atlantic coasts of Europe and Africa, especially in temperate and subtropical regions; two species (both introduced) in China.

This genus is adapted to the saline environment of the coast. Species with spreading rhizomes form colonies in tidal saltmarshes and are particularly suitable for stabilizing coastal mud flats.

1a. Spikelets glabrous, rarely short hairs on keels; culms (0.5–)1–2(–3) m tall; leaf blades 10–90 × 1–2 cm ..... 1. *S. alterniflora*
1b. Spikelets pubescent; culms 0.1–0.5(–1.2) m tall; leaf blades 11–22 × 0.7–1 cm ..... 2. *S. anglica*

1. Spartina alterniflora Loiseleur, Fl. Gall. 719. 1807.

互花米草 hu hua mi cao

Spartina glabra Muhlenberg ex Elliott var. *alterniflora* (Loiseleur) Merrill; *S. maritima* (Curtis) Fernald var. *alterniflora* (Loiseleur) St.-Yves; *S. stricta* Roth var. *alterniflora* (Loiseleur) A. Gray; *Trachynotia alterniflora* (Loiseleur) Candolle.

Perennial with soft fleshy rhizomes. Culms stout, forming large clumps, erect, (0.5–)1–2(–3) m tall, ca. 1 cm in diam. Leaf sheaths mostly longer than internodes, smooth; leaf blades linear-lanceolate, flat, 10–90 × 1–2 cm, smooth or margins minutely scabrous, tapering to long hard involute apex; ligule ca. 1 mm. Racemes racemosely arranged, (5–)10–20, 5–20 cm, slender, erect or slightly spreading; spikelets scarcely overlapping; rachis smooth, terminating in a bristle up to 3 cm. Spikelets ca. 10 mm, glabrous or nearly so; lower glume linear, 1/2–2/3 as long as spikelet, acute; upper glume ovate-lanceolate, as long as spikelet, glabrous or with very short hairs on keel, subacute; lemma lanceolate-oblong to narrowly ovate, glabrous; palea slightly longer than lemma. Anthers 5–6 mm. 2*n* = 62.

Tidal mudflats of coast, introduced. Fujian, Guangdong, Guangxi, Hebei, Jiangsu, Shandong, Zhejiang [native to Atlantic coast of North America].

Spartina alterniflora was first introduced to China from North America in 1979. From eight initial plantings in 1985 it has spread rapidly in suitable habitats along the whole Chinese coast. It is used to protect coastal dykes from tidal erosion and to promote sediment build-up for polder formation. Plantations are also used for pasture and cut for green manure and forage.

2. Spartina anglica C. E. Hubbard, Bot. J. Linn. Soc. 76: 364. 1978.

大米草 da mi cao

Spartina townsendii H. Groves & J. Groves var. *anglica* (C. E. Hubbard) Lambinon & Maquet.

Perennial with soft fleshy rhizomes, deeply rooted. Culms forming large clumps, erect, 10–50(–120) cm tall, 3–35 mm in diam. Leaf sheaths mostly longer than internodes, smooth; leaf blades linear, flat or inrolled upward, 10–45 × 0.7–1.5 cm, smooth, apex fine, hard, upper blades usually patent; ligule 2–3 mm. Racemes racemosely arranged, 2–6(–12), 7–23 cm, stiff, erect or slightly spreading; spikelets closely overlapping; rachis terminating in a hard bristle up to 5 cm. Spikelets 12–21 mm, pubescent; lower glume 2/3–4/5 as long as spikelet, acute; upper glume lanceolate-oblong, as long as spikelet, acute; lemma lanceolate-oblong, ca. 1 cm, keel scaberulous, pubescent, entirely or in upper half; palea slightly longer than lemma. Anthers 7–13 mm. 2*n* = 124.

Tidal mudflats of coast, introduced. Jiangsu, Zhejiang [native to England].

Spartina anglica is an extremely vigorous species, which arose in England at the end of the 19th century by the natural hybridization of *S. alterniflora* and *S. maritima* (Curtis) Fernald, followed by a doubling of chromosomes in the resulting sterile hybrid to form a fertile amphidiploid. It was introduced from England to China in 1963 and was planted in coastal areas. At first it spread rapidly, occurring in all coastal provinces by 1985. In recent years it has died back, leaving only small residual colonies. The reasons for the dieback are not fully understood.

148. BOUTELOUA Lagasca, Varied. Ci. 2: 134. 1805 [*"Botelua"*], nom. et orth. cons.

格兰马草属 ge lan ma cao shu

Sun Bixing (孙必兴 Sun Bi-sin); Sylvia M. Phillips

Annuals or perennials. Culms mostly tufted. Leaf blades narrow; ligule a line of hairs. Inflorescence of racemes inserted singly along an axis; racemes unilateral, 1–80, short, deciduous or persistent; spikelets sessile, few to numerous, biseriate, sometimes pectinate; rachis narrow, flat, ending in a straight or forked point. Spikelets subterete or laterally compressed, fertile floret 1, usually 2nd sterile floret present, rarely this reduced to a rachilla extension; glumes unequal, narrow, membranous, 1-veined, keeled, acuminate to awn-pointed; lemma of fertile floret ± as long as upper glume, rounded or keeled on back, thinly leathery, 3-veined, veins excurrent into 3 short awns, central awn sometimes flanked by 2 teeth, less often apex simply acute; palea veins sometimes excurrent; sterile floret variable within a species or even an individual specimen, usually lemma body reduced and prominently awned. Caryopsis ellipsoid. *x* = 7, 10.

About 40 species: Canada to Argentina, centered on Mexico; two species (both introduced) in China.

1a. Racemes 10–50, falling entire at maturity ..... 1. *B. curtipendula*
1b. Racemes 1–3(–4); racemes persistent, spikelets disarticulating above glumes ..... 2. *B. gracilis*

1. Bouteloua curtipendula (Michaux) Torrey, Explor. Red River Louisiana, 300. 1853.

垂穗草 chui sui cao

Chloris curtipendula Michaux, Fl. Bor.-Amer. 1: 59. 1803; *Atheropogon curtipendulus* (Michaux) E. Fournier; *Cynodon curtipendulus* (Michaux) Raspail; *Dinebra curtipendula* (Michaux) P. Beauvois; *Eutriana curtipendula* (Michaux) Trinius.

Perennial with short, slender, scaly rhizomes. Culms tufted, erect, 30–100 cm tall. Leaf sheaths glabrous or nearly so; leaf blades flat or slightly involute, 20–30 cm, 1–5 mm wide, both surfaces and margins scabrous, base pubescent; ligule ca. 1 mm. Inflorescence axis 15–25 cm; racemes 10–50, 1–2 cm, purplish, secund along axis, usually nodding, with 3–6 (–10) appressed or ascending spikelets, falling entire. Spikelets 4.5–10 mm; lower glume linear-lanceolate, 2.5–4 mm; upper glume lanceolate, 4(–7) mm; lemma of fertile floret usually somewhat exceeding glumes, acuminate, lateral veins extended into ca. 1 mm mucros; palea slightly longer than lemma; 2nd floret rudimentary, with long central awn and 2 shorter laterals, or greatly reduced, or lacking. Fl. and fr. summer to autumn. 2*n* = 28, 35, 40, 42, 56, 70.

Cultivated in China [native to America].

This is an American pasture grass (Side-oats Grama) reported to be excellent in China for grazing and also for hay.

2. Bouteloua gracilis (Kunth) Lagasca ex Griffiths, Contr. U. S. Natl. Herb. 14: 375. 1912, nom. cons., not Vasey (1878).

格兰马草 ge lan ma cao

Chondrosum gracile Kunth, Nov. Gen. Sp. 1: 176. 1815 ["1816"]; *Actinochloa gracilis* (Kunth) Willdenow ex Roemer & Schultes; *Atheropogon gracilis* (Kunth) Sprengel; *Eutriana gracilis* (Kunth) Trinius.

Perennial. Culms densely tufted, erect, 15–60 cm tall. Leaf sheaths glabrous, in tight bundles at culm base; leaf blades flat or involute, 3–10 cm, 1–2 mm wide, usually glabrous. Inflorescence of (1 or)2(–4) distant racemes; racemes 2.5–5 cm, falcate at maturity, persistent, spikelets numerous, densely crowded, pectinate; rachis not extended beyond uppermost spikelet. Spikelets 5–6 mm; glumes lanceolate, persistent; lower glume linear-lanceolate, ca. 3.5 mm; upper glume lanceolate, 3.5–6 mm, sparsely villous on keel; lemma of fertile floret 5–5.5 mm, dorsally villous, lateral veins extended into 3 short awns at apex, intermediate lobes acute; 2nd floret ca. 2 mm, densely long-villous at rachilla apex, cleft to the base, lobes rounded, awns 3, scabrous, ca. 5 mm; 1 or 2 additional broad awnless rudiments sometimes present. Fl. and fr. summer to autumn. 2*n* = 28, 35, 42, 61, 77.

Cultivated in China [native to North America (including Mexico)].

This is a valuable forage grass native to the North American prairie (Blue Grama).

149. BUCHLOË Engelmann, Trans. Acad. Sci. St. Louis 1: 432. 1859, nom. cons.

野牛草属 ye niu cao shu

Sun Bixing (孙必兴 Sun Bi-sin); Sylvia M. Phillips

Perennial, stoloniferous; monoecious or dioecious. Leaf blades linear; ligule a line of hairs. Male inflorescence long exserted, racemes 1–4, distant, short; spikelets biseriate, pectinate; rachis slender. Female inflorescence composed of usually 2 modified racemes in axils of inflated upper leaf sheaths; spikelets 3–5; rachis shortened and with the spikelets forming a globular deciduous burr. Male spikelets with 2 florets; glumes unequal, 1-veined; lemmas longer than glumes, 3-veined, entire. Female spikelets dorsally compressed, floret 1; lower (inner) glume reduced or suppressed, thin; upper glume strongly indurated, forming an involucre on the outside of the burr, back rounded, margins inflexed and enclosing floret, apex contracted with 3–5 rigid acuminate lobes; lemma ovate-lanceolate, subleathery, 3-veined, apex shortly 3-lobed. Caryopsis ellipsoid.

One species: native to Mexico and the United States; introduced in China.

1. Buchloë dactyloides (Nuttall) Engelmann, Trans. Acad. Sci. St. Louis 1: 432. 1859.

野牛草 ye niu cao

Sesleria dactyloides Nuttall, Gen. N. Amer. Pl. 1: 65. 1818; *Bulbilis dactyloides* (Nuttall) Rafinesque ex Kuntze; *Calanthera dactyloides* (Nuttall) Kunth ex Hooker; *Casiostega dactyloides* (Nuttall) E. Fournier.

Perennial, sward forming. Culms slender, erect, 5–25 cm tall. Leaf sheaths sparsely pilose; leaf blades 3–10(–20) cm, 1–2 mm wide, curling, pilose on both surfaces, apex filiform; ligule ca. 0.5 mm. Male racemes 1–4, stramineous, 5–15 × ca. 5 mm, scattered toward culm apex. Female inflorescence capitate, 6–9 × 3–4 mm; indurated upper (outer) glume whitish with green apical lobes; lemma ovate below, contracted toward green apical lobes, middle lobe much longer than laterals; palea broad, as long as lemma body. Fl. and fr. summer to autumn. 2*n* = 56, 60.

Cultivated in China [native to Mexico and the United States].

This species (Buffalo Grass), from the western prairies of the United States, is a low, creeping grass that has been introduced into China for forage and as a lawn grass.

150. TRAGUS Haller, Hist. Stirp. Helv. 2: 203. 1768, nom. cons.

锋芒草属 feng mang cao shu

Chen Shouliang (陈守良); Sylvia M. Phillips

Nazia Adanson, nom. rej.

Annuals or perennials. Leaf blades narrow, flat; ligule a line of hairs, sometimes from a membranous base. Inflorescence linear, cylindrical, spikelike, dense, axis bearing numerous very short racemes; racemes subsessile or shortly pedunculate, falling entire as spiny burrs; spikelets 2–5, contiguous or on a short rachis, sometimes the upper reduced. Spikelets elliptic to lanceolate, floret 1; lower glume a tiny scale or suppressed; upper glume as long as spikelet, rounded, prominently 5–7-veined, veins forming ribs armed with conspicuous, stout, hooked spines, thin between ribs, apex acute to acuminate; lemma ovate, almost as long as glume, flattened, membranous, 3-veined, pubescent around midvein, apex entire; palea slightly shorter than lemma. Caryopsis ellipsoid to oblong, slightly dorsally compressed.

Seven species: tropical and warm-temperate regions of the Old World; introduced in America; two species in China.

Both species occurring in China have been confused with the Mediterranean, African, and SW Asian *Tragus racemosus* (Linnaeus) Allioni, which differs in having 7 veins (vs. 5) in the upper glume.

1a. Lower spikelet 3.5–4 mm, upper spikelet subequal, 3.2–3.7 mm; apex of upper glume extended beyond spines as long point ..... 1. *T. mongolorum*
1b. Lower spikelet 2–3 mm, upper spikelet clearly smaller, 1.5–2.2 mm; apex of upper glume scarcely extended beyond spines ..... 2. *T. berteronianus*

1. Tragus mongolorum Ohwi, Acta Phytotax. Geobot. 10: 268. 1941.

锋芒草 feng mang cao

Tragus roxburghii Panigrahi.

Annual, mat-forming. Culms tufted, ascending from prostrate base, rooting at nodes, up to 25 cm tall. Leaf sheaths usually shorter than internodes, uppermost longer, inflated, often clasping base of inflorescence; leaf blades broadly linear, tough, flat, glaucous, 3–8 cm, 2–4 mm wide, margins thick, pectinate-spinose, apex acute. Inflorescence 3–6 × ca. 0.8 cm; racemes of 2 subequal contiguous spikelets, rachis internode ca. 0.2 mm; rachis extension absent or up to 1.5 mm beyond upper spikelet, sometimes bearing rudimentary 3rd spikelet, this often reduced to a row of spines; basal peduncle 0.3–0.5 mm. Lower spikelet fertile, elliptic, 3.5–4 mm; lower glume very small, membranous; upper glume 5-ribbed, ribs bearing hooked, thick-based spines, apex acuminate-attenuate; lemma ovate-lanceolate, ca. 3 mm, puberulous, apex sharply acute. Upper spikelet similar to lower but slightly smaller, 3.2–3.7 mm, fertile. Fl. and fr. Jul–Sep.

Hill slopes, roadsides, a weed of cultivation. Gansu, Hebei, Nei Mongol, Ningxia, Qinghai, Shanxi, Sichuan, Xizang, Yunnan [India, Malaysia, Myanmar, Pakistan, Thailand; Indian Ocean Islands (Mascarenes)].

This species has been widely known under the name *Tragus biflorus* Schultes, which is illegitimate because it was nomenclaturally superfluous when published. Panigrahi replaced *T. biflorus* with *T. roxburghii*, but overlooked Ohwi's earlier name, *T. mongolorum*, which was validly published, is legitimate, and is therefore the correct name for the species.

The spiny burrs cling easily to skin and clothing.

2. Tragus berteronianus Schultes, Mant. 2: 205. 1824.

虱子草 shi zi cao

Tragus racemosus (Linnaeus) Allioni var. *berteronianus* (Schultes) Hackel; *T. tcheliensis* Debeaux.

Annual, mat-forming. Culms tufted, usually decumbent at base and rooting at lower nodes, 15–30 cm tall. Leaf sheaths shorter than or subequal to internodes; leaf blades broadly linear, tough, flat, glaucous, 3–7 cm, 3–4 mm wide, margins thick, pectinate-spinose, apex acute. Inflorescence 4–11 × ca. 0.5 cm; racemes of 2 unequal spikelets separated by a 0.4–0.6 mm rachis internode; rachis not extended beyond upper spikelet; basal peduncle 0.2–0.4 mm. Lower spikelet fertile, elliptic, 2–3 mm; lower glume suppressed; upper glume 5-ribbed, ribs bearing hooked, swollen-based spines, apex acute; lemma ovate-lanceolate, 1.8–2.1 mm, puberulous, apex sharply acute. Upper spikelet sterile, narrowly elliptic, 1.5–2.2 mm, often reduced to the upper glume. Fl. and fr. summer to autumn. $2n = 20$.

Roadsides, other weedy places. Anhui, Gansu, Hebei, Jiangsu, Nei Mongol, Shaanxi, Sichuan [Afghanistan, Pakistan; Africa, America, SW Asia].

151. ZOYSIA Willdenow, Ges. Naturf. Freunde Berlin Neue Schriften 3: 440. 1801, nom. cons.

结缕草属 jie lü cao shu

Chen Shouliang (陈守良); Sylvia M. Phillips

Osterdamia Necker ex Kuntze, nom. illeg. superfl.

Perennials, rhizomatous and/or stoloniferous, sward forming. Culms arising from nodes along stolons, often densely branched at ground level. Leaf blades conspicuously distichous, stiff, flat or involute; ligule short, ciliolate. Inflorescence a cylindrical, dense, spikelike raceme; spikelets appressed to axis, falling entire; pedicels persistent, flattened, sometimes widened upward. Spikelets laterally compressed, floret 1; lower glume usually absent; upper glume as long as spikelet, enclosing floret, laterally compressed, leathery, rounded on back, smooth, glossy, apex acute or midvein excurrent into mucro; lemma membranous, 1–3-veined, apex acute or emarginate; palea reduced or absent. Lodicules absent. Styles connate at base, stigmas apically exserted. Caryopsis ovoid. $x = 9, 10$.

Nine species: tropical and subtropical coasts of the Indian Ocean, W Pacific, and Australasia; several species widely introduced elsewhere as tropical lawn grasses; five species in China.

The spikelets often consist of only two scales: a leathery, glossy glume (technically the upper glume) enclosing a much thinner lemma.

The species are good sand-binding and lawn grasses.

1a. Spikelets usually ca. 2 mm wide; uppermost leaf sheaths inflated, enclosing base of inflorescence ..... 1. *Z. macrostachya*
1b. Spikelets less than 1.5 mm wide; uppermost leaf sheaths not inflated.
2a. Spikelets ovate, 2–2.5 times as long as wide; pedicels flexuous, usually longer than spikelet ..... 2. *Z. japonica*
2b. Spikelets lanceolate to oblong, 3–4 times as long as wide; pedicels straight, usually shorter than spikelet.
3a. Spikelets 4–8 mm ..... 3. *Z. sinica*
3b. Spikelets 2–3 mm.

4a. Leaf blades 1.5–2.5 mm wide (when flattened); inflorescence 2–4 cm; spikelets 10–30 ..... 4. *Z. matrella*
4b. Leaf blades ca. 1 mm wide, setaceous; inflorescence up to 1.5 cm; spikelets 6–12 ..... 5. *Z. pacifica*

1. Zoysia macrostachya Franchet & Savatier, Enum. Pl. Jap. 2: 608. 1879.

大穗结缕草 da sui jie lü cao

Perennial, loosely spreading from extensive, deep, slender rhizomes. Culms erect or ascending, 10–20 cm tall, much branched at ground level, many-noded. Leaf sheaths overlapping over whole culm length, glabrous, bearded at mouth with 2–3 mm hairs; leaf blades linear-lanceolate, stiff, patent, margins involute, 1.5–8 cm, 2–4 mm wide, abaxial surface glabrous or puberulous, adaxial surface glaucous, glabrous, apex pungent. Inflorescence lanceolate-oblong, 3–5 × 0.5–1 cm, base enclosed in inflated uppermost leaf sheaths; spikelets many, closely overlapping; pedicels stout, 1–2 mm, apex slightly oblique. Spikelets 6–8 × ca. 2 mm, yellowish, brown or purplish brown; lower glume absent; upper glume elliptic-oblong, obscurely 7-veined, minutely puberulent along margins and near apex, apex acute or with subapical awn to 1.2 mm; lemma lanceolate, ca. 4 mm, 1-veined; palea absent. Anthers 2–2.5 mm. Caryopsis 1.8–2 mm. Fl. and fr. Jun–Sep. $2n = 40$.

Coastal sands extending to grazed or trodden places inland. Anhui, Fujian, Jiangsu, Shandong, Zhejiang [Japan, Korea].

This species is used as a lawn grass.

2. Zoysia japonica Steudel, Syn. Pl. Glumac. 1: 414. 1854.

结缕草 jie lü cao

Zoysia koreana Mez; *Z. matrella* (Linnaeus) Merrill subsp. *japonica* (Steudel) Masamune & Yanagita; *Z. matrella* var. *japonica* (Steudel) Sasaki; *Z. pungens* Willdenow var. *japonica* (Steudel) Hackel.

Perennial, with long slender stolons, forming large mats. Culms erect, up to 20 cm tall, sometimes branched at base. Leaf sheaths glabrous, pilose at mouth with 1–2 mm hairs, basal sheaths persistent; leaf blades aggregated toward culm base, linear-lanceolate, flat or margins involute, tough, patent, 2.5–6 cm, 2–4 mm wide, abaxial surface subglabrous, adaxial surface thinly pilose, apex pungent. Inflorescence linear-elliptic, 2–4 × 0.3–0.5 cm, long exserted above leaves; spikelets many, loosely overlapping; pedicels slender, slightly flexuous, longer than spikelet, up to 5 mm. Spikelets 2.5–3.5 × 1–1.5 mm, yellowish green becoming purplish brown; lower glume absent; upper glume obliquely ovate, obscurely 5–7-veined, upper margins broad, papery, apex obtuse, sometimes mucronate; lemma boat-shaped, slightly shorter than glume, 1-veined; palea absent. Anthers ca. 1.5 mm. Caryopsis 1.5–2 mm. Fl. and fr. May–Aug. $2n = 40$.

Coastal areas, grassy hillsides, open places. Hebei, Hong Kong, Jiangsu, Jiangxi, Liaoning, Shandong, Taiwan, Zhejiang [Japan, Korea].

This species can be distinguished by its relatively short, broad leaf blades, broadly linear inflorescence well exserted above the leaves, and many short, plump spikelets on long, slender pedicels.

This species is a good lawn grass.

3. Zoysia sinica Hance, J. Bot. 7: 168. 1869.

中华结缕草 zhong hua jie lü cao

Zoysia matrella (Linnaeus) Merrill var. *macrantha* Nakai ex Honda; *Z. sinica* var. *macrantha* (Nakai ex Honda) Ohwi; *Z. sinica* subsp. *nipponica* (Ohwi) T. Koyama; *Z. sinica* var. *nipponica* Ohwi.

Perennial, forming dense spreading mats from slender underground rhizomes. Culms erect from nodes of rhizome, stiff, 10–30 cm tall, branched at base. Leaf sheaths glabrous, usually persistent at base, pilose at mouth; leaf blades broadly linear, flat or margins involute, stiff, suberect to patent, 2–10 cm, 2–3 mm wide, green or gray-green, glabrous, apex pungent. Inflorescence linear-elliptic, 2–4(–8) × 0.4–0.5 cm, usually shortly exserted from uppermost leaf sheath; spikelets many, closely overlapping; pedicels shorter than spikelet, ca. 3 mm, widened at apex. Spikelets 4–8 × 1–1.5 mm, yellowish brown or purplish brown; lower glume absent; upper glume lanceolate-oblong to narrowly oblong with slightly falcate apex, obscurely 7–11-veined, midvein usually shortly excurrent; lemma lanceolate-oblong, 3–4 mm, 1-veined; palea absent. Anthers 1.5–2.5 mm. Fl. and fr. May–Oct.

Coastal sands, extending to grazed and trodden places inland. Anhui, Fujian, Guangdong, Guangxi, Hebei, Jiangsu, Liaoning, Shandong, Taiwan, Zhejiang [Japan, Korea].

This species can be recognized by its long, straight-sided spikelets with falcate tips. Specimens with spikelets at the upper end of the size range (5–8 mm) have been separated as var. *nipponica*, but variation is continuous and spikelet size can be variable even on a single specimen.

This species is a good lawn grass.

4. Zoysia matrella (Linnaeus) Merrill, Philipp. J. Sci. 7: 230. 1912.

沟叶结缕草 gou ye jie lü cao

Agrostis matrella Linnaeus, Mant. Pl. 2: 185. 1771; *Zoysia pungens* Willdenow; *Z. serrulata* Mez; *Z. tenuifolia* Thiele.

Perennial, stoloniferous, mat-forming, also with shallow underground rhizomes. Culms up to 20 cm tall. Leaf sheaths glabrous, bearded at mouth with 4–5 mm hairs; leaf blades flat or involute, tough, suberect to spreading, 3–8 cm, 1.5–2.5 mm wide, glabrous or adaxial surface thinly pilose, apex acute. Inflorescence linear, 2–4 × 0.2–0.3 cm, exserted above leaves; spikelets 10–30, loosely overlapping; rachis somewhat wavy; pedicels shorter than spikelet, 1–3 mm, widened at apex. Spikelets 2–3 × ca. 1 mm, yellowish brown or purplish brown; lower glume usually absent; upper glume lanceolate, 5-veined, midrib prominent, sometimes scabrous toward apex, lateral veins obscure, apex obtuse; lemma oblong-ovate, 2–2.5 mm, obscurely 3-veined, midvein sometimes shortly excurrent; palea lanceolate, 1/2 as long as lemma. Anthers 1–1.5 mm. Caryopsis ca. 1.5 mm. Fl. and fr. Jul–Oct. $2n = 20, 40$.

Coastal sands. Guangdong, Hainan, Taiwan [India, Indonesia, Japan (S Kyushu and Ryukyu Islands), Malaysia, Philippines, Sri Lanka, Thailand, Vietnam].

This species forms natural hybrids with *Zoysia sinica*.

Zoysia matrella is a good sand-binding and lawn grass.

5. Zoysia pacifica (Goudswaard) M. Hotta & S. Kuroki, Acta Phytotax. Geobot. 45: 71. 1994.

细叶结缕草 xi ye jie lü cao

Zoysia matrella (Linnaeus) Merrill var. *pacifica* Goudswaard, Blumea 26: 172. 1980.

Perennial, stoloniferous, forming a low dense sward. Culms 5–10 cm tall, much branched. Leaf sheaths glabrous, bearded at mouth with 2–5 mm hairs; leaf blades setaceous, soft, 4–6 cm, ca. 1 mm wide. Inflorescence linear, up to 1.5 cm; spikelets 6–12, loosely overlapping; rachis somewhat wavy; pedicels shorter than spikelet, up to 1.6 mm, scabrous, slightly widened at apex. Spikelets 2–3 × ca. 0.6 mm, straw colored tinged purplish; lower glume absent; upper glume lanceolate, shiny, obscurely 5-veined, apex subacute, sometimes with subapical awn-point; lemma slightly shorter than upper glume, 1-veined; palea absent. Anthers 0.6–0.8 mm. Fl. and fr. Aug–Dec. $2n = 40$*.

Rocky and coral beaches. Taiwan [Japan (S Kyushu and Ryukyu Islands), Philippines, Thailand; Pacific Islands].

This grass has been widely known as *Zoysia tenuifolia* Thiele, but the type specimens of that name belong taxonomically to *Z. matrella*.

This fine-leaved, densely growing, low grass forms excellent lawns and is grown in gardens in S and SE China.

152. PEROTIS Aiton, Hort. Kew. 1: 85. 1789.

茅根属 mao gen shu

Chen Shouliang (陈守良); Sylvia M. Phillips

Diplachyrium Nees.

Annuals or sometimes perennials. Leaf blades short, broad, base slightly cordate, margins often pectinate-ciliate; ligule a membranous rim. Inflorescence a cylindrical raceme of long-awned, solitary spikelets borne directly on main axis; rachis clothed in short pegs after spikelets have fallen. Spikelets linear-elliptic, terete or slightly laterally compressed, with 1 floret, falling entire, subsessile or borne on a pedicel-like callus which falls with spikelet; glumes subequal, as long as spikelet and enclosing floret, papery, 1-veined, rounded, scabrous, apex with a long slender awn far exceeding glume body, lower glume tightly embraced by upper glume, its awn usually longer than upper glume awn; lemma lanceolate, shorter than glumes, hyaline, 1-veined, glabrous, acute; palea hyaline, slightly shorter than lemma, flattened. Caryopsis terete or flattened, apex acute.

Thirteen species: Old World tropics; three species in China.

This is an easily recognizable genus on account of the delicate, elongate, violet-tinged, “bottlebrush” inflorescence of small, long-awned spikelets, which fall entire from the central axis.

1a. Spikelets 3.5–4.5 mm; glume apex tapering into awn ..... 1. *P. rara*
1b. Spikelets 1.5–2.5 mm; glume apex abruptly distinct from awn.
2a. Spikelet callus 0.2–0.5 mm; glumes scabrid on keel, evenly hirtellous on back; leaf blades 2–5 mm wide; inflorescence up to 12 cm ..... 2. *P. indica*
2b. Spikelet callus 0.1–0.2 mm; glumes pectinate-ciliolate on keel, scaberulous-hirtellous in rows on lower back; leaf blades 4–7 mm wide; inflorescence up to 20 cm ..... 3. *P. hordeiformis*

1. Perotis rara R. Brown, Prodr. 172. 1810.

大花茅根 da hua mao gen

Diplachyrium rarum (R. Brown) Nees; *Perotis longiflora* Nees; *P. macrantha* Honda; *P. patula* Nees; *Saccharum rarum* (R. Brown) Poiret.

Annual or short-lived perennial. Culms loosely tufted, decumbent at base, 15–40 cm tall. Leaf sheaths glabrous; leaf blades lanceolate to narrowly ovate, flat or margins involute, tough, 1.5–5 cm, 2–5 mm wide, glaucous, glabrous, margins spiny-scabrous, pectinate at base, apex acute. Inflorescence up to 20 cm; spikelets laxly arranged, horizontally spreading, lightly reflexed at maturity; rachis scaberulous-hirtellous. Spikelets 3.5–4.5 mm (excluding awns); basal callus 0.5–1.5 mm, narrowly obconical, flattened, sometimes laterally pubescent; glumes linear-lanceolate, back evenly scaberulous-hirtellous with short white hairs, midvein scabrous with longer prickles toward awn, apex gradually tapering into awn; awn 1–2.5 cm; lemma 1.2–1.5 mm. Anthers ca. 0.6 mm. Caryopsis terete, subulate, ca. 2.5 mm. Fl. and fr. Jun–Nov.

Sandy seashores. Fujian, Guangdong, Guangxi, Hainan, Taiwan [New Guinea, Philippines, Thailand, Vietnam; Australia].

This species is at the northern limit of its range in S China, and can be distinguished by its much more loosely arranged inflorescence of very narrow spikelets, with the tips drawn out into longer awns.

2. Perotis indica (Linnaeus) O. Kuntze, Revis. Gen. Pl. 2: 787. 1891.

茅根 mao gen

Anthoxanthum indicum Linnaeus, Sp. Pl. 1: 28. 1753; *Saccharum spicatum* Linnaeus.

Annual. Culms loosely tufted, erect or decumbent at base, 20–30 cm tall. Leaf sheaths usually glabrous; leaf blades lanceolate to narrowly ovate, flat or margins involute, tough, 2–4 cm, 2–5 mm wide, glaucous, glabrous, margins spiny-scabrous especially near base, apex acute; ligule ca. 0.5 mm. Inflorescence up to 12 cm; spikelets usually densely arranged, ascending or horizontally spreading; rachis scabrous. Spikelets 1.5–2.5 mm (excluding awns); basal callus 0.2–0.5 mm, subacute; glumes narrowly lanceolate, back uniformly hirtellous with short white

hairs, midvein scabrous, apex obtuse, clearly demarcated from awn; awn 1–1.5 cm; lemma 0.5–1 mm. Anthers ca. 0.3 mm. Caryopsis terete, narrowly ellipsoid, 1–1.8 mm.

Stream banks, roadsides, other weedy places, on sandy soil. Guangdong, Hainan, Shandong, Taiwan, Yunnan [Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam; Africa (probably introduced), Australia (Queensland)].

3. Perotis hordeiformis Nees in Hooker & Arnott, Bot. Beechey Voy. 248. 1838.

麦穗茅根 mai sui mao gen

Perotis chinensis Gandoger.

Annual or short-lived perennial. Culms loosely tufted, erect or decumbent at base, 25–40 cm tall. Leaf sheaths glabrous; leaf blades lanceolate to narrowly ovate, 2–4 cm, 4–7 mm wide, glabrous, margins spiny-scabrous or loosely ciliate near base; ligule ca. 0.5 mm. Inflorescence up to 20 cm; spikelets usually densely arranged, ascending or horizontally spreading; rachis scabrous. Spikelets 1.5–2.5 mm (excluding awns); basal callus 0.1–0.2 mm, obtuse; glumes narrowly lanceolate, back scaberulous-hirtellous in rather indistinct close rows (most obvious toward lemma base), midvein pectinate-ciliolate, apex abruptly acute, clearly demarcated from awn; awn 0.5–1.5 cm. Anthers ca. 0.3 mm. Caryopsis terete, narrowly ellipsoid, ca. 1.5 mm. Fl. and fr. summer and autumn. $2n = 40$.

Sandy places, along seashores. Guangdong, Hebei, Jiangsu, Yunnan [India, Indonesia, Malaysia, Nepal, Myanmar, Pakistan, Sri Lanka, Thailand].

This species is very close to *Perotis indica* and is sometimes included within it. No single character by itself is reliable for separating the two, but the combination of characters given in the key will usually suffice.

24. Tribe **PANICEAE**

黍族 shu zu

Chen Shouliang (陈守良); Sylvia M. Phillips, Stephen A. Renvoize

Perennial or annual. Leaf blades usually linear or lanceolate; ligule membranous, a line of hairs, or a short membrane with ciliate fringe (rarely absent in some *Echinochloa*). Inflorescence variable, an open to spikelike panicle or composed of unilateral racemes, these digitate or spread along a cental axis; spikelets single, paired or clustered, sometimes supported by spines or bristles. Spikelets all alike (sexes separate in *Spinifex* and *Thuarea*), florets 2, without a rachilla extension, lower floret staminate or barren, upper floret bisexual, spikelets dorsally or infrequently lightly laterally compressed, falling entire, usually awnless; glumes membranous or herbaceous, lower glume usually shorter than the spikelet and sometimes very small or rudimentary, upper glume often as long as the spikelet; lower lemma usually as long as the spikelet and resembling the upper glume, with or without a palea; upper floret commonly indurated, tightly enclosing the caryopsis, lemma margins narrow and inrolled or broad and hyaline. Caryopsis with a large embryo 1/3–1/2 its length, hilum punctiform (rarely linear in *Acroceras*, *Oplismenus*, and some *Panicum*). Leaf anatomy: mixed, including non-Kranz, Kranz MS, and Kranz PS types. $x = 9$, occasionally 10 (rarely other numbers reported).

About 100 genera and ca. 2000 species: tropical and subtropical regions of the world, extending into temperate regions especially in North America; 27 genera (one endemic, two introduced) and 145 species (16 endemic, 12 introduced) in China.

The *Paniceae* are a distinctive tribe on account of the uniform pattern of deciduous, 2-flowered spikelets with a staminate or barren lower floret and an indurated, fertile upper floret enclosing the caryopsis.

1a. Plants dioecious; female inflorescence a large globose spiny head ..... 179. *Spinifex*
1b. Plants bisexual; inflorescence not as above.
2a. Spikelets of 2 kinds, the upper staminate portion of the raceme folding over 1–2 bisexual spikelets ..... 168. *Thuarea*
2b. Spikelets all alike.
3a. Spikelets (at least some of them) subtended by bristles or a spiny involucre; or raceme rachis prolonged into a bristle or short point beyond the uppermost spikelet.
4a. Inflorescence of racemes, only the uppermost spikelet of each raceme subtended by a bristle or short (often inconspicuous) point.
5a. Racemes ending in a long bristle; upper glume acuminate-aristate ..... 176. *Pseudoraphis*
5b. Racemes ending in an inconspicuous point; upper glume not awned.
6a. Racemes very short, sunk in pockets on the broad or thick inflorescence axis; upper lemma smooth ..... 173. *Stenotaphrum*
6b. Racemes not sunk in pockets, inflorescence axis slender; upper lemma rugose or granulate ..... 172. *Paspalidium*
4b. Inflorescence paniculate, often spikelike, all or many of the spikelets subtended by bristles or a spiny involucre.
7a. Bristles persisting on the axis after the spikelets have fallen ..... 171. *Setaria*
7b. Bristles or spines falling as involucres around the spikelets.
8a. Involucral bristles slender, free to the base ..... 177. *Pennisetum*
8b. Involucral bristles and spines flattened and connate below, forming a cup ..... 178. *Cenchrus*
3b. Spikelets not subtended by bristles; or raceme rachis terminating in a spikelet.
9a. Inflorescence an open, contracted or spikelike panicle; pedicels usually all slender and distinct.